

CPC**COOPERATIVE PATENT CLASSIFICATION****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.

IPC7 groups**F23B 1/00****Combustion apparatus using only lump fuel****F23B 1/02**

- for indirect heating of a medium in a vessel, e.g. for boiling water ([steam generation F22](#))

F23B 1/04

- . External furnaces, i.e. with furnace in front of the vessel

F23B 1/06

- . . for heating water-tube boilers, e.g. Tenbrink flue furnaces

F23B 1/08

- . Internal furnaces, i.e. with furnaces inside the vessel

F23B 1/10

- . . for heating locomotive boilers

F23B 1/12

- . with a plurality of combustion chambers

F23B 1/16

- the combustion apparatus being modified according to the form of grate or other fuel support [{\(for incinerators F23G 5/002\)}](#)

F23B 1/165

- . [{using roller grate}](#)

F23B 1/18

- . using inclined grate

F23B 1/20

- . using step-type grate

F23B 1/22

- . using travelling grate

F23B 1/24

- . using rotating grate

F23B 1/26

- . using imperforate fuel supports

F23B 1/28

- . using ridge-type grate, e.g. for combustion of peat, sawdust, or pulverulent fuel [{\(combustion of peat, sawdust F23G 7/10\)}](#)

F23B 1/30

- characterised by the form of combustion chamber

F23B 1/32

- . rotating

F23B 1/34

- . annular

F23B 1/36

- . shaft-type

F23B 1/38

- . for combustion of peat, sawdust, or pulverulent fuel on a grate or other fuel support [{\(combustion of peat, sawdust F23G 7/10\)}](#)

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|----------------------------|--|
| F23B 3/00 | Combustion apparatus which is portable or removable with respect to the boiler or other apparatus which is heated |
| F23B 5/00 | Combustion apparatus with arrangements for burning uncombusted material from primary combustion {(combustion apparatus characterised by the combination of two or more combustion chambers F23C 6/00 ; the primary combustion being pulverulent fuel F23C 9/003)} |
| F23B 5/02 | <ul style="list-style-type: none"> in main combustion chamber |
| F23B 5/025 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> {recirculating uncombusted solids to combustion chamber} |
| F23B 5/04 | <ul style="list-style-type: none"> in separate combustion chamber; on separate grate |
| F23B 7/00 | Combustion techniques; Other solid-fuel combustion apparatus |
| F23B 7/002 | <ul style="list-style-type: none"> {characterised by gas flow arrangements} |
| F23B 7/005 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> {with downdraught through fuel bed and grate} |
| F23B 7/007 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> {with fluegas recirculation to combustion chamber} |
| F23B 10/00 | Combustion apparatus characterised by the combination of two or more combustion chambers |
| F23B 10/02 | <ul style="list-style-type: none"> including separate secondary combustion chambers |
| F23B 20/00 | Combustion apparatus specially adapted for portability or transportability |
| F23B 30/00 | Combustion apparatus with driven means for agitating the burning fuel; Combustion apparatus with driven means for advancing the burning fuel through the combustion chamber |
| F23B 30/02 | <ul style="list-style-type: none"> with movable, e.g. vibratable, fuel-supporting surfaces; with fuel-supporting surfaces that have movable parts |
| F23B 30/04 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> with fuel-supporting surfaces that are rotatable around a horizontal or inclined axis and support the fuel on their inside, e.g. cylindrical grates |
| F23B 30/06 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> with fuel supporting surfaces that are specially adapted for advancing fuel through the combustion zone |
| F23B 30/08 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> with fuel-supporting surfaces that move through the combustion zone, e.g. with chain grates |
| F23B 30/10 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> 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 |
| F23B 40/00 | Combustion apparatus with driven means for feeding fuel into the combustion chamber |
| F23B 40/02 | <ul style="list-style-type: none"> the fuel being fed by scattering over the fuel-supporting surface |
| F23B 40/04 | <ul style="list-style-type: none"> the fuel being fed from below through an opening in the fuel-supporting surface |
| F23B 40/06 | <ul style="list-style-type: none"> the fuel being fed along the fuel-supporting surface |
| F23B 40/08 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> into pot- or through-shaped grates |
| F23B 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 |

- F23B 50/02
 - the fuel forming a column, stack or thick layer with the combustion zone at its bottom
- F23B 50/04
 - the movement of combustion air and flue gases being substantially transverse to the movement of the fuel
- F23B 50/06
 - the fuel gases being removed downwards through one or more openings in the fuel-supporting surface
- F23B 50/08
 - with fuel-deflecting bodies forming free combustion spaces inside the fuel layer
- F23B 50/10
 - with the combustion zone at the bottom of fuel-filled conduits ending at the surface of a fuel bed
- F23B 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
- F23B 60/00** **Combustion apparatus in which the fuel burns essentially without moving**
- F23B 60/02
 - with combustion air supplied through a grate
- F23B 70/00** **Combustion apparatus characterised by means returning solid combustion residues to the combustion chamber**
- F23B 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**
- F23B 80/02
 - by means for returning flue gases to the combustion chamber or to the combustion zone
- F23B 80/04
 - by means for guiding the flow of flue gases, e.g. baffles
- F23B 90/00** **Combustion methods not related to a particular type of apparatus**
- NOTE**
- Groups [F23B 90/00](#) - [F23B 90/08](#) correspond to IPC2012.01
- F23B 90/02
 - Start-up techniques
- F23B 90/04
 - including secondary combustion ([in separate combustion chambers F23B 10/02](#))
- F23B 90/06
 - the primary combustion being a gasification or pyrolysis in a reductive atmosphere
- F23B 90/08
 - in the presence of catalytic material
- F23B 99/00** **Subject matter not provided for in other groups of this subclass**
- F23B 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

- F23B 2103/00** **Adaptation of combustion apparatus for placement in or against an opening of a boiler, e.g. for replacing an oil burner**
- F23B 2103/02
 - for producing an essentially horizontal flame

F23B 2700/00

Combustion apparatus for solid fuel

- F23B 2700/003 . adapted for use in water-tube boilers
 - F23B 2700/004 . adapted for use in Tenbrink boilers
 - F23B 2700/005 . adapted for use in locomotives
 - F23B 2700/006 . Details of locomotive combustion apparatus
 - F23B 2700/007 . with pressurised combustion chambers
 - F23B 2700/008 . with interchangeable combustion chambers
 - F23B 2700/009 . adapted for use in various steam boilers
 - F23B 2700/01 . adapted for boilers built up from sections
 - F23B 2700/011 . with fuel shaft for steam boilers
 - F23B 2700/012 . with predrying in fuel supply area
 - F23B 2700/013 . for use in baking ovens or cooking vessels
 - F23B 2700/014 . for use in reverberatory furnaces
 - F23B 2700/018 . with fume afterburning by staged combustion
 - F23B 2700/022 . with various types of fume afterburners
 - F23B 2700/023 . with various arrangements not otherwise provided for
 - F23B 2700/037 . Burners for solid or solidified fuel, e.g. metaldehyde blocks
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F23B 2900/00

Special features of, or arrangements for combustion apparatus using solid fuels; Combustion processes therefor

- F23B 2900/00001 . Combustion chambers with integrated fuel hopper
- F23B 2900/00003 . Combustion devices specially adapted for burning metal fuels, e.g. Al or Mg
- F23B 2900/00004 . Means for generating pulsating combustion of solid fuel
- F23B 2900/00005 . Means for applying acoustical energy to flame
- F23B 2900/00006 . Means for applying electricity to flame, e.g. an electric field
- F23B 2900/99001 . Retrofitting or converting solid fuel stoves to gas or liquid fuels