

**CPC****COOPERATIVE PATENT CLASSIFICATION****F23R****GENERATING COMBUSTION PRODUCTS OF HIGH PRESSURE OR HIGH VELOCITY, e.g. GAS-TURBINE COMBUSTION CHAMBERS**

(using such products for specific purposes, see the relevant classes for the purposes; chemical aspects of gas production [C06D 5/00](#); gas-turbine plants characterised by the arrangement of the combustion chamber in the plant [F02C 3/14](#); arrangement of afterburners in jet-propulsion plants [F02K 3/10](#); combustion chambers of rocket-engine plants [F02K 9/00](#))

**F23R 3/00****Continuous combustion chambers using liquid or gaseous fuel**

F23R 3/002

- {Wall structures ([F23R 3/02](#) and [F23R 3/007](#) take precedence)}

F23R 3/005

- {Combined with pressure or heat exchangers}

F23R 3/007

- {constructed mainly of ceramic components}

F23R 3/02

- characterised by the air-flow or gas-flow configuration (reverse-flow combustion chambers [F23R 3/54](#); cyclone or vortex type combustion chambers [F23R 3/58](#))

F23R 3/04

- . Air inlet arrangements

F23R 3/045

- . . {using pipes}

F23R 3/06

- . . Arrangement of apertures along the flame tube

F23R 3/08

- . . . between annular flame tube sections, e.g. flame tubes with telescopic sections

F23R 3/10

- . . . for primary air ([F23R 3/06](#), [F23R 3/045](#) take precedence)

F23R 3/12

- . . . inducing a vortex

F23R 3/14

- . . . . by using swirl vanes

F23R 3/16

- . with devices inside the flame tube or the combustion chamber to influence the air or gas flow

F23R 3/18

- . . Flame stabilising means, e.g. flame holders for after-burners of jet-propulsion plants

F23R 3/20

- . . . incorporating fuel injection means

F23R 3/22

- . . . . movable, e.g. to an inoperative position; adjustable, e.g. self-adjusting

F23R 3/24

- . . . . of the fluid-screen type

F23R 3/26

- . Controlling the air flow

F23R 3/28

- characterised by the fuel supply (burners [F23D](#))

F23R 3/283

- . {Attaching or cooling of fuel injecting means}

F23R 3/286

- . {having fuel-air premixing devices ([F23R 3/30](#) takes precedence)}

F23R 3/30

- . comprising fuel prevapourising devices

F23R 3/32

- . . being tubular

F23R 3/34

- . Feeding into different combustion zones

F23R 3/343

- . . {Pilot flames, i.e. fuel nozzles or injectors using only a very small proportion of the total fuel to insure continuous combustion (ignition in gas-turbine plants [F02C 7/264](#); pilot flame igniters [F23Q 9/00](#))}

F23R 3/346

- . . {for staged combustion}

- F23R 3/36 . . Supply of different fuels
- F23R 3/38 . . comprising rotary fuel injection means
- F23R 3/40 . characterised by the used of catalytic means
- F23R 3/42 . characterised by the arrangement or form of the flame tubes or combustion chambers
- F23R 3/425 . . {Combustion chambers comprising a tangential or helicoidal arrangement of the flame tubes}
- F23R 3/44 . . Combustion chambers comprising a {single} tubular flame tube within a tubular casing (reverse-flow combustion chambers [F23R 3/54](#))
- F23R 3/46 . . Combustion chambers comprising an annular arrangement of {several essentially tubular} flame tubes within a common annular casing or within individual casings
- F23R 3/48 . . . Flame tube interconnectors, e.g. cross-over tubes
- F23R 3/50 . . Combustion chambers comprising an annular flame tube within an annular casing (toroidal combustion chambers [F23R 3/52](#))
- F23R 3/52 . . Toroidal combustion chambers
- F23R 3/54 . . Reverse-flow combustion chambers
- F23R 3/56 . . Combustion chambers having rotary flame tubes
- F23R 3/58 . . Cyclone or vortex type combustion chambers
- F23R 3/60 . . Support structures; Attaching or mounting means

## **F23R 5/00 Continuous combustion chambers using solid or pulverulent fuel**

## **F23R 7/00 Intermittent or explosive combustion chambers**

## **F23R 2900/00 Special features of, or arrangements for continuous combustion chambers; Combustion processes therefor**

- F23R 2900/00001 . Arrangements using bellows, e.g. to adjust volumes or reduce thermal stresses
- F23R 2900/00002 . Gas turbine combustors adapted for fuels having low heating value [LHV]
- F23R 2900/00004 . Preventing formation of deposits on surfaces of gas turbine components, e.g. coke deposits
- F23R 2900/00005 . Preventing fatigue failures or reducing mechanical stress in gas turbine components
- F23R 2900/00006 . Using laser for starting or improving the combustion process
- F23R 2900/00008 . Combustion techniques using plasma gas (plasma torches [F23R 2900/00009](#))
- F23R 2900/00009 . Using plasma torches for igniting, stabilizing, or improving the combustion process
- F23R 2900/00012 . Details of sealing devices
- F23R 2900/00013 . Reducing thermo-acoustic vibrations by active means
- F23R 2900/00014 . Reducing thermo-acoustic vibrations by passive means, e.g. by Helmholtz resonators (silence apparatus using resonance [F01N 1/023](#))
- F23R 2900/00015 . Trapped vortex combustion chambers
- F23R 2900/00016 . Retrofitting in general, e.g. to respect new regulations on pollution
- F23R 2900/00017 . Assembling combustion chamber liners or subparts

- F23R 2900/00018 . Manufacturing combustion chamber liners or subparts
- F23R 2900/00019 . Repairing or maintaining combustion chamber liners or subparts
- F23R 2900/03041 . Effusion cooled combustion chamber walls or domes
- F23R 2900/03042 . Film cooled combustion chamber walls or domes
- F23R 2900/03043 . Convection cooled combustion chamber walls with means for guiding the cooling air flow ([means for creating turbulence F23R 2900/03045](#))
- F23R 2900/03044 . Impingement cooled combustion chamber walls or subassemblies
- F23R 2900/03045 . Convection cooled combustion chamber walls provided with turbolators or means for creating turbulences to increase cooling
- F23R 2900/03281 . Intermittent fuel injection or supply with plunger pump or other means therefor
- F23R 2900/03282 . High speed injection of air and/or fuel inducing internal recirculation
- F23R 2900/03341 . Sequential combustion chambers or burners
- F23R 2900/03342 . Arrangement of silo-type combustion chambers
- F23R 2900/03343 . Pilot burners operating in premixed mode