

CPC COOPERATIVE PATENT CLASSIFICATION

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

LIGHTING; HEATING

F23 COMBUSTION APPARATUS; COMBUSTION PROCESSES (NOTE omitted)

F23D BURNERS

NOTE

{In this subclass, it is desirable to use the indexing codes of [F23D 2200/00](#) – [F23D 2900/00](#).}

1/00	Burners for combustion of pulverulent fuel	5/06	• the liquid forming a film on one or more plane or convex surfaces
1/005	• {burning a mixture of pulverulent fuel delivered as a slurry, i.e. comprising a carrying liquid}	5/08	• • on cascaded surfaces
1/02	• Vortex burners, e.g. for cyclone-type combustion apparatus	5/10	• • on grids
1/04	• Burners producing cylindrical flames without centrifugal action	5/12	• Details
1/06	• Burners producing sheet flames	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
Combustion of a liquid		7/00	Burners in which drops of liquid fuel impinge on a surface
3/00	Burners using capillary action	9/00	Burners in which a stream of liquid fuel impinges intermittently on a hot surface
3/02	• Wick burners	11/00	Burners using a direct spraying action of liquid droplets or vaporised liquid into the combustion space
3/04	• • with flame spreaders (F23D 3/12 takes precedence)	11/001	• {Spraying nozzle combined with forced draft fan in one unit}
3/06	• • Inverted wick burners, e.g. for illumination	11/002	• {Spraying nozzle arranged within furnace openings}
3/08	• • characterised by shape, construction, or material, of wick	11/004	• • {for producing radiant heat}
3/10	• • Blue-flame burners	11/005	• {with combinations of different spraying or vaporising means}
3/12	• • • with flame spreaders	11/007	• • {combination of means covered by sub-groups F23D 11/10 and F23D 11/24 }
3/14	• • • with mixing of air and fuel vapour in a chamber before the flame	11/008	• • {combination of means covered by sub-groups F23D 5/00 and F23D 11/00 }
3/16	• • using candles	11/02	• the combustion space being a chamber substantially at atmospheric pressure
3/18	• • Details of wick burners	11/04	• the spraying action being obtained by centrifugal action
3/20	• • • Flame spreaders	11/06	• • using a horizontal shaft
3/22	• • • Devices for mixing evaporated fuel with air	11/08	• • using a vertical shaft
3/24	• • • Carriers for wicks	11/10	• the spraying being induced by a gaseous medium, e.g. water vapour
3/26	• • • Safety devices thereon	11/101	• • {medium and fuel meeting before the burner outlet}
3/28	• • • Wick-adjusting devices	11/102	• • • {in an internal mixing chamber}
3/30	• • • directly engaging with the wick	11/103	• • • • {with means creating a swirl inside the mixing chamber}
3/32	• • • engaging with a tube carrying the wick	11/104	• • • {intersecting at a sharp angle, e.g. Y-jet atomiser}
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}		

11/105	. . . {at least one of the fluids being submitted to a swirling motion}	14/08	. . . with axial outlets at the burner head
11/106	. . {medium and fuel meeting at the burner outlet}	14/085	. . . . {with injector axis inclined to the burner head axis}
11/107	. . . {at least one of both being subjected to a swirling motion}	14/10	. . . with elongated tubular burner head
11/108	. . {medium and fuel intersecting downstream of the burner outlet}	14/105	. . . . {with injector axis parallel to the burner head axis}
11/12	. . characterised by the shape or arrangement of the outlets from the nozzle	14/12	. Radiant burners
11/14	. . . with a single outlet, e.g. slit	14/125	. . {heating a wall surface to incandescence}
11/16	. . in which an emulsion of water and fuel is sprayed	14/126	. . {cooperating with refractory wall surfaces}
11/18	. . the gaseous medium being water vapour generated at the nozzle	14/14	. . using screens or perforated plates
11/20	. . . the water vapour being superheated	14/145	. . . {combustion being stabilised at a screen or a perforated plate}
11/22	. . the gaseous medium being vaporised fuel, e.g. for a soldering lamp	14/147	. . . {with perforated plates as radiation intensifying means}
11/24	. by pressurisation of the fuel before a nozzle through which it is sprayed by a substantial pressure reduction into a space	14/148	. . . {with grids, e.g. strips or rods, as radiation intensifying means}
11/26	. . with provision for varying the rate at which the fuel is sprayed	14/149	. . . {with wires, threads or gauzes as radiation intensifying means}
11/28	. . . with flow-back of fuel at the burner, e.g. using by-pass	14/151	. . {with radiation intensifying means other than screens or perforated plates}
11/30	. . . with return feed of uncombusted sprayed fuel to reservoir	14/16	. . using permeable blocks
11/32	. by electrostatic means	14/18	. . using catalysis for flameless combustion
11/34	. by ultrasonic means	14/181	. . . {with carbon containing radiating surface}
11/345	. . {with vibrating atomiser surfaces}	14/20	. Non-premix gas burners, i.e. in which gaseous fuel is mixed with combustion air on arrival at the combustion zone (F23D 14/38 takes precedence)
11/36	. Details	14/22	. . with separate air and gas feed ducts, e.g. with ducts running parallel or crossing each other
11/38	. . Nozzles; Cleaning devices therefor	14/24	. . . at least one of the fluids being submitted to a swirling motion
11/383	. . . {with swirl means}	14/26	. with provision for a retention flame (pilot flame igniters F23Q 9/00)
11/386	. . . {Nozzle cleaning}	14/28	. in association with a gaseous fuel source, e.g. acetylene generator, or a container for liquefied gas
11/40	. . Mixing tubes; Burner heads	14/30	. Inverted burners, e.g. for illumination
11/402	. . . {Mixing chambers downstream of the nozzle}	14/32	. using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air (F23D 14/38 takes precedence)
11/404	. . . {Flame tubes (not forming part of the burner F23M 9/06)}	14/34	. Burners specially adapted for use with means for pressurising the gaseous fuel or the combustion air
11/406	. . . {Flame stabilising means, e.g. flame holders}	14/36	. . in which the compressor and burner form a single unit
11/408	. . . {Flow influencing devices in the air tube}	14/38	. Torches, e.g. for brazing or heating (nozzles F23D 14/48)
11/42	. . Starting devices (igniting F23Q)	14/40	. . for welding (F23D 14/44 takes precedence)
11/44	. . Preheating devices; Vaporising devices	14/42	. . for cutting (F23D 14/44 takes precedence)
11/441	. . . {Vaporising devices incorporated with burners}	14/44	. . for use under water
11/443	. . . . {heated by the main burner flame}	14/46	. Details
11/445	. . . . {the flame and the vaporiser not coming into direct contact}	14/465	. . {for torches (F23D 14/52 takes precedence)}
11/446	. . . . {heated by an auxiliary flame}	14/48	. . Nozzles
11/448	. . . . {heated by electrical means}	14/50	. . . Cleaning devices therefor
11/46	. . Devices on the vaporiser for controlling the feeding of the fuel	14/52	. . . for torches; for blow-pipes
<hr/>		14/54	. . . . for cutting or welding metal
14/00	Burners for combustion of a gas, e.g. of a gas stored under pressure as a liquid	14/56	. . . for spreading the flame over an area, e.g. for desurfacing of solid material, for surface hardening or for heating workpieces
14/02	. Premix gas burners, i.e. in which gaseous fuel is mixed with combustion air upstream of the combustion zone	14/58	. . . characterised by the shape or arrangement of the outlet or outlets from the nozzle, e.g. of annular configuration
14/04	. . induction type, e.g. Bunsen burner	14/583	. . . . {of elongated shape, e.g. slits}
14/045	. . . {with a plurality of burner bars assembled together, e.g. in a grid-like arrangement}	14/586	. . . . . {formed by a set of sheets, strips, ribbons or the like}
14/06	. . . with radial outlets at the burner head	14/60	. . Devices for simultaneous control of gas and combustion air
14/065	. . . . {with injector axis inclined to the burner head axis}		

- 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, or moistening
- 14/70 . . Baffles or like flow-disturbing devices
- 14/72 . . Safety devices, e.g. operative in case of failure of gas supply
- 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
- 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
- 14/825 {[using valves](#)}
- 14/84 . . Flame spreading or otherwise shaping ([F23D 14/70](#) takes precedence)

Other burners

- 17/00** **Burners for combustion simultaneously or alternately 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](#))**

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- 99/00** **Subject matter not provided for in other groups of this subclass**
 - 99/002 . {[Burners specially adapted for specific applications](#)}
 - 99/004 . . {[for use in particular heating operations](#)}
 - 99/005 . . . {[for heating liquids, e.g. for vaporising or concentrating](#)}

Indexing codes associated with burners

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| <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 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 |
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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	2900/14002 • • of premix or non premix types, specially adapted for the combustion of low heating value [LHV] gas
2212/10	• ceramic	2900/14003 • • with more than one nozzle
2212/101	• • Foam, e.g. reticulated	2900/14004 • • with radially extending gas distribution spokes
2212/103	• • Fibres	2900/14005 • • Rotary gas burner
2212/105	• • Particles	2900/14021 • • Premixing burners with swirling or vortices creating means for fuel or air
2212/20	• metallic	2900/14041 • • Segmented or straight line assembly of burner bars
2212/201	• • Fibres	2900/14042 • • Star shaped assembly of burner bars or arms
2212/203	• • Particles	2900/14061 • • for cooking ranges having a coated burner cap
2213/00	Burner manufacture specifications	2900/14062 • • for cooking ranges having multiple flame rings
2214/00	Cooling	2900/14063 • • for cooking ranges having one flame ring fed by multiple venturis
2900/00	Special features of, or arrangements for burners using fluid fuels or solid fuels suspended in a carrier gas	2900/14064 • • Burner heads of non circular shape
2900/00001	• local catalytic coatings applied to burner surfaces	2900/1412 • • for radiant burners
2900/00002	• Cleaning burner parts, e.g. burner tips	2900/14241 • • Post-mixing with swirling means
2900/00003	• Fuel or fuel-air mixtures flow distribution devices upstream of the outlet	2900/14381 • • Single operating member opening and closing fuel and oxidant supply valves in torches
2900/00004	• Burners specially adapted for generating high luminous flames, e.g. yellow for fuel-rich mixtures	2900/14481 • • Burner nozzles incorporating flow adjusting means
2900/00006	• Liquid fuel burners using pure oxygen or oxygen-enriched air as oxidant	2900/14482 • • Burner nozzles incorporating a fluidic oscillator
2900/00008	• Burner assemblies with diffusion and premix modes, i.e. dual mode burners	2900/14581 • • with outlets consisting of a bed of irregular particles, e.g. glass
2900/00011	• Burner with means for propagating the flames along a wall surface	2900/14582 • • with outlets consisting of layers of spherical particles
2900/00012	• Liquid or gas fuel burners with flames spread over a flat surface, either premix or non-premix type, e.g. "Flächenbrenner"	2900/14641 • • with gas distribution manifolds or bars provided with a plurality of nozzles
2900/00013	• • with means for spreading the flame in a fan or fishtail shape over a melting bath	2900/14642 • • with jet mixers with more than one gas injection nozzles or orifices for a single mixing tube
2900/00014	• Pilot burners specially adapted for ignition of main burners in furnaces or gas turbines	2900/14681 • • Adding steam or water vapor to primary or secondary combustion air
2900/00015	• Pilot burners specially adapted for low load or transient conditions, e.g. for increasing stability	2900/14701 • • Swirling means inside the mixing tube or chamber to improve premixing
2900/00016	• Preventing or reducing deposit build-up on burner parts, e.g. from carbon	2900/21 • Burners specially adapted for a particular use
2900/00017	• Assembled burner modules	2900/21001 • • for use in blast furnaces
2900/00018	• Means for protecting parts of the burner, e.g. ceramic lining outside of the flame tube	2900/21002 • • for use in car heating systems
2900/00019	• Outlet manufactured from knitted fibres	2900/21003 • • for heating or re-burning air or gas in a duct
2900/01001	• Pulverised solid fuel burner with means for swirling the fuel-air mixture	2900/21004 • • for use in gas fed fireplaces
2900/03081	• Catalytic wick burners	2900/21005 • • for flame deposition, e.g. flame hydrolysis deposition [FHD]
2900/03082	• Wick made of specific material, e.g. ceramic	2900/21006 • • for heating a catalyst in a car
2900/05001	• Burner using gel type fuel	2900/21007 • • for producing soot, e.g. nanoparticle soot
2900/05002	• Use of porous members to convert liquid fuel into vapor	2900/31 • Air supply for wick burners
2900/11001	• Impinging-jet injectors or jet impinging on a surface	2900/31001 • Wick burners without flame spreaders or burner hood
2900/11002	• Liquid fuel burners with more than one nozzle	2900/31002 • Wick burners with flame spreaders or burner hood
2900/11101	• Pulverising gas flow impinging on fuel from pre-filming surface, e.g. lip atomizers	2900/31003 • Inverted wick burners; Wick burners using preheated air
2900/11401	• Flame intercepting baffles forming part of burner head	2900/31004 • Wick burners using alcohol as a fuel
2900/11402	• Airflow diaphragms at burner nozzle	2900/31005 • Wick burners using oil as a fuel
2900/11403	• Flame surrounding tubes in front of burner nozzle	2900/31006 • Details of blue flame wick burners
2900/14	• Special features of gas burners	2900/31007 • Blue flame burners without flame spreader or burner hood
2900/14001	• • Sealing or support of burner plate borders	2900/31008 • Blue flame burners with flame spreader or burner hood without a bead at the wick carrying tube
		2900/31009 • Blue flame burners with flame spreader or burner hood with a bead at the wick carrying tube
		2900/3101 • Blue flame burners with flame on one side only without a bead at the wick carrying tube
		2900/31011 • Blue flame burners with flame on one side only and a bead at the wick carrying tube

- 2900/31012 . Wick adjusting devices directly engaging the wick
- 2900/31013 . Wick adjusting devices engaging the tube carrying the wick
- 2900/31014 . Wick stop devices; Wick fixing devices
- 2900/31015 . Devices for mounting the wick to the carrier
- 2900/31016 . Burners in which the gas produced in the wick is not burned instantaneously
- 2900/31017 . Burners using carburetted gas
- 2900/31018 . Nozzles and cleaning devices therefor
- 2900/31019 . Mixing tubes combined with burner heads
- 2900/3102 . Preheating devices; Starting devices
- 2900/31021 . Vaporisers with devices for controlling the feeding of the fuel
- 2900/31022 . Alcohol vapour burners
- 2900/31023 . Vapour burners where the vaporiser is heated by conduction