

# 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](#))

#### NOTES

1. This subclass only covers combustion wherein the main body of fuel is either essentially stationary during combustion or mechanically transported, as opposed to pneumatically transported or suspended in air, during combustion.
2. In this subclass, the first place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.
3. In this subclass, methods are classified in the groups that cover the apparatus used. Methods that are not related to a particular type of apparatus are classified in group [F23B 90/00](#).
4. In this subclass, it is desirable to add the indexing codes of groups [F23B 2101/00](#) - [F23B 2900/00](#).

<b>1/00</b>	<b>{Combustion apparatus using only lump fuel}</b>	<b>3/00</b>	<b>{Combustion apparatus which is portable or removable with respect to the boiler or other apparatus which is heated}</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}	<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>
1/06	. . . {for heating water-tube boilers, e.g. Tenbrink flue furnaces}		
1/08	. . {Internal furnaces, i.e. with furnaces inside the vessel}	5/02	. {in main combustion chamber}
1/10	. . . {for heating locomotive boilers}	5/025	. . {recirculating uncombusted solids to combustion chamber}
1/12	. . {with a plurality of combustion chambers}	5/04	. {in separate combustion chamber; on separate grate}
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> )}	<b>7/00</b>	<b>{Combustion techniques; Other solid-fuel combustion apparatus}</b>
1/165	. . {using roller grate}	7/002	. {characterised by gas flow arrangements}
1/18	. . {using inclined grate}	7/005	. . {with downdraught through fuel bed and grate}
1/20	. . {using step-type grate}	7/007	. . {with fluegas recirculation to combustion chamber}
1/22	. . {using travelling grate}		
1/24	. . {using rotating grate}	<b>10/00</b>	<b>Combustion apparatus characterised by the combination of two or more combustion chambers</b>
1/26	. . {using imperforate fuel supports}	10/02	. including separate secondary combustion chambers
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> )}	<b>20/00</b>	<b>Combustion apparatus specially adapted for portability or transportability</b>
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}		
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> )}		

- 30/02 . with movable, e.g. vibratable, fuel-supporting surfaces; with fuel-supporting surfaces that have movable parts
- 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
- 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