

# CPC COOPERATIVE PATENT CLASSIFICATION

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

### LIGHTING; HEATING

## F22 STEAM GENERATION (NOTE omitted)

## F22B METHODS OF STEAM GENERATION; STEAM BOILERS

### NOTE

This subclass covers only methods of, or apparatus for, the generation of steam under pressure for heating or power purposes

#### General aspects of, or methods for, steam generation

#### 1/00 Methods of steam generation characterised by form of heating method

- 1/003 . {using combustion of hydrogen with oxygen}
- 1/006 . {using solar heat}
- 1/02 . by exploitation of the heat content of hot heat carriers
- 1/021 . . {with heating tubes in which flows a non-specified heating fluid (for nuclear reactors [F22B 1/023](#))}
- 1/023 . . {with heating tubes for nuclear reactors, as long as they are not classified according to a specified heating fluid, in another group}
- 1/025 . . . {with vertical U shaped tubes carried on a horizontal tube sheet}
- 1/026 . . . {with vertical tubes between two horizontal tube sheets}
- 1/028 . . {Steam generation using heat accumulators ([F22B 27/14](#) takes precedence)}
- 1/04 . . the heat carrier being hot slag, hot residues, or heated blocks, e.g. iron blocks
- 1/06 . . the heat carrier being molten; Use of molten metal, e.g. zinc, as heat transfer medium
- 1/063 . . . {for metal cooled nuclear reactors}
- 1/066 . . . . {with double-wall tubes having a third fluid between these walls, e.g. helium for leak detection}
- 1/08 . . the heat carrier being steam
- 1/10 . . . released from heat accumulators
- 1/12 . . . produced by an indirect cyclic process
- 1/123 . . . . {Steam generators downstream of a nuclear boiling water reactor}
- 1/126 . . . . {Steam generators of the Schmidt-Hartmann type}
- 1/14 . . . coming in direct contact with water in bulk or in sprays
- 1/143 . . . . {in combination with a nuclear installation}
- 1/146 . . . . {Loffler boilers}
- 1/16 . . the heat carrier being hot liquid or hot vapour, e.g. waste liquid, waste vapour
- 1/162 . . . {in combination with a nuclear installation}
- 1/165 . . . {using heat pipes}
- 1/167 . . . {using an organic fluid}

- 1/18 . . the heat carrier being a hot gas, e.g. waste gas such as exhaust gas of internal-combustion engines
- 1/1807 . . . {using the exhaust gases of combustion engines}
- 1/1815 . . . . {using the exhaust gases of gas-turbines}
- 1/1823 . . . {for gas-cooled nuclear reactors}
- 1/183 . . . {in combination with metallurgical converter installations}
- 1/1838 . . . {the hot gas being under a high pressure, e.g. in chemical installations}
- 1/1846 . . . . {the hot gas being loaded with particles, e.g. waste heat boilers after a coal gasification plant}
- 1/1853 . . . {coming in direct contact with water in bulk or in sprays}
- 1/1861 . . . {Waste heat boilers with supplementary firing}
- 1/1869 . . . {Hot gas water tube boilers not provided for in [F22B 1/1807](#) - [F22B 1/1861](#)}
- 1/1876 . . . . {the hot gas being loaded with particles, e.g. dust}
- 1/1884 . . . {Hot gas heating tube boilers with one or more heating tubes}
- 1/1892 . . . {Systems therefor not provided for in [F22B 1/1807](#) - [F22B 1/1861](#)}
- 1/20 . using heat evolved in a solution absorbing steam; Soda steam boilers
- 1/22 . using combustion under pressure substantially exceeding atmospheric pressure
- 1/24 . . Pressure-fired steam boilers, e.g. using turbo air compressors actuated by hot gases from boiler furnace
- 1/26 . . Steam boilers of submerged-flame type, i.e. the flame being surrounded by, or impinging on, the water to be vaporised
- 1/265 . . . {the water being in bulk}
- 1/28 . in boilers heated electrically
- 1/281 . . {other than by electrical resistances or electrodes}
- 1/282 . . {with water or steam circulating in tubes or ducts}
- 1/284 . . {with water in reservoirs}
- 1/285 . . . {the water being fed by a pump to the reservoirs}
- 1/287 . . {with water in sprays or in films}

- 1/288 . . {Instantaneous electrical steam generators built-up from heat-exchange elements arranged within a confined chamber having heat-retaining walls}
- 1/30 . . Electrode boilers
- 1/303 . . . {with means for injecting or spraying water against electrodes or with means for water circulation}
- 1/306 . . . . {with at least one electrode permanently above the water surface}
- 3/00 Other methods of steam generation; Steam boilers not provided for in other groups of this subclass**
- 3/02 . involving the use of working media other than water
- 3/04 . by drop in pressure of high-pressure hot water within pressure-reducing chambers, e.g. in accumulators
- 3/045 . . {the drop in pressure being achieved by compressors, e.g. with steam jet pumps}
- 3/06 . by transformation of mechanical, e.g. kinetic, energy into heat energy
- 3/08 . at critical or supercritical pressure values

**Kinds of steam boilers**

- 5/00 Steam boilers of drum type, i.e. without internal furnace or fire tubes, the boiler body being contacted externally by flue gas**
- 5/005 . {with rotating drums}
- 5/02 . with auxiliary water tubes outside the boiler body
- 5/04 . Component parts thereof; Accessories therefor
- 7/00 Steam boilers of furnace-tube type, i.e. the combustion of fuel being performed inside one or more furnace tubes built-in in the boiler body**
- 7/02 . without auxiliary water tubes
- 7/04 . with auxiliary water tubes
- 7/06 . . inside the furnace tube in transverse arrangements
- 7/08 . . inside the furnace tube in longitudinal arrangement
- 7/10 . . outside the boiler body
- 7/12 . with auxiliary fire tubes; Arrangement of header boxes providing for return diversion of flue gas flow
- 7/14 . with both auxiliary water tubes and auxiliary fire tubes
- 7/16 . Component parts thereof; Accessories therefor, e.g. stay-bolt connections
- 7/18 . . Walling of flues; Flue-gas header boxes
- 7/20 . . Furnace tubes
- 9/00 Steam boilers of fire-tube type, i.e. the flue gas from a combustion chamber outside the boiler body flowing through tubes built-in in the boiler body**
- 9/02 . the boiler body being disposed upright, e.g. above the combustion chamber
- 9/04 . . the fire tubes being in upright arrangement
- 9/06 . . . Arrangement of header boxes providing for return diversion of flue gas flow
- 9/08 . . the fire tubes being in horizontal arrangement
- 9/10 . the boiler body being disposed substantially horizontally, e.g. at the side of the combustion chamber
- 9/12 . . the fire tubes being in substantially-horizontal arrangement
- 9/14 . . . Arrangement of header boxes providing for return diversion of flue gas flow

- 9/16 . the boiler body containing fire tubes disposed crosswise in inclined upward arrangement
- 9/18 . Component parts thereof; Accessories therefor, e.g. stay-bolt connections
- 11/00 Steam boilers of combined fire-tube type and water-tube type, i.e. steam boilers of fire-tube type having auxiliary water tubes**
- 11/02 . the fire tubes being in upright arrangement
- 11/04 . the fire tubes being in horizontal arrangement
- 13/00 Steam boilers of fire-box type, i.e. boilers where both combustion chambers and subsequent flues or fire tubes are arranged within the boiler body**
- 13/005 . {with flues, other than fire tubes}
- 13/02 . mounted in fixed position with the boiler body disposed upright
- 13/023 . . {with auxiliary water tubes inside the fire-box, e.g. vertical tubes (F22B 13/10 takes precedence)}
- 13/026 . . . {the tubes being in substantially horizontal arrangement}
- 13/04 . mounted in fixed position with the boiler body disposed substantially horizontally
- 13/06 . Locomobile, traction-engine, steam-roller, or locomotive boilers
- 13/065 . . {Combination of low- and high-pressure locomotive boilers}
- 13/08 . . without auxiliary water tubes inside the fire-box
- 13/10 . . with auxiliary water tubes inside the fire-box
- 13/12 . . . the auxiliary water tubes lining the fire-box
- 13/14 . Component parts thereof; Accessories therefor
- 13/145 . . {Firebox thermosiphons}
- 13/16 . . Stay-bolt connections, e.g. rigid connections
- 13/18 . . . Flexible connections, e.g. of ball-and-socket type
- 15/00 Water-tube boilers of horizontal type, i.e. the water-tube sets being arranged horizontally**
- 17/00 Water-tube boilers of horizontally-inclined type, i.e. the water-tube sets being inclined slightly with respect to the horizontal plane**
- 17/02 . built-up from water-tube sets in abutting connection with two header boxes in common for all sets, e.g. with flat header boxes
- 17/025 . . {with combined inlet and outlet header boxes, e.g. connected by U-tubes or Field tubes}
- 17/04 . . the water-tube sets being inclined in opposite directions, e.g. crosswise
- 17/06 . . the water-tube sets being bent angularly
- 17/08 . . the water-tube sets being curved
- 17/10 . built-up from water-tube sets in abutting connection with two sectional headers each for every set, i.e. with headers in a number of sections across the width or height of the boiler
- 17/105 . . {with tubes in series flow arrangement}
- 17/12 . . the sectional headers being in vertical or substantially-vertical arrangement
- 17/14 . . the sectional headers being in horizontal or substantially-horizontal arrangement
- 17/16 . Component parts thereof; Accessories therefor
- 17/18 . . Header boxes; Sectional headers

<b>19/00</b>	<b>Water-tube boilers of combined horizontally-inclined type and vertical type, i.e. water-tube boilers of horizontally-inclined type having auxiliary water-tube sets in vertical or substantially-vertical arrangement</b>	21/343	. . . {the vertical radiation combustion chamber being connected at its upper part to a sideways convection chamber}
<b>21/00</b>	<b>Water-tube boilers of vertical or steeply-inclined type, i.e. the water-tube sets being arranged vertically or substantially vertically</b>	21/345	. . . {with a tube bundle between an upper and a lower drum in the convection pass}
21/002	. {involving a single upper drum (F22B 21/36 takes precedence)}	21/346	. . {Horizontal radiation boilers}
21/005	. {involving a central vertical drum, header or downcomer}	21/348	. . {Radiation boilers with a burner at the top}
21/007	. {specially adapted for locomotives}	21/36	. . involving an upper drum or headers mounted at the top of the combustion chamber
21/02	. built-up from substantially-straight water tubes	21/363	. . . {involving a horizontal drum mounted in an upper corner of the boiler}
21/04	. . involving a single upper drum and a single lower drum, e.g. the drums being arranged transversely	21/366	. . . {involving a horizontal drum mounted in the middle of the boiler}
21/06	. . . the water tubes being arranged annularly in sets, e.g. in abutting connection with drums of annular shape	21/38	. . Component parts thereof, e.g. prefabricated panels
21/065	. . . . {involving an upper and lower drum of annular shape}	21/40	. built-up from water tubes arranged in a comparatively long vertical shaft, i.e. tower boilers
21/08	. . . the water tubes being arranged sectionally in groups or in banks, e.g. bent over at their ends	<b>23/00</b>	<b>Water-tube boilers built-up from sets of spaced double-walled water tubes of return type in unilateral abutting connection with a boiler drum or with a header box, i.e. built-up from Field water tubes comprising an inner tube arranged within an outer unilaterally-closed tube</b>
21/081	. . . . {involving a combustion chamber, placed at the side and built-up from water tubes}	23/02	. the water-tube, i.e. Field-tube, sets being horizontal or substantially horizontal
21/083	. . . . {involving an upper drum and a lower drum and a fire-place between the two drums}	23/04	. the water-tube, i.e. Field-tube, sets being vertical or substantially vertical
21/085	. . . . {the tubes being placed in layers}	23/06	. Component parts thereof, e.g. Field water tubes
21/086	. . . . {Frames built-up from water tubes}	<b>25/00</b>	<b>Water-tube boilers built-up from sets of water tubes with internally-arranged flue tubes, or fire tubes, extending through the water tubes</b>
21/088	. . . . {involving an upper drum and a lower drum and two lateral drums}	<b>27/00</b>	<b>Instantaneous or flash steam boilers</b>
21/10	. . . the water tubes being arranged in staggered rows	27/02	. built-up from fire tubes
21/12	. . involving two or more upper drums and two or more lower drums, e.g. with crosswise-arranged water-tube sets in abutting connection with drums	27/04	. built-up from water tubes (F22B 27/12 - F22B 27/16 take precedence)
21/123	. . . {involving crossed water tubes}	27/06	. . bent in serpentine or sinuous form
21/126	. . . {involving more than two lower or upper drums}	27/08	. . bent helically, i.e. coiled
21/14	. . involving a single upper drum and two or more lower drums	27/10	. . bent spirally
21/16	. . . the lower drums being interconnected by further water tubes	27/12	. built-up from rotary heat-exchange elements, e.g. from tube assemblies
21/18	. . involving two or more upper drums and a single lower drum	27/14	. built-up from heat-exchange elements arranged within a confined chamber having heat-retaining walls {(F22B 1/288 takes precedence)}
21/185	. . . {involving more than two upper drums and a single lower drum}	27/16	. involving spray nozzles for sprinkling or injecting water particles on to or into hot heat-exchange elements, e.g. into tubes {(F22B 1/287 takes precedence)}
21/20	. . involving sectional or subdivided headers in separate arrangement for each water-tube set	27/165	. . {with film flow of water on heated surfaces}
21/22	. built-up from water tubes of form other than straight or substantially straight	<b>29/00</b>	<b>Steam boilers of forced-flow type</b>
21/24	. . bent in serpentine or sinuous form	29/02	. of forced-circulation type
21/26	. . bent helically, i.e. coiled	29/023	. . {without drums, i.e. without hot water storage in the boiler}
21/28	. . bent spirally	29/026	. . . {operating at critical or supercritical pressure}
21/30	. . bent in U-loop form	29/04	. of combined-circulation type, i.e. in which convection circulation due to the difference in specific gravity between cold and hot water is promoted by additional measures, e.g. by injecting pressure-water temporarily
21/32	. . . disposed horizontally in abutting connection with upright headers or rising water mains		
21/34	. built-up from water tubes grouped in panel form surrounding the combustion chamber, i.e. radiation boilers		
21/341	. . {Vertical radiation boilers with combustion in the lower part}		

29/06	<ul style="list-style-type: none"> <li>of once-through type, i.e. built-up from tubes receiving water at one end and delivering superheated steam at the other end of the tubes (combined low- and high-pressure boilers of forced-flow type F22B 33/16)</li> </ul>	33/04	<ul style="list-style-type: none"> <li>of boilers of furnace-tube type with boilers of water-tube type</li> </ul>
29/061	<ul style="list-style-type: none"> <li>{Construction of tube walls}</li> </ul>	33/06	<ul style="list-style-type: none"> <li>of boilers of furnace-tube type with boilers of fire-tube type</li> </ul>
29/062	<ul style="list-style-type: none"> <li>{involving vertically-disposed water tubes}</li> </ul>	33/08	<ul style="list-style-type: none"> <li>of boilers of water-tube type with boilers of fire-tube type</li> </ul>
29/064	<ul style="list-style-type: none"> <li>{involving horizontally- or helically-disposed water tubes}</li> </ul>	33/10	<ul style="list-style-type: none"> <li>of two or more superposed boilers with separate water volumes and operating with two or more separate water levels</li> </ul>
29/065	<ul style="list-style-type: none"> <li>{involving upper vertically disposed water tubes and lower horizontally- or helically disposed water tubes}</li> </ul>	33/12	<ul style="list-style-type: none"> <li>Self-contained steam boilers, i.e. comprising as a unit the steam boiler, the combustion apparatus, the fuel storage, accessory machines and equipment</li> </ul>
29/067	<ul style="list-style-type: none"> <li>{operating at critical or supercritical pressure}</li> </ul>	33/14	<ul style="list-style-type: none"> <li>Combinations of low- and high-pressure boilers (combination of low- and high-pressure locomotive boilers of fire-box type F22B 13/065)</li> </ul>
29/068	<ul style="list-style-type: none"> <li>{operating with superimposed recirculation during normal operation (F22B 29/12 takes precedence)}</li> </ul>	33/16	<ul style="list-style-type: none"> <li>of forced-flow type</li> </ul>
29/08	<ul style="list-style-type: none"> <li>operating with fixed point of final state of complete evaporation</li> </ul>	33/18	<ul style="list-style-type: none"> <li>Combinations of steam boilers with other apparatus</li> </ul>
29/10	<ul style="list-style-type: none"> <li>operating with sliding point of final state of complete evaporation</li> </ul>	33/185	<ul style="list-style-type: none"> <li>{in combination with a steam accumulator}</li> </ul>
29/12	<ul style="list-style-type: none"> <li>operating with superimposed recirculation during starting and low-load periods, e.g. composite boilers</li> </ul>	<b>35/00</b>	<b>Control systems for steam boilers (for regulating feed-water supply F22D 5/00; for controlling superheat temperature F22G 5/00)</b>
<b>31/00</b>	<b>Modifications of boiler construction, or of tube systems, dependent on installation of combustion apparatus; Arrangements or dispositions of combustion apparatus</b>	35/001	<ul style="list-style-type: none"> <li>{Controlling by flue-gas dampers (for superheaters F22G 5/04)}</li> </ul>
31/0007	<ul style="list-style-type: none"> <li>{with combustion in a fluidized bed}</li> </ul>	35/002	<ul style="list-style-type: none"> <li>{Control by recirculating flue gases (for superheaters F22G 5/06)}</li> </ul>
31/0015	<ul style="list-style-type: none"> <li>{for boilers of the water tube type}</li> </ul>	35/004	<ul style="list-style-type: none"> <li>{Control systems for steam generators of nuclear power plants}</li> </ul>
31/0023	<ul style="list-style-type: none"> <li>{with tubes in the bed (F22B 31/003 takes precedence)}</li> </ul>	35/005	<ul style="list-style-type: none"> <li>{Control systems for instantaneous steam boilers}</li> </ul>
31/003	<ul style="list-style-type: none"> <li>{with tubes surrounding the bed or with water tube wall partitions}</li> </ul>	35/007	<ul style="list-style-type: none"> <li>{Control systems for waste heat boilers}</li> </ul>
31/0038	<ul style="list-style-type: none"> <li>{with tubes in the bed}</li> </ul>	35/008	<ul style="list-style-type: none"> <li>{Control systems for two or more steam generators (automatic water-feed control for a number of steam boilers designed for different ranges of temperature and pressure F22D 5/36)}</li> </ul>
31/0046	<ul style="list-style-type: none"> <li>{for boilers of the shell type, e.g. with furnace box}</li> </ul>	35/02	<ul style="list-style-type: none"> <li>for steam boilers with natural convection circulation</li> </ul>
31/0053	<ul style="list-style-type: none"> <li>{with auxiliary water tubes}</li> </ul>	35/04	<ul style="list-style-type: none"> <li>during starting-up periods, i.e. during the periods between the lighting of the furnaces and the attainment of the normal operating temperature of the steam boilers</li> </ul>
31/0061	<ul style="list-style-type: none"> <li>{Constructional features of bed cooling}</li> </ul>	35/06	<ul style="list-style-type: none"> <li>for steam boilers of forced-flow type</li> </ul>
31/0069	<ul style="list-style-type: none"> <li>{Systems therefor}</li> </ul>	35/08	<ul style="list-style-type: none"> <li>of forced-circulation type</li> </ul>
31/0084	<ul style="list-style-type: none"> <li>{with recirculation of separated solids or with cooling of the bed particles outside the combustion bed}</li> </ul>	35/083	<ul style="list-style-type: none"> <li>{without drum, i.e. without hot water storage in the boiler}</li> </ul>
31/0092	<ul style="list-style-type: none"> <li>{with a fluidized heat exchange bed and a fluidized combustion bed separated by a partition, the bed particles circulating around or through that partition}</li> </ul>	35/086	<ul style="list-style-type: none"> <li>{operating at critical or supercritical pressure}</li> </ul>
31/02	<ul style="list-style-type: none"> <li>Installation of water-tube boilers in chimneys, e.g. in converter chimneys</li> </ul>	35/10	<ul style="list-style-type: none"> <li>of once-through type</li> </ul>
31/04	<ul style="list-style-type: none"> <li>Heat supply by installation of two or more combustion apparatus, e.g. of separate combustion apparatus for the boiler and the superheater respectively</li> </ul>	35/101	<ul style="list-style-type: none"> <li>{operating with superimposed recirculation during starting or low load periods, e.g. composite boilers (F22B 35/125 takes precedence)}</li> </ul>
31/045	<ul style="list-style-type: none"> <li>{Steam generators specially adapted for burning refuse}</li> </ul>	35/102	<ul style="list-style-type: none"> <li>{operating with fixed point of final state of complete evaporation, e.g. in a steam-water separator}</li> </ul>
31/06	<ul style="list-style-type: none"> <li>Installation of emergency heat supply</li> </ul>	35/104	<ul style="list-style-type: none"> <li>{Control systems by injecting water (for superheaters F22G 5/12)}</li> </ul>
31/08	<ul style="list-style-type: none"> <li>Installation of heat-exchange apparatus or of means in boilers for heating air supplied for combustion</li> </ul>	35/105	<ul style="list-style-type: none"> <li>{operating at sliding pressure}</li> </ul>
<b>Steam-generation plants; Control systems</b>		35/107	<ul style="list-style-type: none"> <li>{Control systems with auxiliary heating surfaces}</li> </ul>
<b>33/00</b>	<b>Steam-generation plants, e.g. comprising steam boilers of different types in mutual association</b>	35/108	<ul style="list-style-type: none"> <li>{Control systems for steam generators having multiple flow paths}</li> </ul>
33/02	<ul style="list-style-type: none"> <li>Combinations of boilers having a single combustion apparatus in common</li> </ul>	35/12	<ul style="list-style-type: none"> <li>operating at critical or supercritical pressure</li> </ul>
		35/125	<ul style="list-style-type: none"> <li>{operating with superimposed recirculation during starting or low load periods, e.g. composite boilers}</li> </ul>



- 35/14 . . during the starting-up periods, i.e. during the periods between the lighting of the furnaces and the attainment of the normal operating temperature of the steam boilers
- 35/16 . . responsive to the percentage of steam in the mixture of steam and water
- 35/18 . Applications of computers to steam-boiler control
- 37/00 Component parts or details of steam boilers**
- 37/001 . {Steam generators built-up from pre-fabricated elements}
- 37/002 . {specially adapted for nuclear steam generators, e.g. maintenance, repairing or inspecting equipment not otherwise provided for}
- 37/003 . . {Maintenance, repairing or inspecting equipment positioned in or via the headers}
- 37/005 . . . {Positioning apparatus specially adapted therefor (F22B 37/64 takes precedence)}
- 37/006 . . {Walking equipment, e.g. walking platforms suspended at the tube sheet}
- 37/007 . . {Installation or removal of nuclear steam generators}
- 37/008 . {Adaptations for flue-gas purification in steam generators}
- 37/02 . applicable to more than one kind or type of steam boiler
- 37/025 . . {Devices and methods for diminishing corrosion, e.g. by preventing cooling beneath the dew point}
- 37/04 . . and characterised by material, e.g. use of special steel alloy
- 37/06 . . Flue or fire tubes; Accessories therefor, e.g. fire-tube inserts
- 37/08 . . . Fittings preventing burning-off of the tube edges
- 37/10 . . Water tubes; Accessories therefor
- 37/101 . . . {Tubes having fins or ribs}
- 37/102 . . . . {Walls built-up from finned tubes}
- 37/103 . . . . {Internally ribbed tubes}
- 37/104 . . . {Connection of tubes one with the other or with collectors, drums or distributors}
- 37/105 . . . {Penetrations of tubes through a wall and their sealing}
- 37/106 . . . {Studding of tubes}
- 37/107 . . . {Protection of water tubes}
- 37/108 . . . . {Protection of water tube walls}
- 37/12 . . . Forms of water tubes, e.g. of varying cross-section
- 37/125 . . . . {Bifurcates}
- 37/14 . . . Supply mains, e.g. rising mains, down-comers, in connection with water tubes
- 37/141 . . . . {involving vertically-disposed water tubes, e.g. walls built-up from vertical tubes}
- 37/142 . . . . {involving horizontally-or helically-disposed water tubes, e.g. walls built-up from horizontal or helical tubes}
- 37/143 . . . . {Panel shaped heating surfaces built up from tubes (F22B 37/145 takes precedence)}
- 37/145 . . . . {Flag-shaped panels built-up from tubes, e.g. from U-shaped tubes}
- 37/146 . . . . {Tube arrangements for ash hoppers and grates and for combustion chambers of the cyclone or similar type out of the flues}
- 37/147 . . . . {Tube arrangements for cooling orifices, doors and burners}
- 37/148 . . . . {Tube arrangements for the roofs}
- 37/16 . . . Return bends
- 37/165 . . . . {Closures for access openings in return bends}
- 37/18 . . . Inserts, e.g. for receiving deposits from water
- 37/20 . . . Supporting arrangements, e.g. for securing water-tube sets
- 37/201 . . . . {Suspension and securing arrangements for walls built-up from tubes}
- 37/202 . . . . {Suspension and securing arrangements for contact heating surfaces}
- 37/203 . . . . . {Horizontal tubes supported only away from their ends on vertical support tubes}
- 37/204 . . . . {Supporting arrangements for individual tubes, e.g. for securing tubes to a refractory wall}
- 37/205 . . . . {Supporting and spacing arrangements for tubes of a tube bundle}
- 37/206 . . . . . {Anti-vibration supports for the bends of U-tube steam generators}
- 37/207 . . . . {Supporting arrangements for drums and collectors}
- 37/208 . . . . {Backstay arrangements}
- 37/22 . . Drums; Headers; Accessories therefor
- 37/221 . . . {Covers for drums, collectors, manholes or the like}
- 37/222 . . . . {Nozzle dams introduced through a smaller manway, e.g. foldable}
- 37/223 . . . . {Boiler plugs, e.g. for handholes}
- 37/225 . . . {Arrangements on drums or collectors for fixing tubes or for connecting collectors to each other}
- 37/226 . . . {Protection of drums against combustion}
- 37/227 . . . {Drums and collectors for mixing}
- 37/228 . . . {Headers for distributing feedwater into steam generator vessels; Accessories therefor}
- 37/24 . . Supporting, suspending or setting arrangements, e.g. heat shielding
- 37/242 . . . {for bottom supported water-tube steam generators}
- 37/244 . . . {for water-tube steam generators suspended from the top}
- 37/246 . . . {for steam generators of the reservoir type, e.g. nuclear steam generators}
- 37/248 . . . . {with a vertical cylindrical wall}
- 37/26 . . Steam-separating arrangements
- 37/261 . . . {specially adapted for boiler drums}
- 37/263 . . . {Valves with water separators}
- 37/265 . . . {Apparatus for washing and purifying steam}
- 37/266 . . . {Separator reheaters}
- 37/268 . . . {specially adapted for steam generators of nuclear power plants}
- 37/28 . . . involving reversal of direction of flow
- 37/283 . . . . {specially adapted for boiler drums}
- 37/286 . . . . {specially adapted for steam generators of nuclear power plants}
- 37/30 . . . using impingement against baffle separators
- 37/303 . . . . {specially adapted for boiler drums}
- 37/306 . . . . {specially adapted for steam generators of nuclear power plants}
- 37/32 . . . using centrifugal force
- 37/322 . . . . {specially adapted for boiler drums}
- 37/325 . . . . {using a revolving element}

- 37/327 . . . . {specially adapted for steam generators of nuclear power plants}
- 37/34 . . Adaptations of boilers for promoting water circulation (auxiliary devices for promoting water circulation [F22D 7/00](#))
- 37/36 . . Arrangements for sheathing or casing boilers
- 37/365 . . . . {Casings of metal sheets, e.g. expansion plates, expansible joints}
- 37/38 . . Determining or indicating operating conditions in steam boilers, e.g. monitoring direction or rate of water flow through water tubes
- 37/40 . . Arrangements of partition walls in flues of steam boilers, e.g. built-up from baffles
- 37/42 . . Applications, arrangements or dispositions of alarm or automatic safety devices (for feed-water heaters [F22D 1/14](#) {; emergency feed-water supply [F22D 11/003](#)})
- 37/421 . . . . {Arrangements for detecting leaks}
- 37/423 . . . . {Valves for testing steam generators}
- 37/425 . . . . {Feed-water supply alarm devices using floats}
- 37/426 . . . . {Feed-water supply alarm devices using electric signals}
- 37/428 . . . . {Feed-water supply alarm devices using dilatation of solids or liquids}
- 37/44 . . . . of safety valves
- 37/443 . . . . . {Safety devices extinguishing the fire}
- 37/446 . . . . . {Safety devices responsive to overpressure}
- 37/46 . . . . responsive to low or high water level, e.g. for checking, suppressing or extinguishing combustion in boilers
- 37/47 . . . . responsive to abnormal temperature, e.g. actuated by fusible plugs
- 37/475 . . . . . {Safety devices with fusible plugs}
- 37/48 . . Devices or arrangements for removing water, minerals or sludge from boilers (cleaning water tubes, furnace tubes or the like of boilers [F28G](#)) {; Arrangement of cleaning apparatus in boilers; Combinations thereof with boilers}
- 37/483 . . . . {specially adapted for nuclear steam generators}
- 37/486 . . . . {Devices for removing water, minerals or sludge from boilers ([F22B 37/483](#), [F22B 37/50](#), [F22B 37/52](#) and [F22B 37/54](#) take precedence)}
- 37/50 . . . . for draining or expelling water
- 37/52 . . . . Washing-out devices
- 37/54 . . . . De-sludging or blow-down devices {([F22B 37/565](#) takes precedence)}
- 37/545 . . . . . {Valves specially adapted therefor}
- 37/56 . . Boiler cleaning control devices, e.g. for ascertaining proper duration of boiler blow-down
- 37/565 . . . . {Blow-down control, e.g. for ascertaining proper duration of boiler blow-down}
- 37/58 . . Removing tubes from headers or drums; Extracting tools
- 37/60 . . specially adapted for steam boilers of instantaneous or flash type
- 37/62 . . specially adapted for steam boilers of forced-flow type
- 37/64 . . Mounting of, or supporting arrangements for, tube units
- 37/645 . . . . {involving upper vertically-disposed water tubes and lower horizontally- or helically disposed water tubes}
- 37/66 . . . . involving vertically-disposed water tubes {([F22B 37/645](#) takes precedence)}
- 37/68 . . . . involving horizontally-disposed water tubes {([F22B 37/645](#) takes precedence)}
- 37/70 . . Arrangements for distributing water into water tubes
- 37/72 . . . . involving injection devices
- 37/74 . . . . Throttling arrangements for tubes or sets of tubes
- 37/76 . . Adaptations or mounting of devices for observing existence or direction of fluid flow
- 37/78 . . Adaptations or mounting of level indicators