

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

## F23 COMBUSTION APPARATUS; COMBUSTION PROCESSES

### F23D BURNERS

#### Subclass index

BURNERS FOR PULVERULENT FUEL.....	1/00
BURNERS FOR COMBUSTION OF A LIQUID	
Using capillary action.....	3/00
Using fuel evaporation; direct spraying action.....	5/00, 11/00
Using fuel impingement on a surface.....	7/00, 9/00
BURNERS FOR COMBUSTION OF A GAS.....	14/00
BURNERS FOR COMBUSTION OF GASEOUS OR LIQUID OR PULVERULENT FUEL.....	17/00
ASSEMBLIES OF TWO OR MORE BURNERS.....	23/00
OTHER BURNERS.....	99/00

<b>1/00 Burners for combustion of pulverulent fuel</b>	<b>5/00 Burners in which liquid fuel evaporates in the combustion space, with or without chemical conversion of evaporated fuel</b>
1/02 • Vortex burners, e.g. for cyclone-type combustion apparatus	5/02 • the liquid forming a pool, e.g. bowl-type evaporators, dish-type evaporators
1/04 • Burners producing cylindrical flames without centrifugal action	5/04 • • Pot-type evaporators, i.e. using a partially-enclosed combustion space
1/06 • Burners producing sheet flames	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
	<b>7/00 Burners in which drops of liquid fuel impinge on a surface</b>
	<b>9/00 Burners in which a stream of liquid fuel impinges intermittently on a hot surface</b>
	<b>11/00 Burners using a direct spraying action of liquid droplets or vaporised liquid into the combustion space</b>
<b>3/00 Burners using capillary action</b>	11/02 • the combustion space being a chamber substantially at atmospheric pressure
3/02 • Wick burners	11/04 • the spraying action being obtained by centrifugal action
3/04 • • with flame spreaders (F23D 3/12 takes precedence)	11/06 • • using a horizontal shaft
3/06 • • Inverted wick burners, e.g. for illumination	11/08 • • using a vertical shaft
3/08 • • characterised by shape, construction, or material, of wick	11/10 • the spraying being induced by a gaseous medium, e.g. water vapour
3/10 • • Blue-flame burners	11/12 • • characterised by the shape or arrangement of the outlets from the nozzle
3/12 • • • with flame spreaders	11/14 • • • with a single outlet, e.g. slit
3/14 • • • with mixing of air and fuel vapour in a chamber before the flame	11/16 • • in which an emulsion of water and fuel is sprayed
3/16 • • using candles	
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	

## F23D

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