F23D

BURNERS

Definition statement

This place 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; or
- pulverulent, liquid or gaseous fuels are used simultaneously or alternately.

Relationships with other classification places

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

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

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
Surface shaping of plastics by flame treatment	B29C 59/08
Joining of plastics using flames coming in contact with at least one of the parts to be joined	B29C 65/106
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 incandescent bodies on lighting burners	F21V 36/00
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 9/1832
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:

Mixing a gas with another gas or vapour and flow mixers in general	B01F 23/00, B01F 25/00
Spraying or atomising apparatus in general; Nozzles in general	B05B
Fuels	C10H, C10J, C10K, C10L
Candles	C11C 5/00
Pressure vessels for gases	F17C
Methods or apparatus for combustion using fluid fuel or solid fuel suspended in air	F23C
Air supply specially adapted for combustion of fluid fuels	F23C 7/00
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
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

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.

Indexing codes F23D 2200/00-F23D 2900/00 are available for further classification.

Glossary of terms

In this place, 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

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	a heat-producing sequence of chemical reactions between a burnable substance and molecular oxygen, e.g. in air, in most cases generating light in the form of flames or a glow
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 space	the zone downstream of the fuel (and, where applicable, air) outlet 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
primary air	air supplied to the burning fuel in order to liberate combustible gases
retention flame	a small flame that is kept alight in order to maintain the uninterrupted operation of a more powerful burner
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.
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

References

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

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

F23D 1/005

{burning a mixture of pulverulent fuel delivered as a slurry, i.e. comprising a carrying liquid}

Definition statement

This place 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.

References

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

Burners using capillary action

References

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 3/16

using candles

References

Informative references

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

Candles per se	C11C

F23D 5/00

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

References

Informative references

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

Combinations of different spraying or vaporising means	F23D 11/005

F23D 11/00

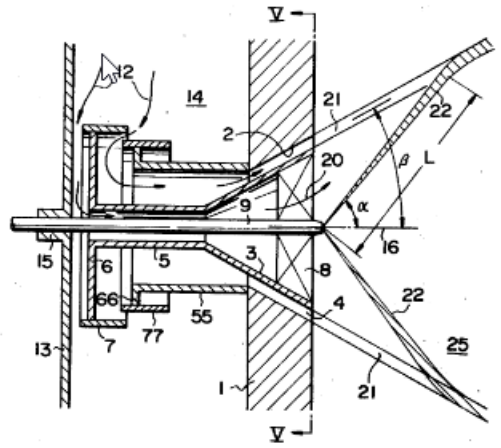
Burners using a direct spraying action of liquid droplets or vaporised liquid into the combustion space

Definition statement

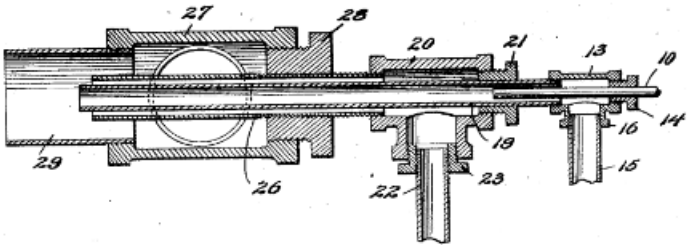
This place covers:

Illustrative examples of the subject matter classified in this place:

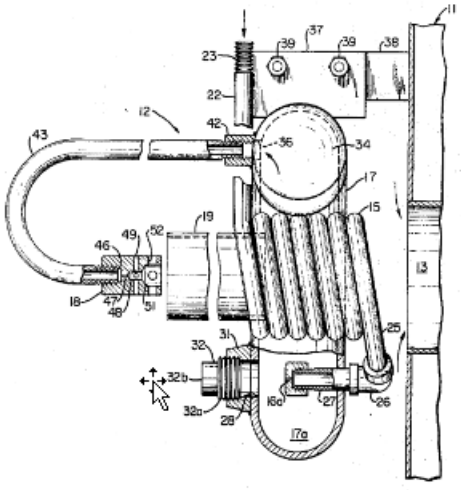
1. Liquid fuel is sprayed into the combustion space by fluid pressure



2. Liquid fuel is entrained into the combustion space by a stream of gaseous medium, for example, air or steam



3. Liquid fuel is vaporised within a conduit and released in gaseous form into the combustion space



References

Informative references

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

Spraying apparatus; Atomising apparatus; Nozzles	B05B
Processes for applying fluent materials to surfaces, in general	B05D
Vaporising devices which do not form part of the burner	F23K 5/22

F23D 11/001

{Spraying nozzle combined with forced draft fan in one unit}

References

Informative references

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

Nozzles for burners using a direct spraying action of liquid droplets or vaporised liquid; Cleaning devices therefor	F23D 11/38
Combustion apparatus characterised by arrangements for air supply	F23C 7/00
Blast-producing apparatus before the fire	F23L 5/00

F23D 11/002

{Spraying nozzle arranged within furnace openings}

References

Informative references

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

Nozzles for burners using a direct spraying action of liquid droplets or vaporised liquid; Cleaning devices therefor	F23D 11/38
Combustion chambers with casings, linings or walls with the shape of bricks or blocks used specially adapted for burner openings	F23M 5/025

F23D 11/22

the gaseous medium being vaporised fuel, e.g. for a soldering lamp

Definition statement

This place covers:

Spraying of liquid fuel droplets being induced by vaporised fuel.

F23D 11/34

by ultrasonic means

Special rules of classification

Ultrasonic devices technically operate at frequencies greater than 20 kHz, but devices operating at lower frequencies may be placed in F23D 11/34 if they have a similar function.

F23D 11/38

Nozzles; Cleaning devices therefor

References

Informative references

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

Spraying nozzle combined with forced draft fan in one unit	F23D 11/001
Spraying nozzle arranged within furnace openings	F23D 11/002
Nozzles in general	B05B

F23D 11/42

Starting devices (igniting F23Q)

Definition statement

This place 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

Limiting references

This place does not cover:

Igniting	F23Q

Informative references

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

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

F23D 11/44

Preheating devices; Vaporising devices

References

Informative references

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

Vaporising devices per se	F23K 5/22

F23D 14/04

induction type, e.g. Bunsen burner

Definition statement

This place covers:

This subgroup covers:

Atmospheric burners referring to burners that are purely induction type burners where air is drawn into the burner without any help of blowers or fans for the injection of fuel draws air into the burner. A Bunsen burner is an example of such a burner.

Aerated burners referring to burners where a fan or blower is used, in addition to the induction effect of fuel injection, to supply air to the burner. The fan can be forced draft or induced draft type.

F23D 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)

References

Limiting references

This place does not cover:

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

Informative references

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

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

F23D 14/26

with provision for a retention flame (pilot flame igniters F23Q 9/00)

References

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 (F23D 14/38 takes precedence)

References

Limiting references

This place 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

References

Informative references

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

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

F23D 14/40

for welding (F23D 14/44 takes precedence)

References

Limiting references

This place does not cover:

Torches specially adapted for use under water	F23D 14/44

F23D 14/42

for cutting (F23D 14/44 takes precedence)

References

Limiting references

This place does not cover:

Torches specially adapted for use under water	F23D 14/44

F23D 14/465

{for torches (F23D 14/52 takes precedence)}

References

Limiting references

This place does not cover:

Nozzles for torches	F23D 14/52

F23D 14/48

Nozzles

References

Informative references

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

Injectors for mixing devices	F23D 14/64
Nozzles in general	B05B

F23D 14/56

for spreading the flame over an area, e.g. for desurfacing of solid material, for surface hardening or for heating workpieces

References

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

Definition statement

This place covers:

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

References

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

References

Informative references

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

Flow mixers in general	B01F 25/00

F23D 14/68

Treating the combustion air or gas, e.g. by filtering, or moistening

References

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

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

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

References

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

References

Informative references

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

Baffles or similar flow-disturbing devices	F23D 14/70

F23D 14/82

Preventing flashback or blowback

References

Informative references

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

Preventing flashback or blowback by use of a retention flame	F23D 14/26
Baffles or similar flow-disturbing devices	F23D 14/70
Preventing flashback or blowback in gas feed lines	A62C 4/02

F23D 14/84

Flame spreading or otherwise shaping (F23D 14/70 takes precedence)

References

Limiting references

This place does not cover:

Baffles or similar flow-disturbing devices	F23D 14/70

F23D 23/00

Assemblies of two or more burners (gas burners with provision for a retention flame F23D 14/26)

References

Limiting references

This place 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 99/002

{Burners specially adapted for specific applications}

References

Informative references

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

Using burners for spectroscopy	G01N 21/72

F23D 2207/00

Ignition devices associated with burner

Definition statement

This place covers:

Spark-type or glow-type igniters.

References

Informative references

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

Pilot burners specially adapted for ignition of main burners in furnaces or gas turbines	F23D 2900/00014
Pilot burners specially adapted for low load or transient conditions, e.g. for increasing stability	F23D 2900/00015
Regulating or controlling combustion	F23N
Ignition; Extinguishing devices	F23Q
Sparking plugs	H01T 13/00

F23D 2900/00006

Liquid fuel burners using pure oxygen or oxygen-enriched air as oxidant

References

Informative references

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

Burners for combustion of a gas using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air	F23D 14/32

F23D 2900/11402

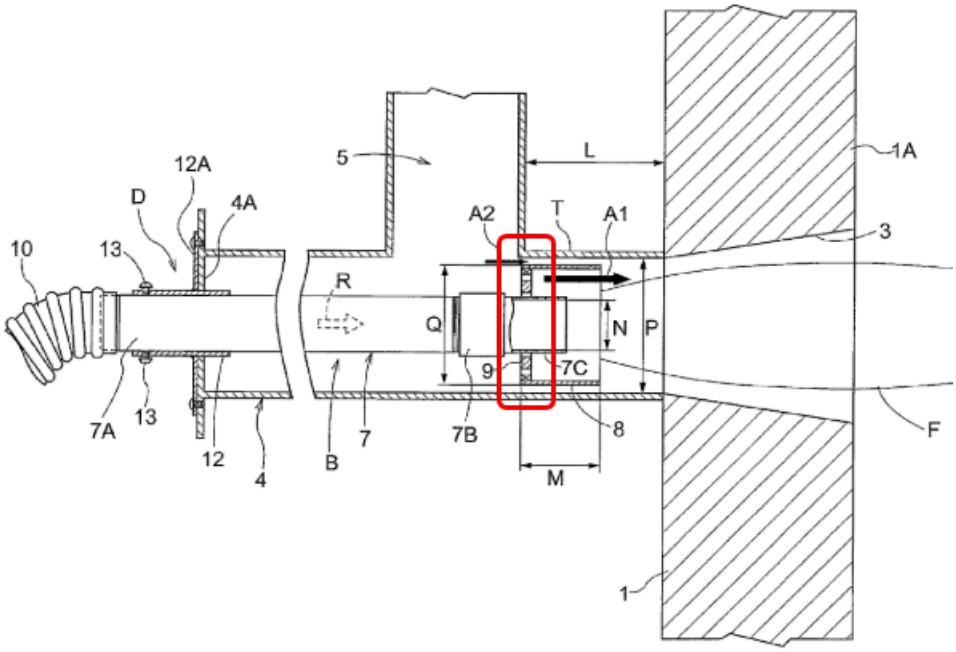
Airflow diaphragms at burner nozzle

Definition statement

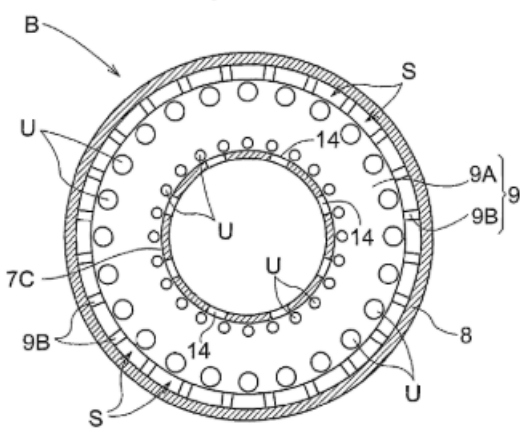
This place covers:

Illustrative example of the subject matter classified in this place:

1a. Burner with flame stabilising diaphragm (side view)



1b. Flame stabilising diaphragm (front view)



Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

diaphragm	a dividing membrane or thin partition, especially in a tube

F23D 2900/14021

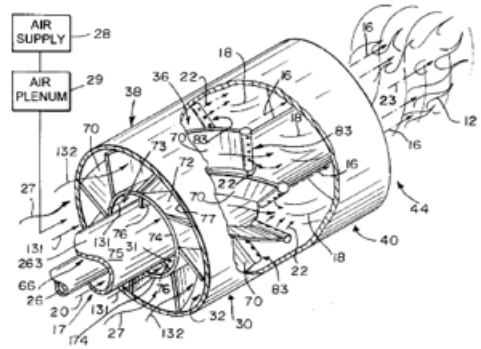
Premixing burners with swirling or vortices creating means for fuel or air

Definition statement

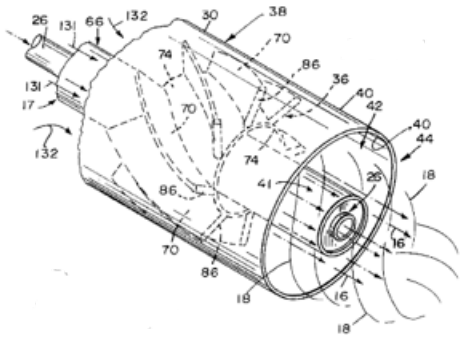
This place covers:

Illustrative example of the subject matter classified in this place:

1a.



1b.



References

Informative references

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

Post-mixing with swirling means	F23D 2900/14241
Swirling means inside the mixing tube or chamber to improve premixing	F23D 2900/14701

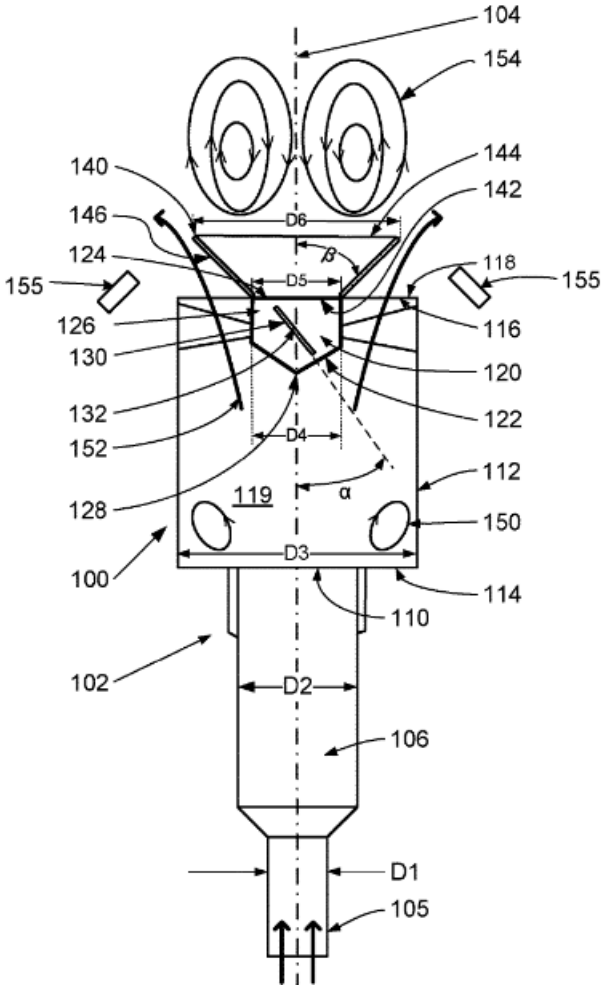
F23D 2900/14241

Post-mixing with swirling means

Definition statement

This place covers:

Illustrative example of the subject matter classified in this place:



References

Informative references

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

Premixing burners with swirling or vortices creating means for fuel or air	F23D 2900/14021
Swirling means inside the mixing tube or chamber to improve premixing	F23D 2900/14701

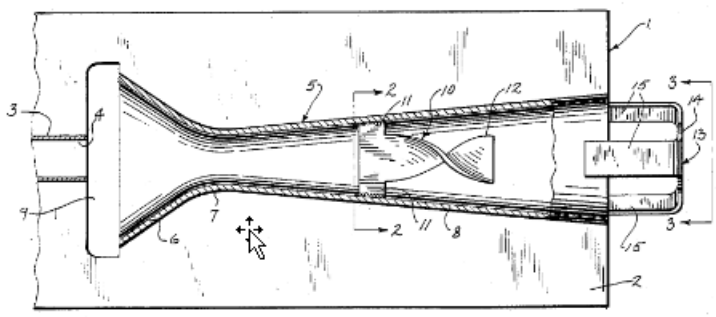
F23D 2900/14701

Swirling means inside the mixing tube or chamber to improve premixing

Definition statement

This place covers:

Illustrative example of the subject matter classified in this place:



References

Informative references

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

Premixing burners with swirling or vortices creating means for fuel or air	F23D 2900/14021
Post-mixing with swirling means	F23D 2900/14241