

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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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

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- 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 vaporised fuel, e.g. for a soldering lamp
- 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
- 11/36 • Details
- 11/38 • • Nozzles (nozzles in general B05B); Cleaning devices therefor
- 11/40 • • Mixing tubes; Burner heads
- 11/42 • • Starting devices (igniting F23Q)
- 11/44 • • Preheating devices; Vaporising devices
- 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 [4]

- 14/02 • Premix gas burners, i.e. in which gaseous fuel is mixed with combustion air upstream of the combustion zone [4]
- 14/04 • • induction type, e.g. Bunsen burner [4]
- 14/06 • • • with radial outlets at the burner head [4]
- 14/08 • • • with axial outlets at the burner head [4]
- 14/10 • • • with elongated tubular burner head [4]
- 14/12 • Radiant burners [4]
- 14/14 • • using screens or perforated plates [4]
- 14/16 • • using permeable blocks [4]
- 14/18 • • using catalysis for flameless combustion [4]
- 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) [4]
- 14/22 • • with separate air and gas feed ducts, e.g. with ducts running parallel or crossing each other [4]
- 14/24 • • • at least one of the fluids being submitted to a swirling motion [4]
- 14/26 • with provision for a retention flame (pilot flame igniters F23Q 9/00) [4]
- 14/28 • in association with a gaseous fuel source, e.g. acetylene generator, or a container for liquefied gas [4]
- 14/30 • Inverted burners, e.g. for illumination [4]
- 14/32 • using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air (F23D 14/38 takes precedence) [4]

- 14/34 • Burners specially adapted for use with means for pressurising the gaseous fuel or the combustion air (F23D 14/38 takes precedence) [4]
- 14/36 • • in which the compressor and burner form a single unit [4]
- 14/38 • Torches, e.g. for cutting, brazing, welding or heating (nozzles F23D 14/48) [4]
- 14/40 • • for welding (F23D 14/44 takes precedence) [4]
- 14/42 • • for cutting (F23D 14/44 takes precedence) [4]
- 14/44 • • for use under water [4]
- 14/46 • Details [4]
- 14/48 • • Nozzles (for spraying or coating B05B) [4]
- 14/50 • • • Cleaning devices therefor [4]
- 14/52 • • • for torches; for blow-pipes [4]
- 14/54 • • • for cutting or welding metal [4]
- 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) [4]
- 14/58 • • • characterised by the shape or arrangement of the outlet or outlets from the nozzle, e.g. of annular configuration [4]
- 14/60 • • Devices for simultaneous control of gas and combustion air (regulation of combustion in general F23N) [4]
- 14/62 • • Mixing devices; Mixing tubes [4]
- 14/64 • • • with injectors [4]
- 14/66 • • Preheating the combustion air or gas [4]
- 14/68 • • Treating the combustion air or gas, e.g. by filtering, by moistening (in general B01) [4]
- 14/70 • • Baffles or like flow-disturbing devices [4]
- 14/72 • • Safety devices, e.g. operative in case of failure of gas supply (protection or supervision of pipe-line systems F17D 5/00) [4]
- 14/74 • • • Preventing flame lift-off (F23D 14/70 takes precedence) [4]
- 14/76 • • • Protecting flame and burner parts [4]
- 14/78 • • • Cooling burner parts [4]
- 14/80 • • • Selection of a non-toxic gas [4]
- 14/82 • • • Preventing flashback or blowback (F23D 14/70 takes precedence; in gas feed lines A62C 4/02) [4]
- 14/84 • • Flame spreading or otherwise shaping (F23D 14/70 takes precedence) [4]

Other burners

17/00 Burners for combustion simultaneously or alternately of gaseous or liquid or pulverulent fuel

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)

99/00 Subject matter not provided for in other groups of this subclass [2010.01]