

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

		1/18	. . . the heat carrier being a hot gas, e.g. waste gas such as exhaust gas of internal-combustion engines
1/00	Methods of steam generation characterised by form of heating method		
1/003	. {using combustion of hydrogen with oxygen}	1/1807	. . . . {using the exhaust gases of combustion engines}
1/006	. {using solar heat}		
1/02	. by exploitation of the heat content of hot heat carriers	1/1815	. . . . {using the exhaust gases of gas-turbines}
		1/1823	. . . . {for gas-cooled nuclear reactors}
1/021	. . {with heating tubes in which flows a non-specified heating fluid (for nuclear reactors F22B 1/023)}	1/183	. . . . {in combination with metallurgical converter installations}
		1/1838	. . . . {the hot gas being under a high pressure, e.g. in chemical installations}
1/023	. . {with heating tubes for nuclear reactors, as long as they are not classified according to a specified heating fluid, in another group}	1/1846	. . . . {the hot gas being loaded with particles, e.g. waste heat boilers after a coal gasification plant}
1/025	. . . . {with vertical U shaped tubes carried on a horizontal tube sheet}	1/1853	. . . . {coming in direct contact with water in bulk or in sprays}
1/026	. . . . {with vertical tubes between two horizontal tube sheets}	1/1861	. . . . {Waste heat boilers with supplementary firing}
1/028	. . {Steam generation using heat accumulators (F22B 27/14 takes precedence)}	1/1869	. . . . {Hot gas water tube boilers not provided for in F22B 1/1807 - F22B 1/1861 }
1/04	. . the heat carrier being hot slag, hot residues, or heated blocks, e.g. iron blocks	1/1876	. . . . {the hot gas being loaded with particles, e.g. dust}
1/06	. . the heat carrier being molten; Use of molten metal, e.g. zinc, as heat transfer medium	1/1884	. . . . {Hot gas heating tube boilers with one or more heating tubes}
1/063	. . . . {for metal cooled nuclear reactors}	1/1892	. . . . {Systems therefor not provided for in F22B 1/1807 - F22B 1/1861 }
1/066	. . . . {with double-wall tubes having a third fluid between these walls, e.g. helium for leak detection}	1/20	. using heat evolved in a solution absorbing steam; Soda steam boilers
1/08	. . the heat carrier being steam	1/22	. using combustion under pressure substantially exceeding atmospheric pressure
1/10	. . . released from heat accumulators	1/24	. . Pressure-fired steam boilers, e.g. using turbo air compressors actuated by hot gases from boiler furnace
1/12	. . . produced by an indirect cyclic process		
1/123	. . . . {Steam generators downstream of a nuclear boiling water reactor}	1/26	. . Steam boilers of submerged-flame type, i.e. the flame being surrounded by, or impinging on, the water to be vaporised
1/126	. . . . {Steam generators of the Schmidt-Hartmann type}	1/265	. . . . {the water being in bulk}
1/14	. . . coming in direct contact with water in bulk or in sprays	1/28	. in boilers heated electrically
1/143	. . . . {in combination with a nuclear installation}	1/281	. . {other than by electrical resistances or electrodes}
1/146	. . . . {Loffler boilers}	1/282	. . {with water or steam circulating in tubes or ducts}
1/16	. . the heat carrier being hot liquid or hot vapour, e.g. waste liquid, waste vapour	1/284	. . {with water in reservoirs}
1/162	. . . . {in combination with a nuclear installation}	1/285	. . . . {the water being fed by a pump to the reservoirs}
1/165	. . . . {using heat pipes}		
1/167	. . . . {using an organic fluid}	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

19/00	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	21/343	. . . {the vertical radiation combustion chamber being connected at its upper part to a sideways convection chamber}
		21/345	. . . {with a tube bundle between an upper and a lower drum in the convection pass}
21/00	Water-tube boilers of vertical or steeply-inclined type, i.e. the water-tube sets being arranged vertically or substantially vertically	21/346	. . {Horizontal radiation boilers}
		21/348	. . {Radiation boilers with a burner at the top}
21/002	. {involving a single upper drum (F22B 21/36 takes precedence)}	21/36	. . involving an upper drum or headers mounted at the top of the combustion chamber
21/005	. {involving a central vertical drum, header or downcomer}	21/363	. . . {involving a horizontal drum mounted in an upper corner of the boiler}
21/007	. {specially adapted for locomotives}	21/366	. . . {involving a horizontal drum mounted in the middle of the boiler}
21/02	. built-up from substantially-straight water tubes	21/38	. . Component parts thereof, e.g. prefabricated panels
21/04	. . involving a single upper drum and a single lower drum, e.g. the drums being arranged transversely	21/40	. built-up from water tubes arranged in a comparatively long vertical shaft, i.e. tower boilers
21/06	. . . the water tubes being arranged annularly in sets, e.g. in abutting connection with drums of annular shape	23/00	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
21/065	. . . . {involving an upper and lower drum of annular shape}		. the water-tube, i.e. Field-tube, sets being horizontal or substantially horizontal
21/08	. . . the water tubes being arranged sectionally in groups or in banks, e.g. bent over at their ends	23/02	. the water-tube, i.e. Field-tube, sets being vertical or substantially vertical
21/081	. . . . {involving a combustion chamber, placed at the side and built-up from water tubes}	23/04	. Component parts thereof, e.g. Field water tubes
21/083	. . . . {involving an upper drum and a lower drum and a fire-place between the two drums}	25/00	Water-tube boilers built-up from sets of water tubes with internally-arranged flue tubes, or fire tubes, extending through the water tubes
21/085	. . . . {the tubes being placed in layers}	27/00	Instantaneous or flash steam boilers
21/086	. . . . {Frames built-up from water tubes}	27/02	. built-up from fire tubes
21/088	. . . . {involving an upper drum and a lower drum and two lateral drums}	27/04	. built-up from water tubes (F22B 27/12 - F22B 27/16 take precedence)
21/10	. . . the water tubes being arranged in staggered rows	27/06	. . bent in serpentine or sinuous form
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	27/08	. . bent helically, i.e. coiled
21/123	. . . {involving crossed water tubes}	27/10	. . bent spirally
21/126	. . . {involving more than two lower or upper drums}	27/12	. built-up from rotary heat-exchange elements, e.g. from tube assemblies
21/14	. . involving a single upper drum and two or more lower drums	27/14	. built-up from heat-exchange elements arranged within a confined chamber having heat-retaining walls (F22B 1/288 takes precedence)
21/16	. . . the lower drums being interconnected by further water tubes	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)
21/18	. . involving two or more upper drums and a single lower drum	27/165	. . {with film flow of water on heated surfaces}
21/185	. . . {involving more than two upper drums and a single lower drum}	29/00	Steam boilers of forced-flow type
21/20	. . involving sectional or subdivided headers in separate arrangement for each water-tube set	29/02	. of forced-circulation type
21/22	. built-up from water tubes of form other than straight or substantially straight	29/023	. . {without drums, i.e. without hot water storage in the boiler}
21/24	. . bent in serpentine or sinuous form	29/026	. . . {operating at critical or supercritical pressure}
21/26	. . bent helically, i.e. coiled	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
21/28	. . bent spirally		
21/30	. . bent in U-loop form		
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	. 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)	33/04	. . of boilers of furnace-tube type with boilers of water-tube type
29/061	. . {Construction of tube walls}	33/06	. . of boilers of furnace-tube type with boilers of fire-tube type
29/062	. . . {involving vertically-disposed water tubes}	33/08	. . of boilers of water-tube type with boilers of fire-tube type
29/064	. . . {involving horizontally- or helically-disposed water tubes}	33/10	. . of two or more superposed boilers with separate water volumes and operating with two or more separate water levels
29/065	. . . {involving upper vertically disposed water tubes and lower horizontally- or helically disposed water tubes}	33/12	. Self-contained steam boilers, i.e. comprising as a unit the steam boiler, the combustion apparatus, the fuel storage, accessory machines and equipment
29/067	. . {operating at critical or supercritical pressure}	33/14	. Combinations of low- and high-pressure boilers { (combination of low- and high-pressure locomotive boilers of fire-box type F22B 13/065) }
29/068	. . {operating with superimposed recirculation during normal operation (F22B 29/12 takes precedence)}	33/16	. . of forced-flow type
29/08	. . operating with fixed point of final state of complete evaporation	33/18	. Combinations of steam boilers with other apparatus
29/10	. . operating with sliding point of final state of complete evaporation	33/185	. . {in combination with a steam accumulator}
29/12	. . operating with superimposed recirculation during starting and low-load periods, e.g. composite boilers	35/00	Control systems for steam boilers (for regulating feed-water supply F22D 5/00; for controlling superheat temperature F22G 5/00)
31/00	Modifications of boiler construction, or of tube systems, dependent on installation of combustion apparatus; Arrangements or dispositions of combustion apparatus	35/001	. {Controlling by flue-gas dampers (for superheaters F22G 5/04)}
31/0007	. {with combustion in a fluidized bed}	35/002	. {Control by recirculating flue gases (for superheaters F22G 5/06)}
31/0015	. . {for boilers of the water tube type}	35/004	. {Control systems for steam generators of nuclear power plants}
31/0023	. . . {with tubes in the bed (F22B 31/003 takes precedence)}	35/005	. {Control systems for instantaneous steam boilers}
31/003	. . . {with tubes surrounding the bed or with water tube wall partitions}	35/007	. {Control systems for waste heat boilers}
31/0038	. . . . {with tubes in the bed}	35/008	. {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)}
31/0046	. . {for boilers of the shell type, e.g. with furnace box}	35/02	. for steam boilers with natural convection circulation
31/0053	. . . {with auxiliary water tubes}	35/04	. . 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
31/0061	. . {Constructional features of bed cooling}	35/06	. for steam boilers of forced-flow type
31/0069	. . {Systems therefor}	35/08	. . of forced-circulation type
31/0084	. . {with recirculation of separated solids or with cooling of the bed particles outside the combustion bed}	35/083	. . . {without drum, i.e. without hot water storage in the boiler}
31/0092	. . . {with a fluidized heat exchange bed and a fluidized combustion bed separated by a partition, the bed particles circulating around or through that partition}	35/086	. . . . {operating at critical or supercritical pressure}
31/02	. Installation of water-tube boilers in chimneys, e.g. in converter chimneys	35/10	. . of once-through type
31/04	. Heat supply by installation of two or more combustion apparatus, e.g. of separate combustion apparatus for the boiler and the superheater respectively	35/101	. . . {operating with superimposed recirculation during starting or low load periods, e.g. composite boilers (F22B 35/125 takes precedence)}
31/045	. . {Steam generators specially adapted for burning refuse}	35/102	. . . {operating with fixed point of final state of complete evaporation, e.g. in a steam-water separator}
31/06	. . Installation of emergency heat supply	35/104	. . . {Control systems by injecting water (for superheaters F22G 5/12)}
31/08	. Installation of heat-exchange apparatus or of means in boilers for heating air supplied for combustion	35/105	. . . {operating at sliding pressure}
		35/107	. . . {Control systems with auxiliary heating surfaces}
		35/108	. . . {Control systems for steam generators having multiple flow paths}
Steam-generation plants; Control systems		35/12	. . . operating at critical or supercritical pressure
33/00	Steam-generation plants, e.g. comprising steam boilers of different types in mutual association	35/125	. . . . {operating with superimposed recirculation during starting or low load periods, e.g. composite boilers}
33/02	. Combinations of boilers having a single combustion apparatus in common		

- 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