

**CPC****COOPERATIVE PATENT CLASSIFICATION****F23D****BURNERS** (generating combustion products of high pressure or high velocity [F23R](#))**F23D 1/00****Burners for combustion of pulverulent fuel** (disposition of burners [F23C](#))**F23D 1/005**

- . {burning a mixture of pulverulent fuel delivered as a slurry, i.e. comprising a carrying liquid (preparing slurries [F23K 1/02](#))}

**F23D 1/02**

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

**F23D 1/04**

- . Burners producing cylindrical flames without centrifugal action

**F23D 1/06**

- . Burners producing sheet flames

**Combustion of a liquid****F23D 3/00****Burner using capillary action****F23D 3/02**

- . Wick burners

**F23D 3/04**

- .. with flame spreaders ([F23D 3/12](#) takes precedence)

**F23D 3/06**

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

**F23D 3/08**

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

**F23D 3/10**

- .. Blue-flame burners

**F23D 3/12**

- ... with flame spreaders

**F23D 3/14**

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

**F23D 3/16**

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

**F23D 3/18**

- .. Details of wick burners

**F23D 3/20**

- ... Flame spreaders

**F23D 3/22**

- ... Devices for mixing evaporated fuel with air

**F23D 3/24**

- ... Carriers for wicks

**F23D 3/26**

- .... Safety devices thereon

**F23D 3/28**

- ... Wick-adjusting devices

**F23D 3/30**

- .... directly engaging with the wick

**F23D 3/32**

- .... engaging with a tube carrying the wick

**F23D 3/34**

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

**F23D 3/36**

- ... Devices for trimming wicks

**F23D 3/38**

- ... Devices for replacement of wicks

**F23D 3/40**

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

**F23D 5/00****Burners in which liquid fuel evaporates in the combustion space, with or without chemical conversion of evaporated fuel****F23D 5/02**

- . the liquid forming a pool, e.g. bowl-type evaporators, dish-type evaporators

**F23D 5/04**

- .. Pot-type evaporators, i.e. using a partially-enclosed combustion space

**F23D 5/045**

- ... {with forced draft}

F23D 5/06	<ul style="list-style-type: none"> <li>the liquid forming a film on one or more plane or convex surfaces</li> </ul>
F23D 5/08	<ul style="list-style-type: none"> <li>on cascaded surfaces</li> </ul>
F23D 5/10	<ul style="list-style-type: none"> <li>on grids</li> </ul>
F23D 5/12	<ul style="list-style-type: none"> <li>Details</li> </ul>
F23D 5/123	<ul style="list-style-type: none"> <li>{Inserts promoting evaporation}</li> </ul>
F23D 5/126	<ul style="list-style-type: none"> <li>{Catalytic elements}</li> </ul>
F23D 5/14	<ul style="list-style-type: none"> <li>Maintaining predetermined amount of fuel in evaporator</li> </ul>
F23D 5/16	<ul style="list-style-type: none"> <li>Safety devices</li> </ul>
F23D 5/18	<ul style="list-style-type: none"> <li>Preheating devices</li> </ul>
<b>F23D 7/00</b>	<b>Burners in which drops of liquid fuel impinge on a surface</b>
<b>F23D 9/00</b>	<b>Burners in which a stream of liquid fuel impinges intermittently on a hot surface</b>
<b>F23D 11/00</b>	<b>Burners using a direct spraying action of liquid droplets or vaporised liquid into the combustion space</b> (spraying in general <a href="#">B05B</a> , <a href="#">B05D</a> )
F23D 11/001	<ul style="list-style-type: none"> <li>{spraying nozzle combined with forced draft fan in one unit (nozzles per se <a href="#">F23D 11/38</a>)}</li> </ul>
F23D 11/002	<ul style="list-style-type: none"> <li>{spraying nozzle arranged within furnace openings (refractory bricks or blocks specially shaped for burner openings <a href="#">F23M 5/025</a>)}</li> </ul>
F23D 11/004	<ul style="list-style-type: none"> <li>{for producing radiant heat}</li> </ul>
F23D 11/005	<ul style="list-style-type: none"> <li>{with combinations of different spraying or vaporising means}</li> </ul>
F23D 11/007	<ul style="list-style-type: none"> <li>{combination of means covered by sub-groups <a href="#">F23D 11/10</a> and <a href="#">F23D 11/24</a>}</li> </ul>
F23D 11/008	<ul style="list-style-type: none"> <li>{combination of means covered by sub-groups <a href="#">F23D 5/00</a> and <a href="#">F23D 11/00</a>}</li> </ul>
F23D 11/02	<ul style="list-style-type: none"> <li>the combustion space being a chamber substantially at atmospheric pressure</li> </ul>
F23D 11/04	<ul style="list-style-type: none"> <li>the spraying action being obtained by centrifugal action</li> </ul>
F23D 11/06	<ul style="list-style-type: none"> <li>using a horizontal shaft</li> </ul>
F23D 11/08	<ul style="list-style-type: none"> <li>using a vertical shaft</li> </ul>
F23D 11/10	<ul style="list-style-type: none"> <li>the spraying being induced by a gaseous medium, e.g. water vapour</li> </ul>
F23D 11/101	<ul style="list-style-type: none"> <li>{medium and fuel meeting before the burner outlet}</li> </ul>
F23D 11/102	<ul style="list-style-type: none"> <li>{in an internal mixing chamber}</li> </ul>
F23D 11/103	<ul style="list-style-type: none"> <li>{with means creating a swirl inside the mixing chamber}</li> </ul>
F23D 11/104	<ul style="list-style-type: none"> <li>{intersecting at a sharp angle, e.g. Y-jet atomiser}</li> </ul>
F23D 11/105	<ul style="list-style-type: none"> <li>{at least one of the fluids being submitted to a swirling motion}</li> </ul>
F23D 11/106	<ul style="list-style-type: none"> <li>{medium and fuel meeting at the burner outlet}</li> </ul>
F23D 11/107	<ul style="list-style-type: none"> <li>{at least one of both being subjected to a swirling motion}</li> </ul>
F23D 11/108	<ul style="list-style-type: none"> <li>{medium and fuel intersecting downstream of the burner outlet}</li> </ul>
F23D 11/12	<ul style="list-style-type: none"> <li>characterised by the shape or arrangement of the outlets from the nozzle</li> </ul>
F23D 11/14	<ul style="list-style-type: none"> <li>with a single outlet, e.g. slit</li> </ul>
F23D 11/16	<ul style="list-style-type: none"> <li>in which an emulsion of water and fuel is sprayed</li> </ul>
F23D 11/18	<ul style="list-style-type: none"> <li>the gaseous medium being water vapour generated at the nozzle</li> </ul>

- F23D 11/20 . . . the water vapour being superheated
  - F23D 11/22 . . the gaseous medium being vaporised fuel, e.g. for a soldering lamp, {or other gaseous fuel}
  - F23D 11/24 . by pressurisation of the fuel before a nozzle through which it is sprayed by a substantial pressure reduction into a space
  - F23D 11/26 . . with provision for varying the rate at which the fuel is sprayed
  - F23D 11/28 . . . with flow-back of fuel at the burner, e.g. using by-pass
  - F23D 11/30 . . . with return feed of uncombusted sprayed fuel to reservoir
  - F23D 11/32 . by electrostatic means
  - F23D 11/34 . by ultrasonic means {or other kinds of vibrations}
  - F23D 11/345 . . {with vibrating atomiser surfaces}
  - F23D 11/36 . Details {e.g. burner cooling means, noise reduction means}
  - F23D 11/38 . . Nozzles (nozzles in general [B05B](#)); Cleaning devices therefor
  - F23D 11/383 . . . {with swirl means}
  - F23D 11/386 . . . {Nozzle cleaning}
  - F23D 11/40 . . Mixing tubes [or chambers]; Burner heads
  - F23D 11/402 . . . {Mixing chambers downstream of the nozzle}
  - F23D 11/404 . . . {Flame tubes (not forming part of the burner [F23M 9/06](#))}
  - F23D 11/406 . . . {Flame stabilising means, e.g. flame holders}
  - F23D 11/408 . . . {Flow influencing devices in the air tube}
  - F23D 11/42 . . Starting devices ([igniting F23Q](#))
  - F23D 11/44 . . Preheating devices; Vaporising devices ([vaporising devices per se F23K 5/22](#))
  - F23D 11/441 . . . {Vaporizing devices incorporated with burners}
  - F23D 11/443 . . . . {heated by the main burner flame}
  - F23D 11/445 . . . . . {the flame and the vaporiser not coming into direct contact}
  - F23D 11/446 . . . . {heated by an auxiliary flame}
  - F23D 11/448 . . . . {heated by electrical means}
  - F23D 11/46 . . Devices on the vaporiser for controlling the feeding of the fuel
- F23D 14/00 Burners for combustion of a gas, e.g. of a gas stored under pressure as a liquid**
- F23D 14/02 . Premix gas burners, i.e. in which gaseous fuel is mixed with combustion air upstream of the combustion zone
  - F23D 14/04 . . induction type, e.g. Bunsen burner, {(atmospheric or aerated gas burner)}
  - F23D 14/045 . . . {with a plurality of burner bars assembled together, e.g. in a grid-like arrangement}
  - F23D 14/06 . . . with radial outlets at the burner head
  - F23D 14/065 . . . . {with injector axis inclined to the burner head axis}
  - F23D 14/08 . . . with axial outlets at the burner head
  - F23D 14/085 . . . . {with injector axis inclined to the burner head axis}
  - F23D 14/10 . . . with elongated tubular burner head
  - F23D 14/105 . . . . {with injector axis parallel to the burner head axis}

- F23D 14/12 . Radiant burners
- F23D 14/125 . . {heating a wall surface to incandescence}
- F23D 14/14 . . using screens or perforated plates
- F23D 14/145 . . . {the burner plate being a screen}
- F23D 14/16 . . using permeable blocks
- F23D 14/18 . . using catalysis for flameless combustion
- F23D 14/20 . Non-premix gas burners, i.e. in which gaseous fuel is mixed with combustion air on arrival at the combustion zone ([F23D 14/30 to F23D 14/44 take precedence](#))
- F23D 14/22 . . with separate air and gas feed ducts, e.g. with ducts running parallel or crossing each other
- F23D 14/24 . . . at least one of the fluids being submitted to a swirling motion
- F23D 14/26 . with provision for a retention flame ([pilot flame igniters F23Q 9/00](#))
- F23D 14/28 . in association with a gaseous fuel source, e.g. acetylene generator, or a container for liquefied gas
- F23D 14/30 . Inverted burners, e.g. for illumination
- F23D 14/32 . using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air ([F23D 14/38 takes precedence](#))
- F23D 14/34 . Burners specially adapted for use with means for pressurising the gaseous fuel or the combustion air ([F23D 14/38 takes precedence](#))
- F23D 14/36 . . in which the compressor and burner form a single unit
- F23D 14/38 . Torches, e.g. for cutting, brazing, welding or heating ({[nozzles for torches F23D 14/52](#)})
- F23D 14/40 . . for welding ([F23D 14/44 takes precedence](#))
- F23D 14/42 . . for cutting ([F23D 14/44 takes precedence](#))
- F23D 14/44 . . for use under water
- F23D 14/46 . Details {e.g. noise reduction means}
- F23D 14/465 . . {for torches ([F23D 14/52 takes precedence](#))}
- F23D 14/48 . . Nozzles ({[injectors for mixing devices F23D 14/64](#)}; for spraying or coating [B05B](#))
- F23D 14/50 . . . Cleaning devices therefor
- F23D 14/52 . . . for torches; for blow-pipes
- F23D 14/54 . . . . for cutting or welding metal
- F23D 14/56 . . . for spreading the flame over an area, e.g. for desurfacing of solid material, for surface hardening, for heating workpieces, ([scarfing by applying flames B23K 7/00](#))
- F23D 14/58 . . . characterised by the shape or arrangement of the outlet or outlets from the nozzle, e.g. of annular configuration
- F23D 14/583 . . . . {of elongated shape, e.g. slits}
- F23D 14/586 . . . . . {formed by a set of sheets, strips, ribbons or the like}
- F23D 14/60 . . Devices for simultaneous control of gas and combustion air ([regulation of combustion in general F23N](#))
- F23D 14/62 . . Mixing devices; Mixing tubes
- F23D 14/64 . . . with injectors
- F23D 14/66 . . Preheating the combustion air or gas

F23D 14/68	..	Treating the combustion air or gas, e.g. by filtering, by moistening ( <a href="#">in general B01</a> )
F23D 14/70	..	Baffles or like flow-disturbing devices
F23D 14/72	..	Safety devices, e.g. operative in case of failure of gas supply ( <a href="#">protection or supervision of pipe-line systems F17D 5/00</a> )
F23D 14/725	...	{ <a href="#">Protection against flame failure by using flame detection devices (pilot flame igniters with interlock with main fuel supply F23Q 9/08)</a> }
F23D 14/74	...	Preventing flame lift-off ( <a href="#">F23D 14/70 takes precedence</a> )
F23D 14/76	...	Protecting flame and burner parts
F23D 14/78	...	Cooling burner parts
F23D 14/80	...	Selection of a non-toxic gas
F23D 14/82	...	Preventing flashback or blowback ( <a href="#">F23D 14/70 takes precedence</a> ; {by use of a retention flame <a href="#">F23D 14/26</a> }; in gas feed lines <a href="#">A62C 4/02</a> )
F23D 14/825	....	{ <a href="#">using valves</a> }
F23D 14/84	..	Flame spreading or otherwise shaping ( <a href="#">F23D 14/70 takes precedence</a> )

#### **Other burners**

<b>F23D 17/00</b>	<b>Burners for combustion conjointly or alternatively of gaseous or liquid or pulverulent fuel</b>
F23D 17/002	. { <a href="#">gaseous or liquid fuel</a> }
F23D 17/005	. { <a href="#">gaseous or pulverulent fuel</a> }
F23D 17/007	. { <a href="#">liquid or pulverulent fuel</a> }
<b>F23D 23/00</b>	<b>Assemblies of two or more burners</b> ( <a href="#">gas burners with provision for a retention flame F23D 14/26</a> ; <a href="#">disposition of burners F23C</a> ; for industrial furnaces <a href="#">F27</a> )
<b>F23D 91/00</b>	<b>{<a href="#">Burners specially adapted for specific applications, not otherwise provided for</a>}</b>
	<b><u>NOTE</u></b>
	{ <a href="#">Combinations of spraying or vaporising means covered by sub-groups F23D 5/00 and F23D 91/00 are classified in F23D 11/008</a> }
F23D 91/02	. { <a href="#">for use in particular heating operations</a> }
F23D 91/04	.. { <a href="#">for heating liquids, e.g. for vaporising or concentrating</a> }
<b>F23D 99/00</b>	<b>Subject matter not provided for in other groups of this subclass</b>

<b>F23D 2200/00</b>	<b>Burners for fluid fuel</b>
<b>F23D 2201/00</b>	<b>Burners adapted for particulate solid or pulverulent fuels</b>
F23D 2201/10	. Nozzle tips
F23D 2201/101	.. tiltable
F23D 2201/20	. Fuel flow guiding devices
F23D 2201/30	. Wear protection

**F23D 2202/00****Liquid fuel burners****F23D 2203/00****Gaseous fuel burners**

F23D 2203/002

. Radiant burner mixing tubes

F23D 2203/005

. Radiant burner heads

F23D 2203/007

. Mixing tubes, air supply regulation

F23D 2203/10

. Flame diffusing means

F23D 2203/101

.. characterised by surface shape

F23D 2203/1012

... tubular

F23D 2203/1015

... spherical

F23D 2203/1017

... curved

F23D 2203/102

.. using perforated plates

F23D 2203/1023

... with specific free passage areas

F23D 2203/1026

... with slotshaped openings

F23D 2203/103

.. using screens

F23D 2203/104

.. Grids, e.g. honeycomb grids

F23D 2203/105

.. Porous plates

F23D 2203/1055

... with a specific void range

F23D 2203/106

.. Assemblies of different layers

F23D 2203/107

.. coated with catalysts

F23D 2203/108

.. with stacked sheets or strips forming the outlets

**F23D 2204/00****Burners adapted for simultaneous or alternative combustion having more than one fuel supply**

F23D 2204/10

. gaseous and liquid fuel

F23D 2204/20

. gaseous and pulverulent fuel

F23D 2204/30

. liquid and pulverulent fuel

**F23D 2205/00****Assemblies of two or more burners, irrespective of fuel type****F23D 2206/00****Burners for specific applications**

F23D 2206/0005

. Liquid fuel burners adapted for use in locomotives

F23D 2206/001

. Liquid fuel burners adapted for use in automobile steam boilers

F23D 2206/0015

. Gas burners for use in retort furnaces

F23D 2206/0021

. Gas burners for use in furnaces of the reverberatory, muffle or crucible type

F23D 2206/0026

. Vapour burners adapted for use in illumination devices

F23D 2206/0031

. Liquid fuel burners adapted for use in welding lamps

F23D 2206/0036

.. Liquid fuel burners adapted for use in welding and cutting metals

F23D 2206/0042

. Vapour burners for illumination by radiation, with vaporiser heated by an auxiliary flame

F23D 2206/0047

. Vapour burners for illumination by radiation, with vaporiser heated by the main flame

F23D 2206/0052	<ul style="list-style-type: none"> <li>. Vapour burners for illumination by radiation, with vaporiser heated by conduction</li> </ul>
F23D 2206/0057	<ul style="list-style-type: none"> <li>. Liquid fuel burners adapted for use in illumination and heating</li> </ul>
F23D 2206/0063	<ul style="list-style-type: none"> <li>. . Catalytic burners adapted for use in illumination and heating</li> </ul>
F23D 2206/0068	<ul style="list-style-type: none"> <li>. Gas burners for illumination with slot type nozzles</li> </ul>
F23D 2206/0073	<ul style="list-style-type: none"> <li>. Gas burners for illumination with Argand nozzles</li> </ul>
F23D 2206/0078	<ul style="list-style-type: none"> <li>. Gas burners adapted for use in lamps with preheated air</li> </ul>
F23D 2206/0084	<ul style="list-style-type: none"> <li>. Gas burners adapted for use in ceiling and wagon lamps</li> </ul>
F23D 2206/0089	<ul style="list-style-type: none"> <li>. Gas burners for illumination using acetylene as a fuel</li> </ul>
F23D 2206/0094	<ul style="list-style-type: none"> <li>. Gas burners adapted for use in illumination and heating</li> </ul>
F23D 2206/10	<ul style="list-style-type: none"> <li>. Turbines</li> </ul>
<b>F23D 2207/00</b>	<b>Ignition devices associated with burner</b>
<b>F23D 2208/00</b>	<b>Control devices associated with burners</b>
F23D 2208/005	<ul style="list-style-type: none"> <li>. Controlling air supply in radiant gas burners</li> </ul>
F23D 2208/10	<ul style="list-style-type: none"> <li>. Sensing devices</li> </ul>
<b>F23D 2209/00</b>	<b>Safety arrangements</b>
F23D 2209/10	<ul style="list-style-type: none"> <li>. Flame flashback</li> </ul>
F23D 2209/20	<ul style="list-style-type: none"> <li>. Flame lift-off / stability</li> </ul>
F23D 2209/30	<ul style="list-style-type: none"> <li>. Purging</li> </ul>
<b>F23D 2210/00</b>	<b>Noise abatement</b>
F23D 2210/101	<ul style="list-style-type: none"> <li>. using noise dampening material</li> </ul>
<b>F23D 2211/00</b>	<b>Thermal dilatation prevention or compensation</b>
<b>F23D 2212/00</b>	<b>Burner material specifications</b>
F23D 2212/005	<ul style="list-style-type: none"> <li>. Radiant gas burners made of specific materials, e.g. rare earths</li> </ul>
F23D 2212/10	<ul style="list-style-type: none"> <li>. ceramic</li> </ul>
F23D 2212/101	<ul style="list-style-type: none"> <li>. . Foam, e.g. reticulated</li> </ul>
F23D 2212/103	<ul style="list-style-type: none"> <li>. . Fibres</li> </ul>
F23D 2212/105	<ul style="list-style-type: none"> <li>. . Particles</li> </ul>
F23D 2212/20	<ul style="list-style-type: none"> <li>. metallic</li> </ul>
F23D 2212/201	<ul style="list-style-type: none"> <li>. . Fibres</li> </ul>
F23D 2212/203	<ul style="list-style-type: none"> <li>. . Particles</li> </ul>
<b>F23D 2213/00</b>	<b>Burner manufacture specifications</b>
<b>F23D 2214/00</b>	<b>Cooling</b>
<b>F23D 2700/00</b>	<b>TBD</b>
F23D 2700/001	<ul style="list-style-type: none"> <li>. Air supply for wick burners</li> </ul>
F23D 2700/002	<ul style="list-style-type: none"> <li>. Wick burners without flame spreaders or burner hood</li> </ul>

- F23D 2700/003 . Wick burners with flame spreaders or burner hood
- F23D 2700/004 . Inverted wick burners, wick burners using preheated air
- F23D 2700/005 . Wick burners using alcohol as a fuel
- F23D 2700/006 . Wick burners using oil as a fuel
- F23D 2700/009 . Details of blue flame wick burners
- F23D 2700/01 . Blue flame burners without flame spreader or burner hood
- F23D 2700/011 . Blue flame burners with flame spreader or burner hood without a bead at the wick carrying tube
- F23D 2700/012 . Blue flame burners with flame spreader or burner hood with a bead at the wick carrying tube
- F23D 2700/013 . Blue flame burners with flame on one side only without a bead at the wick carrying tube
- F23D 2700/014 . Blue flame burners with flame on one side only and a bead at the wick carrying tube
- F23D 2700/015 . Tubes carrying the wick
- F23D 2700/016 . Safety devices for wick carrying tubes
- F23D 2700/017 . Wick adjusting devices directly engaging the wick
- F23D 2700/018 . Wick adjusting devices engaging the tube carrying the wick
- F23D 2700/019 . Wick stop devices and wick fixing devices
- F23D 2700/02 . Devices for mounting the wick to the carrier
- F23D 2700/021 . Burners in which the gas produced in the wick is not burned instantaneously
- F23D 2700/022 . Burners using carburetted gas
- F23D 2700/023 . Gasifying and evaporating devices
- F23D 2700/024 . Nozzles and cleaning devices therefor
- F23D 2700/025 . Mixing tubes and burner heads
- F23D 2700/026 . Preheating devices, starting devices
- F23D 2700/027 . Vaporisers with devices for controlling the feeding of the fuel
- F23D 2700/03 . Alcohol vapour burners
- F23D 2700/031 . Vapour burners where the vaporiser is heated by an auxiliary flame
- F23D 2700/032 . Vapour burners where the vaporiser is heated by the main flame itself
- F23D 2700/033 . Vapour burners where the vaporiser is heated by conduction
  
- F23D 2900/00** **Special features of, or arrangements for burners using fluid fuels or solid fuels suspended in a carrier gas**
- F23D 2900/00001 . local catalytic coatings applied to burner surfaces
- F23D 2900/00002 . Cleaning burner parts, e.g. burner tips
- F23D 2900/00003 . Fuel or fuel-air mixtures flow distribution devices upstream of the outlet
- F23D 2900/00004 . Burners specially adapted for generating high luminous flames, e.g. yellow for fuel-rich mixtures
- F23D 2900/00006 . Liquid fuel burners using pure oxygen or O<sub>2</sub>-enriched air as oxidant ([for gaseous fuels F23D 14/32](#))
- F23D 2900/00008 . Burner assemblies with diffusion and premix modes, i.e. dual mode burners
- F23D 2900/00011 . Burner with means for propagating the flames along a wall surface



- F23D 2900/00012 . Liquid or gas fuel burners with flames spread over a flat surface, either premix or non-premix type, e.g. "Flächenbrenner"
- F23D 2900/00013 . . with means for spreading the flame in a fan or fishtail shape over a melting bath
- F23D 2900/00014 . Pilot burners specially adapted for ignition of main burners in furnaces or gas turbines
- F23D 2900/00015 . Pilot burners specially adapted for low load or transient conditions, e.g. for increasing stability
- F23D 2900/00016 . Preventing or reducing deposit build-up on burner parts, e.g. from carbon
- F23D 2900/00017 . Assembled burner modules
- F23D 2900/00018 . Means for protecting parts of the burner, e.g. ceramic lining outside of the flame tube
- F23D 2900/00019 . Outlet manufactured from knitted fibres
- F23D 2900/01001 . Pulverised solid fuel burner with means for swirling the fuel-air mixture
- F23D 2900/03081 . Catalytic wick burners
- F23D 2900/03082 . Wick made of specific material, e.g. ceramic
- F23D 2900/05001 . Burner using gel type fuel
- F23D 2900/05002 . Use of porous members to convert liquid fuel into vapor
- F23D 2900/11001 . Impinging-jet injectors or jet impinging on a surface
- F23D 2900/11002 . Liquid fuel burners with more than one nozzle
- F23D 2900/11101 . Pulverising gas flow impinging on fuel from pre-filming surface, e.g. lip atomizers
- F23D 2900/11401 . Flame intercepting baffles forming part of burner head
- F23D 2900/11402 . Airflow diaphragms at burner nozzle
- F23D 2900/11403 . Flame surrounding tubes in front of burner nozzle
- F23D 2900/14 . Special features of gas burners
- F23D 2900/14001 . . Sealing or support of burner plate borders
- F23D 2900/14002 . . of premix or non premix types, specially adapted for the combustion of low heating value [LHV] gas
- F23D 2900/14003 . . with more than one nozzle
- F23D 2900/14004 . . with radially extending gas distribution spokes
- F23D 2900/14005 . . Rotary gas burner
- F23D 2900/14021 . . Premixing burners with swirling or vortices creating means for fuel or air
- F23D 2900/14041 . . Segmented or straight line assembly of burner bars
- F23D 2900/14042 . . Star shaped assembly of burner bars or arms
- F23D 2900/14061 . . for cooking ranges having a coated burner cap
- F23D 2900/14062 . . for cooking ranges having multiple flame rings
- F23D 2900/14063 . . for cooking ranges having one flame ring fed by multiple venturis
- F23D 2900/14064 . . Burner heads of non circular shape
- F23D 2900/1412 . . for radiant burners
- F23D 2900/14121 . . . with radiation intensifying means
- F23D 2900/14122 . . . with extra radiation grids, e.g. strips or rods
- F23D 2900/14123 . . . with radiation intensifying perforated plates
- F23D 2900/14124 . . . cooperating with refractory wall surfaces
- F23D 2900/14125 . . . with extra radiation screens, e.g. wires, threads or gauzes

- F23D 2900/14181 . . . Catalytic type with carbon containing radiating surface
- F23D 2900/14241 . . Post-mixing with swirling means
- F23D 2900/14381 . . Single operating member opening and closing fuel and oxidant supply valves in torches
- F23D 2900/14481 . . Burner nozzles incorporating flow adjusting means
- F23D 2900/14482 . . Burner nozzles incorporating a fluidic oscillator
- F23D 2900/14581 . . with outlets consisting of a bed of irregular particles, e.g. glass
- F23D 2900/14582 . . with outlets consisting of layers of spherical particles
- F23D 2900/14641 . . with gas distribution manifolds or bars provided with a plurality of nozzles
- F23D 2900/14642 . . with jet mixers with more than one gas injection nozzles or orifices for a single mixing tube
- F23D 2900/14681 . . Adding steam or water vapor to primary or secondary combustion air
- F23D 2900/14701 . . Swirling means inside the mixing tube or chamber to improve premixing
- F23D 2900/21 . Burners specially adapted for a particular use
  - F23D 2900/21001 . . for use in blast furnaces
  - F23D 2900/21002 . . for use in car heating systems
  - F23D 2900/21003 . . for heating or re-burning air or gas in a duct
  - F23D 2900/21004 . . for use in gas fed fireplaces
  - F23D 2900/21005 . . for flame deposition, e.g. FHD, flame hydrolysis deposition
  - F23D 2900/21006 . . for heating a catalyst in a car
  - F23D 2900/21007 . . for producing soot, e.g. nano particle soot