

CPC COOPERATIVE PATENT CLASSIFICATION

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

1/00	Burners for combustion of pulverulent fuel (disposition of burners F23C)	5/18	. . Preheating devices
1/005	. {burning a mixture of pulverulent fuel delivered as a slurry, i.e. comprising a carrying liquid (preparing slurries F23K 1/02)}	7/00	Burners in which drops of liquid fuel impinge on a surface
1/02	. Vortex burners, e.g. for cyclone-type combustion apparatus	9/00	Burners in which a stream of liquid fuel impinges intermittently on a hot surface
1/04	. Burners producing cylindrical flames without centrifugal action	11/00	Burners using a direct spraying action of liquid droplets or vaporised liquid into the combustion space (spraying in general B05B , B05D)
1/06	. Burners producing sheet flames	11/001	. {spraying nozzle combined with forced draft fan in one unit (nozzles per se F23D 11/38)}
Combustion of a liquid		11/002	. {spraying nozzle arranged within furnace openings (refractory bricks or blocks specially shaped for burner openings F23M 5/025)}
3/00	Burner using capillary action	11/004	. . {for producing radiant heat}
3/02	. Wick burners	11/005	. {with combinations of different spraying or vaporising means}
3/04	. . with flame spreaders (F23D 3/12 takes precedence)	11/007	. . {combination of means covered by sub-groups F23D 11/10 and F23D 11/24 }
3/06	. . Inverted wick burners, e.g. for illumination	11/008	. . {combination of means covered by sub-groups F23D 5/00 and F23D 11/00 }
3/08	. . characterised by shape, construction, or material, of wick	11/02	. the combustion space being a chamber substantially at atmospheric pressure
3/10	. . Blue-flame burners	11/04	. the spraying action being obtained by centrifugal action
3/12	. . . with flame spreaders	11/06	. . using a horizontal shaft
3/14	. . . with mixing of air and fuel vapour in a chamber before the flame	11/08	. . using a vertical shaft
3/16	. . using candles (candles per se C11C)	11/10	. the spraying being induced by a gaseous medium, e.g. water vapour
3/18	. . Details of wick burners	11/101	. . {medium and fuel meeting before the burner outlet}
3/20	. . . Flame spreaders	11/102	. . . {in an internal mixing chamber}
3/22	. . . Devices for mixing evaporated fuel with air	11/103	. . . . {with means creating a swirl inside the mixing chamber}
3/24	. . . Carriers for wicks	11/104	. . . {intersecting at a sharp angle, e.g. Y-jet atomiser}
3/26	. . . . Safety devices thereon	11/105	. . . {at least one of the fluids being submitted to a swirling motion}
3/28	. . . Wick-adjusting devices	11/106	. . {medium and fuel meeting at the burner outlet}
3/30	. . . . directly engaging with the wick	11/107	. . . {at least one of both being subjected to a swirling motion}
3/32	. . . . engaging with a tube carrying the wick	11/108	. . {medium and fuel intersecting downstream of the burner outlet}
3/34	. . . . Wick stop devices; Wick-fixing devices	11/12	. . characterised by the shape or arrangement of the outlets from the nozzle
3/36	. . . Devices for trimming wicks	11/14	. . . with a single outlet, e.g. slit
3/38	. . . Devices for replacement of wicks	11/16	. . in which an emulsion of water and fuel is sprayed
3/40	. the capillary action taking place in one or more rigid porous bodies	11/18	. . the gaseous medium being water vapour generated at the nozzle
5/00	Burners in which liquid fuel evaporates in the combustion space, with or without chemical conversion of evaporated fuel	11/20	. . . the water vapour being superheated
5/02	. the liquid forming a pool, e.g. bowl-type evaporators, dish-type evaporators	11/22	. . the gaseous medium being vaporised fuel, e.g. for a soldering lamp, {or other gaseous fuel}
5/04	. . Pot-type evaporators, i.e. using a partially-enclosed combustion space	11/24	. by pressurisation of the fuel before a nozzle through which it is sprayed by a substantial pressure reduction into a space
5/045	. . . {with forced draft}	11/26	. . with provision for varying the rate at which the fuel is sprayed
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		

- 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
- 14/00 Burners for combustion of a gas, e.g. of a gas stored under pressure as a liquid**
- 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}
- 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 vaporising 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 vaporising 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
2203/102	. . 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 vaporiser heated by an auxiliary flame
2206/0047	. Vapour burners for illumination by radiation, with vaporiser heated by the main flame
2206/0052	. Vapour burners for illumination by radiation, with vaporiser 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
2206/0094	. Gas burners adapted for use in illumination and heating
2206/10	. Turbines
2207/00	Ignition devices associated with burner
2208/00	Control devices associated with burners
2208/005	. Controlling air supply in radiant gas burners
2208/10	. Sensing devices
2209/00	Safety arrangements
2209/10	. Flame flashback
2209/20	. Flame lift-off / stability
2209/30	. Purging
2210/00	Noise abatement
2210/101	. using noise dampening material
2211/00	Thermal dilatation prevention or compensation
2212/00	Burner material specifications
2212/005	. Radiant gas burners made of specific materials, e.g. rare earths
2212/10	. ceramic
2212/101	. . Foam, e.g. reticulated
2212/103	. . Fibres
2212/105	. . Particles
2212/20	. metallic
2212/201	. . Fibres
2212/203	. . Particles
2213/00	Burner manufacture specifications

2214/00	Cooling	
2700/00	TBD	
2700/001	• Air supply for wick burners	
2700/002	• Wick burners without flame spreaders or burner hood	
2700/003	• Wick burners with flame spreaders or burner hood	
2700/004	• Inverted wick burners, wick burners using preheated air	
2700/005	• Wick burners using alcohol as a fuel	
2700/006	• Wick burners using oil as a fuel	
2700/009	• Details of blue flame wick burners	
2700/01	• Blue flame burners without flame spreader or burner hood	
2700/011	• Blue flame burners with flame spreader or burner hood without a bead at the wick carrying tube	
2700/012	• Blue flame burners with flame spreader or burner hood with a bead at the wick carrying tube	
2700/013	• Blue flame burners with flame on one side only without a bead at the wick carrying tube	
2700/014	• Blue flame burners with flame on one side only and a bead at the wick carrying tube	
2700/015	• Tubes carrying the wick	
2700/016	• Safety devices for wick carrying tubes	
2700/017	• Wick adjusting devices directly engaging the wick	
2700/018	• Wick adjusting devices engaging the tube carrying the wick	
2700/019	• Wick stop devices and wick fixing devices	
2700/02	• Devices for mounting the wick to the carrier	
2700/021	• Burners in which the gas produced in the wick is not burned instantaneously	
2700/022	• Burners using carburetted gas	
2700/023	• Gasifying and evaporating devices	
2700/024	• Nozzles and cleaning devices therefor	
2700/025	• Mixing tubes and burner heads	
2700/026	• Preheating devices, starting devices	
2700/027	• Vaporisers with devices for controlling the feeding of the fuel	
2700/03	• Alcohol vapour burners	
2700/031	• Vapour burners where the vaporiser is heated by an auxiliary flame	
2700/032	• Vapour burners where the vaporiser is heated by the main flame itself	
2700/033	• Vapour burners where the vaporiser is heated by conduction	
2900/00	Special features of, or arrangements for burners using fluid fuels or solid fuels suspended in a carrier gas	
2900/00001	• local catalytic coatings applied to burner surfaces	
2900/00002	• Cleaning burner parts, e.g. burner tips	
2900/00003	• Fuel or fuel-air mixtures flow distribution devices upstream of the outlet	
2900/00004	• Burners specially adapted for generating high luminous flames, e.g. yellow for fuel-rich mixtures	
2900/00006	• Liquid fuel burners using pure oxygen or O ₂ -enriched air as oxidant (for gaseous fuels F23D 14/32)	
2900/00008	• Burner assemblies with diffusion and premix modes, i.e. dual mode burners	
2900/00011	• Burner with means for propagating the flames along a wall surface	
2900/00012	• Liquid or gas fuel burners with flames spread over a flat surface, either premix or non-premix type, e.g. "Flächenbrenner"	
2900/00013	• with means for spreading the flame in a fan or fishtail shape over a melting bath	
2900/00014	• Pilot burners specially adapted for ignition of main burners in furnaces or gas turbines	
2900/00015	• Pilot burners specially adapted for low load or transient conditions, e.g. for increasing stability	
2900/00016	• Preventing or reducing deposit build-up on burner parts, e.g. from carbon	
2900/00017	• Assembled burner modules	
2900/00018	• Means for protecting parts of the burner, e.g. ceramic lining outside of the flame tube	
2900/00019	• Outlet manufactured from knitted fibres	
2900/01001	• Pulverised solid fuel burner with means for swirling the fuel-air mixture	
2900/03081	• Catalytic wick burners	
2900/03082	• Wick made of specific material, e.g. ceramic	
2900/05001	• Burner using gel type fuel	
2900/05002	• Use of porous members to convert liquid fuel into vapor	
2900/11001	• Impinging-jet injectors or jet impinging on a surface	
2900/11002	• Liquid fuel burners with more than one nozzle	
2900/11101	• Pulverising gas flow impinging on fuel from pre-filming surface, e.g. lip atomizers	
2900/11401	• Flame intercepting baffles forming part of burner head	
2900/11402	• Airflow diaphragms at burner nozzle	
2900/11403	• Flame surrounding tubes in front of burner nozzle	
2900/14	• Special features of gas burners	
2900/14001	• . Sealing or support of burner plate borders	
2900/14002	• . of premix or non premix types, specially adapted for the combustion of low heating value [LHV] gas	
2900/14003	• . with more than one nozzle	
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	

F23D

- 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. nano particle soot