

# CPC COOPERATIVE PATENT CLASSIFICATION

## F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

### LIGHTING; HEATING

#### F23 COMBUSTION APPARATUS; COMBUSTION PROCESSES (NOTE omitted)

**F23B METHODS OR APPARATUS FOR COMBUSTION USING ONLY SOLID FUEL** (for combustion of fuels that are solid at room temperatures, but burned in melted form, e.g. candle wax, [C11C 5/00](#), [F23C](#), [F23D](#); using solid fuel suspended in air [F23C](#), [F23D 1/00](#); using solid fuel suspended in liquids [F23C](#), [F23D 11/00](#); using solid fuel and fluent fuel simultaneously or alternately [F23C](#), [F23D 17/00](#); burning of low grade fuel [F23G](#); grates [F23H](#); feeding solid fuel to combustion apparatus [F23K](#); combustion chambers, not otherwise provided for [F23M](#); domestic apparatus [F24](#); central heating boilers [F24D](#); package boilers [F24H](#))

#### NOTE

This subclass is only concerned with the combustion of lump fuel, or of pulverulent or granulated fuel if no use is made of its fluent nature.

<b>1/00</b>	<b>{Combustion apparatus using only lump fuel}</b>	<b>5/00</b>	<b>{Combustion apparatus with arrangements for burning uncombusted material from primary combustion (combustion apparatus characterised by the combination of two or more combustion chambers <a href="#">F23C 6/00</a>; the primary combustion being pulverulent fuel <a href="#">F23C 9/003</a>)}</b>
1/02	. {for indirect heating of a medium in a vessel, e.g. for boiling water ( <a href="#">steam generation F22</a> )}		
1/04	. . {External furnaces, i.e. with furnace in front of the vessel}		
1/06	. . . {for heating water-tube boilers, e.g. Tenbrink flue furnaces}	5/02	. {in main combustion chamber}
1/08	. . {Internal furnaces, i.e. with furnaces inside the vessel}	5/025	. . {recirculating uncombusted solids to combustion chamber}
1/10	. . . {for heating locomotive boilers}	5/04	. {in separate combustion chamber; on separate grate}
1/12	. . {with a plurality of combustion chambers}	<b>7/00</b>	<b>{Combustion techniques; Other solid-fuel combustion apparatus}</b>
1/16	. {the combustion apparatus being modified according to the form of grate or other fuel support ( <a href="#">for incinerators F23G 5/002</a> )}	7/002	. {characterised by gas flow arrangements}
1/165	. . {using roller grate}	7/005	. . {with draught through fuel bed and grate}
1/18	. . {using inclined grate}	7/007	. . {with fluegas recirculation to combustion chamber}
1/20	. . {using step-type grate}		
1/22	. . {using travelling grate}	<b>10/00</b>	<b>Combustion apparatus characterised by the combination of two or more combustion chambers</b>
1/24	. . {using rotating grate}		. including separate secondary combustion chambers
1/26	. . {using imperforate fuel supports}	<b>20/00</b>	<b>Combustion apparatus specially adapted for portability or transportability</b>
1/28	. . {using ridge-type grate, e.g. for combustion of peat, sawdust, or pulverulent fuel ( <a href="#">combustion of peat, sawdust F23G 7/10</a> )}	10/02	
1/30	. {characterised by the form of combustion chamber}	<b>30/00</b>	<b>Combustion apparatus with driven means for agitating the burning fuel; Combustion apparatus with driven means for advancing the burning fuel through the combustion chamber</b>
1/32	. . {rotating}		
1/34	. . {annular}	30/02	. with movable, e.g. vibratable, fuel-supporting surfaces; with fuel-supporting surfaces that have movable parts
1/36	. . {shaft-type}		
1/38	. . {for combustion of peat, sawdust, or pulverulent fuel on a grate or other fuel support ( <a href="#">combustion of peat, sawdust F23G 7/10</a> )}	30/04	. . with fuel-supporting surfaces that are rotatable around a horizontal or inclined axis and support the fuel on their inside, e.g. cylindrical grates
<b>3/00</b>	<b>{Combustion apparatus which is portable or removable with respect to the boiler or other apparatus which is heated}</b>		

- 30/06 . . with fuel supporting surfaces that are specially adapted for advancing fuel through the combustion zone
- 30/08 . . . with fuel-supporting surfaces that move through the combustion zone, e.g. with chain grates
- 30/10 . . . with fuel-supporting surfaces having fuel advancing elements that are movable, but remain essentially in the same place, e.g. with rollers or reciprocating grate bars

#### 40/00 **Combustion apparatus with driven means for feeding fuel into the combustion chamber**

- 40/02 . the fuel being fed by scattering over the fuel-supporting surface
- 40/04 . the fuel being fed from below through an opening in the fuel-supporting surface
- 40/06 . the fuel being fed along the fuel-supporting surface
- 40/08 . . into pot- or trough-shaped grates

#### 50/00 **Combustion apparatus in which the fuel is fed into or through the combustion zone by gravity, e.g. from a fuel storage situated above the combustion zone**

- 50/02 . the fuel forming a column, stack or thick layer with the combustion zone at its bottom
- 50/04 . . the movement of combustion air and flue gases being substantially transverse to the movement of the fuel
- 50/06 . . the flue gases being removed downwards through one or more openings in the fuel-supporting surface
- 50/08 . . with fuel-deflecting bodies forming free combustion spaces inside the fuel layer
- 50/10 . . with the combustion zone at the bottom of fuel-filled conduits ending at the surface of a fuel bed
- 50/12 . the fuel being fed to the combustion zone by free fall or by sliding along inclined surfaces, e.g. from a conveyor terminating above the fuel bed

#### 60/00 **Combustion apparatus in which the fuel burns essentially without moving**

- 60/02 . with combustion air supplied through a grate

#### 70/00 **Combustion apparatus characterised by means returning solid combustion residues to the combustion chamber**

#### 80/00 **Combustion apparatus characterised by means creating a distinct flow path for flue gases or for non-combusted gases given off by the fuel**

- 80/02 . by means for returning flue gases to the combustion chamber or to the combustion zone
- 80/04 . by means for guiding the flow of flue gases, e.g. baffles

#### 90/00 **Combustion methods not related to a particular type of apparatus**

##### **NOTE**

Groups [F23B 90/00](#) - [F23B 90/08](#) correspond to [IPC2012.01](#)

- 90/02 . Start-up techniques
- 90/04 . including secondary combustion ([in separate combustion chambers F23B 10/02](#))
- 90/06 . . the primary combustion being a gasification or pyrolysis in a reductive atmosphere

- 90/08 . . in the presence of catalytic material

#### **99/00 Subject matter not provided for in other groups of this subclass**

#### **2101/00 Adaptation of combustion apparatus to boilers in which the combustion chamber is situated inside the boiler vessel, e.g. surrounded by cooled surfaces**

##### **Indexing scheme related to adaptation of combustion apparatus to boilers**

#### **2103/00 Adaptation of combustion apparatus for placement in or against an opening of a boiler, e.g. for replacing an oil burner**

- 2103/02 . for producing an essentially horizontal flame

#### **2700/00 Combustion apparatus for solid fuel**

- 2700/003 . adapted for use in water-tube boilers
- 2700/004 . adapted for use in Tenbrink boilers
- 2700/005 . adapted for use in locomotives
- 2700/006 . Details of locomotive combustion apparatus
- 2700/007 . with pressurised combustion chambers
- 2700/008 . with interchangeable combustion chambers
- 2700/009 . adapted for use in various steam boilers
- 2700/01 . adapted for boilers built up from sections
- 2700/011 . with fuel shaft for steam boilers
- 2700/012 . with predrying in fuel supply area
- 2700/013 . for use in baking ovens or cooking vessels
- 2700/014 . for use in reverberatory furnaces
- 2700/018 . with fume afterburning by staged combustion
- 2700/022 . with various types of fume afterburners
- 2700/023 . with various arrangements not otherwise provided for
- 2700/037 . Burners for solid or solidified fuel, e.g. metaldehyde blocks

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#### **2900/00 Special features of, or arrangements for combustion apparatus using solid fuels; Combustion processes therefor**

- 2900/00001 . Combustion chambers with integrated fuel hopper
- 2900/00003 . Combustion devices specially adapted for burning metal fuels, e.g. Al or Mg
- 2900/00004 . Means for generating pulsating combustion of solid fuel
- 2900/00005 . Means for applying acoustical energy to flame
- 2900/00006 . Means for applying electricity to flame, e.g. an electric field
- 2900/99001 . Retrofitting or converting solid fuel stoves to gas or liquid fuels