

ECLA**EUROPEAN CLASSIFICATION****F23C**

COMBUSTION APPARATUS USING FLUENT FUEL (combustion apparatus for solid fuel only F23B; burners F23D; constructional details of combustion chambers not otherwise provided for F23M; combustion chambers for generating combustion products of high pressure or high velocity F23R)

F23C1/00

Combustion apparatus specially adapted for combustion of two or more kinds of fuel simultaneously or alternately, at least one kind of fuel being fluent ([combustion apparatus characterised by the combination of two or more combustion chambers F23C6/00](#); pilot flame igniters [F23Q9/00](#))**[M1111]**

F23C1/02

- . lump or liquid fuel

F23C1/04

- . lump or gaseous fuel

F23C1/06

- . lump or pulverulent fuel

F23C1/08

- . liquid or gaseous fuel

F23C1/10

- . liquid or pulverulent fuel

F23C1/12

- . gaseous or pulverulent fuel

F23C3/00

Combustion apparatus characterised by the shape of the combustion chamber

F23C3/00B

- . [\[N: the chamber having an elongated tubular form, e.g. for a radiant tube\]](#)

F23C3/00C

- . [\[N: the chamber being arranged for submerged combustion \(\[F23C3/00B\]\(#\) takes precedence\)\]](#)

F23C3/00F

- . [\[N: the chamber being arranged for cyclonic combustion \(for waste \[F23G5/32\]\(#\)\)\]](#)

F23C3/00F1

- . . [\[N. for pulverulent fuel\]](#)

F23C5/00

Disposition of burners with respect to the combustion chamber or to one another; Mounting of burners in combustion apparatus ([F23C1/00](#), [F23C11/04](#) take precedence)

F23C5/02

- . Structural details of mounting

F23C5/06

- . . Provision for adjustment of burner position during operation

F23C5/08

- . Disposition of burners

F23C5/10

- . . [\[N: IPC2\]](#) to obtain a flame ring

F23C5/12

- . . . [\[N: IPC2\]](#) for pulverulent fuel

F23C5/14

- . . to obtain a single flame of concentrated or substantially planar form, e.g. pencil or sheet flame ([F23C5/32](#) takes precedence)

- F23C5/24 . . . to obtain a loop flame
- F23C5/28 . . . to obtain flames in opposing directions, e.g. impacting flames
- F23C5/32 . . . to obtain rotating flames i.e. flames moving helically or spirally

- F23C6/00** **Combustion apparatus characterised by the combination of two or more combustion chambers** [N: or combustion zones, e.g. for staged combustion]

- F23C6/02 . . in parallel arrangement

- F23C6/04 . . in series connection (consuming smoke or fumes in separate combustion apparatus [F23G7/06](#))
- F23C6/04A . . . [N: with fuel supply in stages (for staged combustion [F23C6/04B1](#))]
- F23C6/04B . . . [N: with staged combustion in a single enclosure]
- F23C6/04B1 [N: with fuel supply in stages]

- F23C7/00** **Combustion apparatus characterised by arrangements for air supply (inlets for fluidisation air [F23C10/20](#))**[M1111]

- F23C7/00A . . [N: the air being submitted to a rotary or spinning motion (cyclonic combustion chamber [F23C3/00F](#))]
- F23C7/00A1 . . . [N: using vanes]
- F23C7/00A1A [N: adjustable]

- F23C7/00B . . [N: Flow control devices ([F23C7/00A1A](#) takes precedence)]

- F23C7/02 . . Disposition of air supply not passing through burner (to obtain a cyclonic tapering flame when burning pulverulent fuel [F23C5/32](#))
- F23C7/04 . . . to obtain maximum heat transfer to wall of combustion chamber
- F23C7/06 . . . for heating the incoming air (arrangements of regenerators and recuperators [F23L15/00](#))
- F23C7/08 indirectly by a secondary fluid other than the combustion products

- F23C9/00** **Combustion apparatus characterised by arrangements for returning combustion products or flue gases to the combustion chamber (fluidised bed combustion apparatus with means for recirculation of particles entrained from the bed [F23C10/02](#); fluidised bed combustion apparatus with devices for removal and partial reintroduction of material from the bed [F23C10/26](#))** [M1111]

- F23C9/00B . . [N: for pulverulent fuel (for fluidized bed [F23C10/02](#))]
- F23C9/00C . . [N: the recirculation taking place in the combustion chamber]
- F23C9/06 . . for completing combustion
- F23C9/08 . . for reducing temperature in combustion chamber e.g. for protecting walls of combustion chamber

- F23C10/00** **Fluidised bed combustion apparatus** [N9911]

- F23C10/00B . [N: for pulverulent solid fuel ([F23C10/00D](#) to [F23C10/32](#) take precedence)] [N9911]
- F23C10/00D . [N: comprising two or more beds] [N9911]
- F23C10/00R . [N: comprising a rotating bed] [N9911]
- F23C10/01 . in a fluidised bed of catalytic particles [N0605]
- F23C10/02 . with means specially adapted for achieving or promoting a circulating movement of particles within the bed or for a recirculation of particles entrained from the bed [N9911]
- F23C10/04 . . the particles being circulated to a section, e.g. a heat-exchange section or a return duct, at least partially shielded from the combustion zone, before being reintroduced into the combustion zone [N9911]
- F23C10/06 . . . the circulating movement being promoted by inducing differing degrees of fluidisation in different parts of the bed [N9911]
- F23C10/08 . . . characterised by the arrangement of separation apparatus, e.g. cyclones, for separating particles from the flue gases [N9911]
- F23C10/10 the separation apparatus being located outside the combustion chamber [N9911]
- F23C10/12 . . the particles being circulated exclusively within the combustion zone [N9911]
- F23C10/14 . . . the circulating movement being promoted by inducing differing degrees of fluidisation in different parts of the bed [N9911]
- F23C10/16 . specially adapted for operation at superatmospheric pressures, e.g. by the arrangement of the combustion chamber and its auxiliary systems inside a pressure vessel [N9911]
- F23C10/18 . Details; Accessories [N9911]
- F23C10/20 . . Inlets for fluidisation air, e.g. grids; Bottoms [N9911]
- F23C10/22 . . Fuel feeders specially adapted for fluidised bed combustion apparatus ([F23C10/26](#) takes precedence) [N9911]
- F23C10/24 . . Devices for removal of material from the bed ([devices for controlling the level of the bed or the amount of material in the bed F23C10/30](#)) [N9911]
- F23C10/26 . . . combined with devices for partial reintroduction of material into the bed, e.g. after separation of agglomerated parts [N9911]
- F23C10/28 . . Control devices specially adapted for fluidised bed, combustion apparatus [N9911]
- F23C10/30 . . . for controlling the level of the bed or the amount of material in the bed [N9911]
- F23C10/32 by controlling the rate of recirculation of particles separated from the flue gases [N9911]
- F23C13/00** **Apparatus in which combustion takes place in the presence of catalytic material (in a fluidised bed of catalytic particles [F23C10/01](#); radiant gas burners using catalysis for flameless combustion [F23D14/18](#)) [N0605]**
- F23C13/02 . characterised by arrangements for starting the operation, e.g. for heating the catalytic material to operating temperature [N0605]
- F23C13/04 . characterised by arrangements of two or more catalytic elements in series connection [N0605]

- F23C13/06
 - in which non-catalytic combustion takes place in addition to catalytic combustion, e.g. downstream of a catalytic element [N0605]
- F23C13/08
 - characterised by the catalytic material [N0605]
- F23C15/00

Apparatus in which combustion takes place in pulses influenced by acoustic resonance in a gas mass [N: (for generating combustion products of high pressure or high velocity F23R7/00; starting devices F23D11/42)] [N0605] [C0803]
- F23C99/00

Subject-matter not provided for in other groups of this subclass [N0605]
- F23C99/00F
 - [N: Applying electric means or magnetism to combustion (for combustion engines F02B51/04, F02M27/04)] [N1111]
- F23C99/00G
 - [N: Combustion process using sound or vibrations (for combustion engines F02B51/06, F02M27/08; liquid fuel burners using ultrasonic means for spraying the fuel F23D11/34)] [N1111]
- F23C99/00H
 - [N: Suspension-type burning, i.e. fuel particles carried along with a gas flow while burning (fluidized-bed combustion apparatus F23C10/00)] [N1111]
- F23C99/00M
 - [N: Flameless combustion stabilised within a bed of porous heat-resistant material (F23C13/00 takes precedence; gas burners with radiant combustion on a porous surface F23D14/16)] [N1111]
- F23C99/00Q
 - [N: Combustion methods wherein flame cooling techniques other than fuel or air staging or fume recirculation are used] [N1111]