

SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

F23 COMBUSTION APPARATUS; COMBUSTION PROCESSES

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

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BURNERS FOR COMBUSTION OF A LIQUID	
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1/00 Burners for combustion of pulverulent fuel (arrangement or mounting of burners F23C 5/00)

- 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
- 5/06 • 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
- 5/14 • • 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 vaporised liquid into the combustion space (spraying in general B05B, B05D)

- 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
- 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

F23D

11/18	<ul style="list-style-type: none">• the gaseous medium being water vapour generated at the nozzle	14/34	<ul style="list-style-type: none">• Burners specially adapted for use with means for pressurising the gaseous fuel or the combustion air (F23D 14/38 takes precedence) [4]
11/20	<ul style="list-style-type: none">• • the water vapour being superheated	14/36	<ul style="list-style-type: none">• • in which the compressor and burner form a single unit [4]
11/22	<ul style="list-style-type: none">• • the gaseous medium being vaporised fuel, e.g. for a soldering lamp	14/38	<ul style="list-style-type: none">• Torches, e.g. for cutting, brazing, welding or heating (nozzles F23D 14/48) [4]
11/24	<ul style="list-style-type: none">• by pressurisation of the fuel before a nozzle through which it is sprayed by a substantial pressure reduction into a space	14/40	<ul style="list-style-type: none">• • for welding (F23D 14/44 takes precedence) [4]
11/26	<ul style="list-style-type: none">• • with provision for varying the rate at which the fuel is sprayed	14/42	<ul style="list-style-type: none">• • for cutting (F23D 14/44 takes precedence) [4]
11/28	<ul style="list-style-type: none">• • • with flow-back of fuel at the burner, e.g. using by-pass	14/44	<ul style="list-style-type: none">• • for use under water [4]
11/30	<ul style="list-style-type: none">• • • with return feed of uncombusted sprayed fuel to reservoir	14/46	<ul style="list-style-type: none">• Details [4]
11/32	<ul style="list-style-type: none">• by electrostatic means	14/48	<ul style="list-style-type: none">• • Nozzles (for spraying or coating B05B) [4]
11/34	<ul style="list-style-type: none">• by ultrasonic means	14/50	<ul style="list-style-type: none">• • • Cleaning devices therefor [4]
11/36	<ul style="list-style-type: none">• Details	14/52	<ul style="list-style-type: none">• • • for torches; for blow-pipes [4]
11/38	<ul style="list-style-type: none">• • Nozzles (nozzles in general B05B); Cleaning devices therefor	14/54	<ul style="list-style-type: none">• • • • for cutting or welding metal [4]
11/40	<ul style="list-style-type: none">• • Mixing tubes; Burner heads	14/56	<ul style="list-style-type: none">• • • 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) [4]
11/42	<ul style="list-style-type: none">• • Starting devices (igniting F23Q)	14/58	<ul style="list-style-type: none">• • • characterised by the shape or arrangement of the outlet or outlets from the nozzle, e.g. of annular configuration [4]
11/44	<ul style="list-style-type: none">• • Preheating devices; Vaporising devices	14/60	<ul style="list-style-type: none">• • Devices for simultaneous control of gas and combustion air (regulation of combustion in general F23N) [4]
11/46	<ul style="list-style-type: none">• • Devices on the vaporiser for controlling the feeding of the fuel	14/62	<ul style="list-style-type: none">• • Mixing devices; Mixing tubes [4]
<hr/>		14/64	<ul style="list-style-type: none">• • • with injectors [4]
14/00	Burners for combustion of a gas, e.g. of a gas stored under pressure as a liquid [4]	14/66	<ul style="list-style-type: none">• • Preheating the combustion air or gas [4]
14/02	<ul style="list-style-type: none">• Premix gas burners, i.e. in which gaseous fuel is mixed with combustion air upstream of the combustion zone [4]	14/68	<ul style="list-style-type: none">• • Treating the combustion air or gas, e.g. by filtering, by moistening (in general B01) [4]
14/04	<ul style="list-style-type: none">• • induction type, e.g. Bunsen burner [4]	14/70	<ul style="list-style-type: none">• • Baffles or like flow-disturbing devices [4]
14/06	<ul style="list-style-type: none">• • • with radial outlets at the burner head [4]	14/72	<ul style="list-style-type: none">• • Safety devices, e.g. operative in case of failure of gas supply (protection or supervision of pipe-line systems F17D 5/00) [4]
14/08	<ul style="list-style-type: none">• • • with axial outlets at the burner head [4]	14/74	<ul style="list-style-type: none">• • • Preventing flame lift-off (F23D 14/70 takes precedence) [4]
14/10	<ul style="list-style-type: none">• • • with elongated tubular burner head [4]	14/76	<ul style="list-style-type: none">• • • Protecting flame and burner parts [4]
14/12	<ul style="list-style-type: none">• Radiant burners [4]	14/78	<ul style="list-style-type: none">• • • Cooling burner parts [4]
14/14	<ul style="list-style-type: none">• • using screens or perforated plates [4]	14/80	<ul style="list-style-type: none">• • • Selection of a non-toxic gas [4]
14/16	<ul style="list-style-type: none">• • using permeable blocks [4]	14/82	<ul style="list-style-type: none">• • • Preventing flashback or blowback (F23D 14/70 takes precedence; in gas feed lines A62C 4/02) [4]
14/18	<ul style="list-style-type: none">• • using catalysis for flameless combustion [4]	14/84	<ul style="list-style-type: none">• • Flame spreading or otherwise shaping (F23D 14/70 takes precedence) [4]
14/20	<ul style="list-style-type: none">• 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) [4]	<hr/>	
14/22	<ul style="list-style-type: none">• • with separate air and gas feed ducts, e.g. with ducts running parallel or crossing each other [4]	Other burners	
14/24	<ul style="list-style-type: none">• • • at least one of the fluids being submitted to a swirling motion [4]	17/00	Burners for combustion simultaneously or alternately of gaseous or liquid or pulverulent fuel
14/26	<ul style="list-style-type: none">• with provision for a retention flame (pilot flame igniters F23Q 9/00) [4]	23/00	Assemblies of two or more burners (gas burners with provision for a retention flame F23D 14/26; arrangement or mounting of burners F23C 5/00; for industrial furnaces F27)
14/28	<ul style="list-style-type: none">• in association with a gaseous fuel source, e.g. acetylene generator, or a container for liquefied gas [4]	<hr/>	
14/30	<ul style="list-style-type: none">• Inverted burners, e.g. for illumination [4]	99/00	Subject matter not provided for in other groups of this subclass [2010.01]
14/32	<ul style="list-style-type: none">• using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air (F23D 14/38 takes precedence) [4]		