F23D

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

Definition statement

This subclass/group covers:

Burners, i.e. devices by which fluid fuel, or solid fuel suspended in air, is passed to a combustion space where it burns to produce a self-supporting flame, for example burners in which:

- pulverulent solid fuel is entrained into the combustion space by air
- liquid fuel is transported by capillary action to the combustion space where it evaporates, e.g. wick burners
- liquid fuel evaporates from an open fuel surface, e.g. pot burners
- liquid fuel is sprayed into the combustion space by fluid pressure
- liquid fuel is entrained into the combustion space by a stream of gaseous medium, for example air or steam
- liquid fuel is vaporised within a conduit and released in gaseous form into the combustion space
- liquid fuel is dispersed into the combustion space by mechanical means, e.g. ultrasonic vibrations or centrifugal action
- gaseous fuel mixed with air is released into the combustion space
- gaseous fuel is released into the combustion space where it is mixed with air
- pulverulent, liquid or gaseous fuels are used simultaneously or alternately

Relationship between large subject matter areas

This subclass is the main function-oriented place for burners. Classification is always made in this subclass if the subject matter is of general interest for burners.

Burners are used in many fields where heat is generated or used. Burners per se are only classified in these application fields if they are specially adapted for a specific application, for example coating by flame spraying. Examples of application fields can be found in the section "References relevant to classification in this subclass" below. In case of doubt, classification should be made both in this subclass and the application field.

Classification is made in F23C if the subject matter to be classified, in addition to a burner, includes further features of a combustion apparatus, such as a particular form of combustion chamber or a particular arrangement of burners in a combustion chamber.

Feeding air

Air supply means that are arranged in immediate connection with the fuel-feeding conduit of a burner, for example concentric with it, are considered to be part of the burner. Means for feeding air otherwise than in immediate connection with the fuel-feeding conduit of a burner, for example arrangements for feeding secondary air at points distant from a burner, are classified in F23C 7/00 or F23L.

Control of combustion, methods of combustion

With the exception of devices or methods that are specially adapted to particular types of burners, for example the matter of the following groups:

- Wick-adjusting devices, F23D 3/28
- Maintaining a predetermined amount of fuel in evaporators, F23D 5/14
- Provision for varying the rate at which liquid fuel is sprayed, F23D 11/26
- Devices on vaporisers for controlling the feeding of fuel, F23D 11/46
- Devices for simultaneous control of gas and combustion air, F23D 14/60

this subclass does not cover control of combustion, which is covered by F23N, or methods of combustion, which are covered by F23C.

Catalytic combustion

With the exception of radiant gas burners using catalysis for flameless combustion, which is covered by F23D 14/18, this subclass does not cover the combustion of fluid fuels in the presence of catalytic material, which is covered by F23C 10/01, F23C 13/00 and F23G 7/07.

References relevant to classification in this subclass

This subclass/group does not cover:

Candles	C11C 5/00
Combustion in a fluidised bed of fuel or other particles	F23C 10/00
Apparatus in which combustion takes place in pulses influenced by acoustic resonance in a gas mass	F23C 15/00

Igniting of burners	F23Q
Generating combustion products of high pressure or high velocity	F23R

Flame throwers for destroying noxious animals or plants	A01M 15/00
Bakers' ovens	A21B 1/00
Cooking devices, e.g. travelling cookers or barbecues	A47J 36/00 A47J 37/00
Soldering	B23K 1/00 B23B 3/00
Gas flame welding or cutting	B23K 5/00
Cutting, scarfing, or desurfacing by applying flames	B23K 7/00
Using burners in chemical vapour deposition	C23C 16/453
Heating boreholes or wells with burners	E21B 36/02
Using burners for regenerating exhaust gas filters	F01N 3/025
Gas-turbine plants	F02C
Jet-propulsion plants	F02K
Using burners for ignition of internal combustion engines	F02P 19/00 F02P 21/00
Incandescent mantles	F21H
Non-electric portable lighting devices	F21L 17/00- F21L 27/00
Non-electric non-portable lighting devices	F21S 13/00- F21S 19/00
Arrangements of mantles or other	F21V 36/00

incandescent bodies on lighting burners	
Details of lighting devices employing combustion as light source	F21V 37/00
Steam boilers	F22B
Arrangement of burners in combustion apparatus	F23C 5/00
Methods or apparatus specially adapted for combustion of waste or low-grade fuels. e.g. waste oil, waste liquors or waste gases	F23G
Lighters containing fuel	F23Q 2/00
Ignition using burners	F23Q 9/00 F23Q 13/00
Generating combustion products of high pressure or high velocity, e.g. gas turbine burners	F23R
Stoves or ranges for liquid or gaseous fuels	F24C
Fluid heaters having heat-generating means, e.g. heating boilers	F24H
Arrangement of burners in fluid heaters	F24H 9/18
Arrangement of burners in furnaces or ovens for heat treatment	F27B
Using burners for cleaning heat exchangers	F28G 11/00
Flame-throwers for attack or defence	F41H 9/02

Informative references

Attention is drawn to the following places, which may be of interest for search:

Spraying or atomising apparatus in general; Nozzles in general	B05B
Fuels	C10H-C10L
Mixing a gas with another gas or vapour and flow mixers in general	B01F 3/00 B01F 5/00
Pressure vessels for gases	F17C
Methods or apparatus for combustion using fluid fuel in general	F23C
Air supply specially adapted for combustion of fluid fuels	F23C 7/00
Arrangement of devices for supplying chemicals to fire	F23J 7/00
Feeding liquid or gaseous fuel to combustion apparatus	F23K
Supply of air or non-combustible liquids or gases to combustion apparatus in general	F23L
Details of combustion chambers, e.g. linings, doors or baffles	F23M
Regulating or controlling combustion in general	F23N

Special rules of classification within this subclass

In this subclass methods are classified in the groups which cover the apparatus used.

Multiple classification is mandatory when:

the subject matter to be classified deals with air supply means which are part of a burner, but no relevant subgroup is available in F23D, e.g. arrangements of swirling vanes in a premix gas burner have to be classified in F23C 7/004 and F23D 14/02;

the subject matter to be classified, in addition to a burner, includes further features of the air supply means that are of interest, for example a particular

form of a swirling vane, even if a relevant subgroup is available in F23D, e.g. an arrangement of adjustable swirling vanes in a non-premix gas burner having separate air and gas feed conduits have to be classified in F23C 7/006 and F23D 14/24.

When classifying in this subclass, add codes F23D 2200/00-F23D 2214/00;

F23D 2900/00-R23D 900/67

F23D 2700/001-F23D 2700/033 are not used for classification purpose.

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Air	a mixture of gases containing free oxygen and able to promote or support combustion
Primary air	air supplied to the burning fuel in order to liberate combustible gases
Secondary air	air supplied to the combustible gases liberated by the primary air in order to complete their combustion. The expression "secondary air" covers "tertiary air" etc.
Burner	a device by which fluid fuel or solid fuel suspended in air is passed to a combustion space where it burns to produce a self-supporting flame. A burner includes means for feeding air that are arranged in immediate connection with a fuel feeding conduit, for example concentric with it.
Combustion	the direct combination of oxygen gas, e.g. in air, and a burnable substance
Combustion chamber	a chamber in which fuel is burned to establish a self-supporting fire or flame and which surrounds that fire or flame
Combustion zone	the part of a combustion apparatus where the reaction takes place between air and fuel

Fuel	any combustible material that can be burned, regardless of whether the main purpose of burning it is for releasing energy therefrom or for disposing of it or rendering it less harmful
Pilot flame	a small flame that is lit or kept alight in order to provide ignition to a more powerful burner
Retention flame	a small flame that is kept alight in order to maintain the uninterrupted operation of a more powerful burner
Torch	a burner fired with fuel gas and oxygen and specially adapted to apply heat to a workpiece, for example for use in welding, cutting or brazing

F23D 1/00

Burners for combustion of pulverulent fuel (disposition of burners F23C)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Disposition of burners	F23C 5/08

Special rules of classification within this group

When classifying in this group add codes F23D 2201/00-F23D 2201/30 if appropriate.

F23D 1/005

[N: burning a mixture of pulverulent fuel delivered as a slurry, i.e. comprising a carrying liquid (preparing slurries F23K1/02)]

Definition Statement

This subclass/group covers:

Burners specially adapted for combusting a fine mixture of solid fuel paricles and a liquid, e.g. a slurry of pulverized coal in water.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Mixing solid fuel with a liquid, e.g. preparing slurries	F23K 1/02

F23D 3/00

Burner using capillary action

Informative references

Attention is drawn to the following places, which may be of interest for search:

Blue-flame wick burners with flame spreaders	F23D 3/12
Candles per se	C11C 5/00

F23D 5/00

Burners in which liquid fuel evaporates in the combustion space, with or without chemical conversion of evaporated fuel

References relevant to classification in this group

This subclass/group does not cover:

Combinations of spraying or vaporising means covered by groups F23D 5/00 and F23D 21/00	F23D 11/008

F23D 7/00

Burners in which drops of liquid fuel impinge on a surface

F23D 9/00

Burners in which a stream of liquid fuel impinges intermittently on a hot surface

F23D 11/00

Burners using a direct spraying action of liquid droplets or vaporized liquid into the combustion space (spraying in general B05B, B05D)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Spraying or nozzles in general	B05B, B05D
Fuel nozzle per se	F23D 11/38
Refractory bricks or blocks specially shaped for burner openings	F23M 5/025
Flame tubes located in the fire-box which do not form part of the burner	F23M 9/06
Vaporizing devices which do not form part of the burner	F23K 5/22
Igniting devices per se	F23Q

F23D 11/42

Starting devices (igniting F23Q)

Definition statement

This subclass/group covers:

Liquid fuel burners characterised by the means for starting the combustion, e.g. fixing, locating or assembling the ignition device to the burner

References relevant to classification in this group

This subclass/group does not cover:

Starting or igniting devices associated to gas fuel burners	F23D 2207/00

Igniting	F23Q

F23D 14/00

Burners for combustion of a gas, e.g. of a gas stored under pressure as a liquid

F23D 14/20

Non-premix gas burners, i.e. in which gaseous fuel is mixed with combustion air on arrival at the combustion zone (F23D14/30 to F23D14/44 take precedence)

References relevant to classification in this group

This subclass/group does not cover:

Inverted burner, e.g. for illumination	F23D 14/30
Burners using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air	F23D 14/32
Burners specially adapted for use with means for pressurising the gaseous fuel or the combustion air	F23D 14/34
Torches, e.g. for cutting, brazing, welding or heating	F23D 14/38 - F23D 14/44

F23D 14/26

with provision for a retention flame (pilot flame igniters F23Q9/00)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Pilot flame igniters	F23Q 9/00

F23D 14/32

using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air (F23D14/38 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Torches, e.g. for cutting, brazing, welding or heating	F23D 14/38

F23D 14/34

Burners specially adapted for use with means for pressurising the gaseous fuel or the combustion air (F23D14/38 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Torches, e.g. for cutting, brazing, welding or heating	F23D 14/38

F23D 14/38

Torches, e.g. for cutting, brazing, welding or heating ([N: nozzles for torches F23D14/52])

Informative references

Attention is drawn to the following places, which may be of interest for search:

Nozzles for torches	F23D 14/52

F23D 14/40

for welding (F23D14/44 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Torches specially adapted for use	F23D 14/44

under water	

F23D 14/42

for cutting (F23D14/44 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Torches specially adapted for use under water	F23D 14/44

F23D 14/465

[N: for torches (F23D14/52 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Nozzles for torches	F23D 14/52

F23D 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 B23K7/00)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Cutting, scarfing or desurfacing by applying flames	B23K 7/00

F23D 14/60

Devices for simultaneous control of gas and combustion air (regulation of combustion in general F23N)

Definition statement

This subclass/group covers:

Devices operating on both combustion air and fuel gas for controlling air to fuel ratio

Informative references

Attention is drawn to the following places, which may be of interest for search:

Regulation and control of combustion in general	F23N

F23D 14/62

Mixing devices; Mixing tubes

Informative references

Attention is drawn to the following places, which may be of interest for search:

Flow mixers in general	B01F 5/00

F23D 14/68

Treating the combustion air or gas, e.g. by filtering, by moistening (in general B01)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Filtering	B01D
Moistening combustion air in general	F23L 7/00

F23D 14/70

Baffles or like flow-disturbing devices

References relevant to classification in this group

This subclass/group does not cover:

Preventing flame lift-off	F23D 14/74
Preventing flashback or blowback	F23D 14/82

F23D 14/72

Safety devices, e.g. operative in case of failure of gas supply (protection or supervision of pipe-line systems F17D5/00)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Protection or supervision of pipe-line systems	F17D 5/00

F23D 14/74

Preventing flame lift-off (F23D14/70 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Baffles or similar flow-disturbing devices	F23D 14/70

F23D 14/82

Preventing flashback or blowback (F23D14/70 takes precedence; [N: by use of a retention flame F23D14/26]; in gas feed lines A62C4/02)

References relevant to classification in this group

This subclass/group does not cover:

Baffles or similar flow-disturbing devices	F23D 14/70
Preventing flashback or blowback by use of a retention flame	F23D 14/26

Informative references

Attention is drawn to the following places, which may be of interest for search:

Preventing flashback or blowback in gas feed lines	A62C 4/02

F23D 14/84

Flame spreading or otherwise shaping (F23D14/70 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Baffles or similar flow-disturbing devices	F23D 14/70

F23D 17/00

Burners for combustion conjointly or alternatively of gaseous or liquid or pulverulent fuel

F23D 21/00

Burners not otherwise provided for [N: Note : combinations of spraying or vaporising means covered by sub-groups F23D5/00 and F23D21/00 are classified in F23D11/008]

References relevant to classification in this group

This subclass/group does not cover:

Combinations of spraying or vaporising means covered by subgroups F23D 5/00 and F23D 21/00	F23D 11/008

Informative references

Attention is drawn to the following places, which may be of interest for search:

Using burners for spectroscopy	G01N 21/72

F23D 23/00

Assemblies of two or more burners (gas burners with provision for a retention flame F23D14/26; disposition of burners F23C; for industrial furnaces F27)

References relevant to classification in this group

This subclass/group does not cover:

Gas burner with provisions for a retention flame	F23D 14/26

Informative references

Attention is drawn to the following places, which may be of interest for search:

Disposition of burners	F23C 5/08
Assembly of burners in industrial furnaces	F27

F23D 99/00

Subject matter not provided for in other groups of this subclass