F23D  BURNERS (generating combustion products of high pressure or high velocity F23R)

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  Burners for combustion of pulverulent fuel

1/005  . (burning a mixture of pulverulent fuel delivered as a slurry, i.e. comprising a carrying liquid (preparing slurries F23K 1/02))

1/02  . Vortex burners, e.g. for cyclone-type combustion apparatus

1/04  . Burners producing cylindrical flames without centrifugal action

1/06  . Burners producing sheet flames

Combustion of a liquid

3/00  Burners using capillary action

3/02  . Wick burners

3/04  . . with flame spreaders (F23D 3/12 takes precedence)

3/06  . . Inverted wick burners, e.g. for illumination

3/08  . . characterised by shape, construction, or material, of wick

3/10  . . Blue-flame burners

3/12  . . with flame spreaders

3/14  . . with mixing of air and fuel vapour in a chamber before the flame

3/16  . . using candles (candles per se C11C)

3/18  . . Details of wick burners

3/20  . . Flame spreaders

3/22  . . Devices for mixing evaporated fuel with air

3/24  . . Carriers for wicks

3/26  . . . Safety devices thereon

3/28  . . . Wick-adjusting devices

3/30  . . . directly engaging with the wick

3/32  . . . engaging with a tube carrying the wick

3/34  . . . Wick stop devices; Wick-fixing devices

3/36  . . . Devices for trimming wicks

3/38  . . . Devices for replacement of wicks

3/40  . . . the capillary action taking place in one or more rigid porous bodies

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

5/02  . . the liquid forming a pool, e.g. bowl-type evaporators, dish-type evaporators

5/04  . . Pot-type evaporators, i.e. using a partially-enclosed combustion space

5/045  . . . {with forced draft}

5/06  . . the liquid forming a film on one or more plane or convex surfaces

5/08  . . on cascaded surfaces

5/10  . . on grids

5/12  . Details

5/123  . . {Inserts promoting evaporation}

5/126  . . {Catalytic elements}

5/14  . . Maintaining predetermined amount of fuel in evaporator

5/16  . . Safety devices

5/18  . . Preheating devices

7/00  Burners in which drops of liquid fuel impinge on a surface

9/00  Burners in which a stream of liquid fuel impinges intermittently on a hot surface

11/00  Burners using a direct spraying action of liquid droplets or vapourised liquid into the combustion space (spraying in general B05B, B05D)

11/001  . {spraying nozzle combined with forced draft fan in one unit (nozzles per se F23D 11/38)}

11/002  . {spraying nozzle arranged within furnace openings (refractory bricks or blocks specially shaped for burner openings F23M 5/025)}

11/004  . . {for producing radiant heat}

11/005  . . {with combinations of different spraying or vaporising means}

11/007  . . {combination of means covered by sub-groups F23D 11/10 and F23D 11/24}

11/008  . . {combination of means covered by sub-groups F23D 5/00 and F23D 11/00}

11/02  . . the combustion space being a chamber substantially at atmospheric pressure

11/04  . . the spraying action being obtained by centrifugal action

11/06  . . . using a horizontal shaft

11/08  . . . using a vertical shaft

11/10  . . . the spraying being induced by a gaseous medium, e.g. water vapour
Burning of a liquid stored under pressure as a liquid

14/00 Combustion of a liquid stored under pressure as a liquid

11/101 . . . [medium and fuel meeting before the burner outlet]
11/102 . . . [in an internal mixing chamber]
11/103 . . . . [with means creating a swirl inside the mixing chamber]
11/104 . . . . [intersecting at a sharp angle, e.g. Y-jet atomiser]
11/105 . . . . [at least one of the fluids being submitted to a swirling motion]
11/106 . . . . [medium and fuel meeting at the burner outlet]
11/107 . . . . [at least one of both being subjected to a swirling motion]
11/108 . . . . [medium and fuel intersecting downstream of the burner outlet]
11/12 . . . . characterised by the shape or arrangement of the outlets from the nozzle
11/14 . . . . with a single outlet, e.g. slit
11/16 . . . . in which an emulsion of water and fuel is sprayed
11/18 . . . . the gaseous medium being water vapour generated at the nozzle
11/20 . . . . the water vapour being superheated
11/22 . . . . the gaseous medium being vapourised fuel, e.g. for a soldering lamp [or other gaseous fuel]
11/24 . . . . by pressurisation of the fuel before a nozzle through which it is sprayed by a substantial pressure reduction into a space
11/26 . . . . with provision for varying the rate at which the fuel is sprayed
11/28 . . . . with flow-back of fuel at the burner, e.g. using by-pass
11/30 . . . . with return feed of uncombusted sprayed fuel to reservoir
11/32 . . . . by electrostatic means
11/34 . . . . by ultrasonic means [or other kinds of vibrations]
11/345 . . . . [with vibrating atomiser surfaces]
11/36 . . . . Details [e.g. burner cooling means, noise reduction means]
11/38 . . . . Nozzles (nozzles in general B05B); Cleaning devices therefor
11/383 . . . . [with swirl means]
11/386 . . . . [Nozzle cleaning]
11/40 . . . . Mixing tubes [or chambers]; Burner heads
11/402 . . . . [Mixing chambers downstream of the nozzle]
11/404 . . . . [Flame tubes (not forming part of the burner F23M 9/06)]
11/406 . . . . [ Flame stabilising means, e.g. flame holders]
11/408 . . . . [Flow influencing devices in the air tube]
11/42 . . . . Starting devices (igniting F23Q)
11/44 . . . . Preheating devices; Vaporising devices (vaporising devices per se F23K 5/22)
11/441 . . . . [Vaporizing devices incorporated with burners]
11/443 . . . . . . [heated by the main burner flame]
11/445 . . . . . . . . [ the flame and the vaporiser not coming into direct contact]
11/446 . . . . . . [heated by an auxiliary flame]
11/448 . . . . . . [heated by electrical means]
11/46 . . Devices on the vaporiser for controlling the feeding of the fuel

14/02 Premix gas burners, i.e. in which gaseous fuel is mixed with combustion air upstream of the combustion zone
14/04 . . . . induction type, e.g. Bunsen burner [(atmospheric or aerated gas burner)]
14/045 . . . . . . [with a plurality of burner bars assembled together, e.g. in a grid-like arrangement]
14/06 . . . . with radial outlets at the burner head
14/065 . . . . . . [with injector axis inclined to the burner head axis]
14/08 . . . . with axial outlets at the burner head
14/085 . . . . . . [with injector axis inclined to the burner head axis]
14/10 . . . . with elongated tubular burner head
14/105 . . . . [with injector axis parallel to the burner head axis]
14/12 . . . . Radiant burners
14/125 . . . . [heating a wall surface to incandescence]
14/14 . . . . using screens or perforated plates
14/145 . . . . [the burner plate being a screen]
14/16 . . . . using permeable blocks
14/18 . . . . using catalysis for flameless combustion
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 - F23D 14/44 take precedence)
14/22 . . . . with separate air and gas feed ducts, e.g. with ducts running parallel or crossing each other
14/24 . . . . at least one of the fluids being submitted to a swirling motion
14/26 . . . . with provision for a retention flame ( pilot flame igniters F23Q 9/00)
14/28 . . . . in association with a gaseous fuel source, e.g. acetylene generator, or a container for liquefied gas
14/30 . . . . Inverted burners, e.g. for illumination
14/32 . . . . using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air (F23D 14/38 takes precedence)
14/34 . . . . Burners specially adapted for use with means for pressurising the gaseous fuel or the combustion air (F23D 14/38 takes precedence)
14/36 . . . . in which the compressor and burner form a single unit
14/38 . . . . Torches, e.g. for cutting, brazing, welding or heating ([nozzles for torches F23D 14/52)]
14/40 . . . . for welding (F23D 14/44 takes precedence)
14/42 . . . . for cutting (F23D 14/44 takes precedence)
14/44 . . . . for use under water
14/46 . . . . Details [e.g. noise reduction means]
14/465 . . . . [for torches (F23D 14/52 takes precedence)]
14/48 . . . . Nozzles ([injectors for mixing devices F23D 14/64]; for spraying or coating B05B)
14/50 . . . . Cleaning devices therefor
14/52 . . . . for torches; for blow-pipes
14/54 . . . . . . . . [for cutting or welding metal]
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)
14/58 . . . . characterised by the shape or arrangement of the outlet or outlets from the nozzle, e.g. of annular configuration
14/583 . . . . . . [of elongated shape, e.g. slits]
Combustion of a liquid

F23D

14/586 . . . . . . . . {formed by a set of sheets, strips, ribbons or the like}
14/60 . . Devices for simultaneous control of gas and combustion air (regulation of combustion in general F23N)
14/62 . . Mixing devices; Mixing tubes
14/64 . . with injectors
14/66 . . Preheating the combustion air or gas
14/68 . . Treating the combustion air or gas, e.g. by filtering, by moistening (in general B01)
14/70 . . Baffles or like flow-disturbing devices
14/72 . . Safety devices, e.g. operative in case of failure of gas supply (protection or supervision of pipe-line systems F17D 5/00)
14/725 . . . . . . [Protection against flame failure by using flame detection devices (pilot flame igniters with interlock with main fuel supply F23Q 9/08)]
14/74 . . Preventing flame lift-off (F23D 14/70 takes precedence)
14/76 . . Protecting flame and burner parts
14/78 . . Cooling burner parts
14/80 . . Selection of a non-toxic gas
14/82 . . Preventing flashback or blowback (F23D 14/70 takes precedence; {by use of a retention flame F23D 14/26}; in gas feed lines A62C 4/02)
14/825 . . . . . . {[using valves]}
14/84 . . Flame spreading or otherwise shaping (F23D 14/70 takes precedence)

Other burners

17/00 Burners for combustion conjointly or alternatively of gaseous or liquid or pulverulent fuel
17/002 . . {gaseous or liquid fuel}
17/005 . . {gaseous or pulverulent fuel}
17/007 . . {liquid or pulverulent fuel}
23/00 Assemblies of two or more burners (gas burners with provision for a retention flame F23D 14/26; disposition of burners F23C; for industrial furnaces F27)
91/00 {Burners specially adapted for specific applications, not otherwise provided for}

NOTE

{Combinations of spraying or vapourising means covered by sub-groups F23D 5/00 and F23D 91/00 are classified in F23D 11/008}

91/02 . . {for use in particular heating operations}
91/04 . . {for heating liquids, e.g. for vapourising or concentrating}
99/00 Subject matter not provided for in other groups of this subclass

2200/00 Burners for fluid fuel
2201/00 Burners adapted for particulate solid or pulverulent fuels
2201/10 . . Nozzle tips
2201/101 . . tiltable
2201/20 . . Fuel flow guiding devices
2201/30 . . Wear protection
2202/00 Liquid fuel burners
2203/00 Gaseous fuel burners
2203/002 . . Radiant burner mixing tubes
2203/005 . . Radiant burner heads
2203/007 . . Mixing tubes, air supply regulation
2203/10 . . Flame diffusing means
2203/101 . . characterised by surface shape
2203/1012 . . tubular
2203/1015 . . spherical
2203/1017 . . curved
2203/1021 . . using perforated plates
2203/1023 . . with specific free passage areas
2203/1026 . . with slotshaped openings
2203/103 . . using screens
2203/104 . . Grids, e.g. honeycomb grids
2203/105 . . Porous plates
2203/1055 . . with a specific void range
2203/106 . . Assemblies of different layers
2203/107 . . coated with catalysts
2203/108 . . with stacked sheets or strips forming the outlets
2204/00 Burners adapted for simultaneous or alternative combustion having more than one fuel supply
2204/10 . . gaseous and liquid fuel
2204/20 . . gaseous and pulverulent fuel
2204/30 . . liquid and pulverulent fuel
2205/00 Assemblies of two or more burners, irrespective of fuel type
2206/00 Burners for specific applications
2206/0005 . . Liquid fuel burners adapted for use in locomotives
2206/001 . . Liquid fuel burners adapted for use in automobile steam boilers
2206/0015 . . Gas burners for use in retort furnaces
2206/0021 . . Gas burners for use in furnaces of the reverberatory, muffle or crucible type
2206/0026 . . Vapour burners adapted for use in illumination devices
2206/0031 . . Liquid fuel burners adapted for use in welding lamps
2206/0036 . . Liquid fuel burners adapted for use in welding and cutting metals
2206/0042 . . Vapour burners for illumination by radiation, with vapouriser heated by an auxiliary flame
2206/0047 . . Vapour burners for illumination by radiation, with vapouriser heated by the main flame
2206/0052 . . Vapour burners for illumination by radiation, with vapouriser heated by conduction
2206/0057 . . Liquid fuel burners adapted for use in illumination and heating
2206/0063 . . Catalytic burners adapted for use in illumination and heating
2206/0068 . . Gas burners for illumination with slot type nozzles
2206/0073 . . Gas burners for illumination with Argand nozzles
2206/0078 . . Gas burners adapted for use in lamps with preheated air
2206/0084 . . Gas burners adapted for use in ceiling and wagon lamps
2206/0089 . . Gas burners for illumination using acetylene as a fuel

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<td>. Flame intercepting baffles forming part of burner head</td>
</tr>
<tr>
<td>CPC</td>
<td>2900/11402</td>
<td>. Airflow diaphragms at burner nozzle</td>
</tr>
<tr>
<td>CPC</td>
<td>2900/11403</td>
<td>. Flame surrounding tubes in front of burner nozzle</td>
</tr>
<tr>
<td>CPC</td>
<td>2900/14</td>
<td>. Special features of gas burners</td>
</tr>
<tr>
<td>CPC</td>
<td>2900/14001</td>
<td>. Sealing or support of burner plate borders</td>
</tr>
<tr>
<td>CPC</td>
<td>2900/14002</td>
<td>. of premix or non premix types, specially adapted for the combustion of low heating value [LHV] gas</td>
</tr>
<tr>
<td>CPC</td>
<td>2900/14003</td>
<td>. with more than one nozzle</td>
</tr>
</tbody>
</table>
2900/14004 . . with radially extending gas distribution spokes
2900/14005 . . Rotary gas burner
2900/14021 . . Premixing burners with swirling or vortices creating means for fuel or air
2900/14041 . . Segmented or straight line assembly of burner bars
2900/14042 . . Star shaped assembly of burner bars or arms
2900/14061 . . for cooking ranges having a coated burner cap
2900/14062 . . for cooking ranges having multiple flame rings
2900/14063 . . for cooking ranges having one flame ring fed by multiple venturis
2900/14064 . . Burner heads of non circular shape
2900/1412 . . for radiant burners
2900/14121 . . with radiation intensifying means
2900/14122 . . with extra radiation grids, e.g. strips or rods
2900/14123 . . with radiation intensifying perforated plates
2900/14124 . . cooperating with refractory wall surfaces
2900/14125 . . with extra radiation screens, e.g. wires, threads or gauzes
2900/14181 . . Catalytic type with carbon containing radiating surface
2900/14241 . . Post-mixing with swirling means
2900/14381 . . Single operating member opening and closing fuel and oxidant supply valves in torches
2900/14481 . . Burner nozzles incorporating flow adjusting means
2900/14482 . . Burner nozzles incorporating a fluidic oscillator
2900/14581 . . with outlets consisting of a bed of irregular particles, e.g. glass
2900/14582 . . with outlets consisting of layers of spherical particles
2900/14641 . . with gas distribution manifolds or bars provided with a plurality of nozzles
2900/14642 . . with jet mixers with more than one gas injection nozzles or orifices for a single mixing tube
2900/14681 . . Adding steam or water vapor to primary or secondary combustion air
2900/14701 . . Swirling means inside the mixing tube or chamber to improve premixing
2900/21 . . Burners specially adapted for a particular use
2900/21001 . . for use in blast furnaces
2900/21002 . . for use in car heating systems
2900/21003 . . for heating or re-burning air or gas in a duct
2900/21004 . . for use in gas fed fireplaces
2900/21005 . . for flame deposition, e.g. FHD, flame hydrolysis deposition
2900/21006 . . for heating a catalyst in a car
2900/21007 . . for producing soot, e.g. nanoparticle soot