CLASS 122, LIQUID HEATERS AND VAPORIZERS

SECTION I - CLASS DEFINITION

This class relates to heating liquids, generating vapors from liquids, treating the vapors generated for use, such as superheating or cooling them, and conserving the heat remaining in the liquid or vapor after a part of the heat energy has been made use of for any purpose. To bring a liquid heater into this class, the chamber, receptacle or conduit in which the liquid is heated must be fluid tight.

This class includes combinations of steam superheaters, feed-water heaters, steam separators, condensers, traps, manhole-closures, safety devices, cleaners, and feeders with a boiler when the structure of necessity must form a part of the boiler structure combination, also parts of boilers unless they are of general application.

This class includes water-cooled grates whether or not in connection with a boiler for heating the boiler water. It also includes the boiler and furnace in combination or the boiler alone with the furnace alone.

The liquid containers classified in this class may be heated by solid or fluid fuel burned in any type of furnace or burner, by friction, or by chemical action other than combustion, or by electricity. The heat may be applied directly to the walls of the fluid containing chamber or indirectly by the interposition of a fluid in a distinct and separate chamber, which fluid being heated may impart its heat to the fluid to be finally heated. When the fluid is heated by the interposition of another fluid the heat generator must be a part of the unitary structure of the fluid heater, with one exception--to wit: devices for generating a vapor having a vapor separator within the fluid chamber may be heated indirectly by a fluid, the furnace for heating which does not form part of the unitary structure. The fluid may be heated also by a heat radiating body in either a liquid, or solid state, which body may be either on the inside or on the outside of the fluid chamber; but if said heating body be inside the fluid chamber its nature must be such that it will not mix with the fluid to be heated.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

The distinction between water heaters in Classes 122 and 126 is this: The water heaters in Class 122 have a closed water containing chamber or receptacle for holding the water while it is heated or have one or more closed conduits through which the water flows while being heated; but the water heaters in class 126 are of the open type. In Class 122 are classified mechanism for regulating both the inflow of water to the boiler and the burning of the fuel in all cases when steam is generated and also in all cases when water is heated, excepting in devices for heating water where the opening of a valve to permit water to flow through the heater at the same time increases the heat of the heat generator, such devices being classified in Class 126, subclasses 351; but this subclass relates only to the controlling device for the water and fuel. The structure of the water heater or boiler together with such a controlling mechanism are classified in Class 122.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

15, Brushing, Scrubbing, and General Cleaning, subclass 104.03 for pipe and tube cleaners generally 314, 316.1+ and 406+ for pipe and tube cleaners and boiler tube blowers using air or steam blast and/or suction.

29, Metal Working, subclass 890.051 for a method of making a boiler or subclass 890.07 for a method of making a condenser, evaporator, or vaporizer.

60, Power Plants, where combustion products are used as a motive fluid, subclasses 39.53 through 39.59 including addition of steam or water, or subclass 775 including introducing water or steam; or subclasses 641.1-641.15 using natural heat (e.g., sun, air, water, earth, etc.).

68, Textiles: Fluid Treating Apparatus, having significant structure for fluid treatment of a textile, subclass 15 for a textile fluid treating machine combined with a tank heater, or subclass 222 for an implement to apply steam to a textile.

73, Measuring and Testing, subclasses 215+ for weir maters combined with feed water heater structures.

99, Foods and Beverages: Apparatus, subclasses 276, 277, and 359+ for beverages and food cookers using liquid heaters pertinent to this class; and subclasses 468+ for treatment of dairy food which includes milk treating apparatus using liquid heaters.

116, Signals and Indicators, for signals.

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 5 for a cooking and heating stove having a water heater or steam generator; subclasses 20-20.2 for a cooking oven heated by steam or hot water; subclass 31 for a cooking stove having a water heater in a flue extension; subclasses 34 and 35 for a cooking stove having a water back; subclass 101 for a hot air furnace combined with a boiler; subclasses 344-363.1 for a liquid heater that may include a kettle, a steam generator, stove pipe for use with a stove, and a domestic water heater or boiler (e.g., kitchen boiler, range boiler, etc.) for use with a stove or furnace; subclasses 513 and 514 for a fireplace with a liquid heater; subclasses 561-568 for a solar heat collector for a pond or pool; subclasses 569-713 for a solar heat collector that may include a fluid medium; or subclass 714 for a process of heating by using solar heat.

137, Fluid Handling, subclass 11 for processes for regulating the boiler water level, subclass 94 for the control of the fuel in response to boiler or water heater condition subclasses 156+ for gas pressure discharge of liquid as to a boiler, subclasses 171+ for steam traps, subclasses 386+ for level responsive valves, and subclasses 557 and 558 for pressure and level responsive signals and indicators.

138, Pipes and Tubular Conduits, appropriate subclasses for the wall structure of a boiler tube or flue; subclasses 89+ for plugs for pipes; and subclasses 98+ for patches for pipes.

165, Heat Exchange, appropriate subclass, for a heat exchanger, per se.

202, Distillation: Apparatus, subclasses 152+ for liquid volatilization for the purpose of recovering material from the vapor produced by condensation or absorption.

204, Chemistry: Electrical and Wave Energy, subclasses 196.01 through 196.38 for electrolytic protection apparatus (e.g., to prevent corrosion, scale formation, or other objectionable action upon liquid heaters or vaporizers, etc.).

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 724 through 740 for processes of electrolytic protection of metal objects (e.g., to prevent corrosion, scale formation, or other objectionable action upon liquid heaters or vaporizers, etc.).

210, Liquid Purification or Separation, subclasses 175+ for a heater or heat exchanger combined with liquid purification means.

219, Electric Heating, subclasses 281+ for water heaters and steam generators particularly adapted to be heated by an electric heater.

220, Receptacles, appropriate subclasses, for wall structures of containers of more general utility and for safety devices and for manhole covers.

237, Heating Systems, for an apparatus or process of heating an enclosure, subclass 7 for a combined radiator and boiler having automatic control, or subclasses 16-18 for a combined boiler and radiator.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 30 for furnace lining formation or repair and see the notes thereto.

411, Expanded, Threaded, Driven, Headed, Tool-Deformed, or Locked-Threaded Fastener, subclass 367 for a threaded fastener and nut having stay bolt spacer sleeve; subclass 370 for a threaded fastener and nut having a stay bolt bearing washer; subclasses 379+ for a threaded stay bolt, per se; and subclass 505 for an unthreaded stay bolt, per se.

417, Pumps, subclasses 36+ for liquid level control of a pump drive motor, subclasses 108+ for aerated column type pumps wherein is elevated by alternate globules of water and steam and subclasses 118+ for pumping of liquid by supplying or exhausting of gaseous motive fluid to or from a pump chamber.

451, Abrading, for structural features of a cleaner for a tube or flue.

510, Cleaning Compositions for Solid Surfaces, Auxiliary Compositions Therefor, or Processes of Preparing the Compositions, subclasses 247+ for compositions for descaling steam boilers or other water containers.

SECTION IV - GLOSSARY

BOILER

Used as a generic term for a liquid heater. The nature of the liquid heated is immaterial. Whether the liquid heated is conducted from the boiler as liquid or vapor depends upon the amount supplied and the degree of heat attained, and for this reason generally no distinction has been noted in the classification, similar structures being classified together regardless of the ultimate effect. In the type of boilers known as “flashers” this

distinction is of importance and provision has been made therefor.

FIRE TUBES

Include both small and large tubes through which the products of combustion pass unless the term "flue" is used with them, in which case "fire tubes" would refer to the small tubes, and "flues" to the large tubes for the products of combustion.

STEAM

To be taken in a generic sense as meaning vapor.

STEAM TUBES

Designate vapor tubes whether the vapor therein be formed from water or any other liquid.

WATER TUBES

Designate tubes, both large and small, through which liquid or vapor passes.

WATER

To be taken in a generic sense as meaning liquid.

SUBCLASSES

1 PLANTS:
This subclass is indented under the class definition. Combinations of elements and devices each performing different functions for the conservation of the heat generated in the furnace, the ultimate object of which is the production of steam or the heating of water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
21, for "alkali" steam generators.
448.1, 449, 450, and 452, for regulating means.

SEE OR SEARCH CLASS:
60, Power Plants, generally for devices peculiar to that class.
91, Motors: Expansible Chamber Type, for plants involving the steam engine structure.
123, Internal-Combustion Engines, subclasses 2+ for combinations of internal combustion motors and other engines and steam boilers.
237, Heating Systems, subclasses 12.1 and 13 for vehicle plant and heating systems.
418, Rotary Expansible Chamber Devices, for plants involving rotary expansible chamber structure.

2 Garbage:
This subclass is indented under subclass 1. Plants for the destruction of garbage relating either to the arrangement of the boiler or the boiler structure adapted for this special purpose.

SEE OR SEARCH THIS CLASS, SUBCLASS:
232, and 376, for water grate structure adapted to burn garbage or other waste material.

SEE OR SEARCH CLASS:
110, Furnaces, subclass 234, for garbage plants with a conventional arrangement of a boiler therewith.

3 Motor vehicle:
This subclass is indented under subclass 1. Boiler plants specially adapted for motor vehicles.

SEE OR SEARCH THIS CLASS, SUBCLASS:
446+, 448.1, 449, and 452, for analogous structure.

SEE OR SEARCH CLASS:
60, Power Plants, subclass 668 for a steam power system physically related to a vehicle.
180, Motor Vehicles, subclasses 36+ for a motor vehicle of the steam traction engine type; subclasses 303+ for a motor vehicle having a traction motor of the kind which is driven by expansible gas from a source external of the motor and wherein the gas is produced by treating a volatile fluid (e.g., the gas is steam); and subclass 310 for a motor vehicle having means to generate steam for a propulsion purpose.

4 MISCELLANEOUS:
This subclass is indented under the class definition. Boilers and parts thereof not otherwise classifiable.

5 GAS-PRODUCER:
This subclass is indented under the class definition. Subject matter relating to combinations of a gas producing furnace and boiler when the structure of the boiler is intimately associated with the producer, so as to form a unitary structure, the gas from the producer being burned to heat the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
6+, for boilers heated by gas passing through a boiler from a gas producer, the heat of the hot gas being used for heating the boiler.

SEE OR SEARCH CLASS:
48, Gas: Heating and Illuminating, for gas making plants including a boiler.
110, Furnaces, subclass 229 for gas producer furnaces and see the notes therewith.

5.51 AIR-INJECTED:
This subclass is indented under the class definition. Devices for vaporizing a liquid, with means for mingling air therewith in the vaporizer.

5.52 Combustion gas and vapor contact:
This subclass is indented under subclass 5.51. Devices wherein the vapor is combined with the byproducts of burning fuels.

6 INDUSTRIAL:
This subclass is indented under the class definition. Subject matter relating to boilers, water heaters, or cooling devices for furnace walls having a closed chamber or conduit combined with a conventional type of furnace employed in a special art.

(1) Note. If the cooling device is not a closed chamber or conduit, it will be classified in the type of furnace of the special art. Class 122 includes such devices known as bosh plates, water cooled walls and roofs, linings, and water cooled tuyeres when the cooling device is a closed chamber or conduit and there is otherwise no novelty in the invention.

SEE OR SEARCH CLASS:
48, Gas: Heating and Illuminating, subclasses 63+ and 67, for gas producers using similar structure.
266, Metallurgical Apparatus, subclasses 190 and 241 for cooling features in devices of that class.
431, Combustion, subclass 160 for a furnace type combustion chamber having means directing nonliquid cooling medium across elements of a device dispersing fuel into a furnace.
432, Heating, subclasses 233+ for a residual material heating apparatus element having protective cooling structure.

6.5 Port:
This subclass is indented under subclass 6. Subject matter comprising water circulation devices applied to the gas or air ports of a furnace.

SEE OR SEARCH CLASS:
431, Combustion, subclass 160 for a fuel disperser installed in a combustion chamber cooled by a gas additional to the combustion materials.
432, Heating, subclass 173 for a specific furnace having a protective cooling means for combustion material feed structure.

6.6 Tuyeres:
This subclass is indented under subclass 6. Subject matter comprising conduits for feeding air to furnaces and provided with a closed water-circulation.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 182.5+ for tuyeres of general application and for other water circulation means therefor.
266, Metallurgical Apparatus, subclasses 265+ and especially 270 for tuyeres used in metallurgical apparatus which may include a liquid cooled tuyere element where the tuyere element is

combined with additional structure, as for example, an external gas supply pipe, means for feeding diverse materials, flow control valves or a tuyere cooler, Further, see subclasses 186+ and 218+ for tuyeres combined with the treating vessel.

6.7 Forge:
This subclass is indented under subclass 6.6. Devices with water circulation, of a type used in a forge and in which the direction of the air blast is usually vertical.

SEE OR SEARCH CLASS:
110, Furnaces, subclass 182.6 for tuyeres in forge furnaces.

7 Waste heat:
This subclass is indented under subclass 6. Devices comprising combinations of a conventional type of industrial furnace and a boiler located so as to be heated by the waste heat of the furnace.

SEE OR SEARCH THIS CLASS, SUBCLASS:
20, 421 and 470, for analogous devices.

SEE OR SEARCH CLASS:
432, Heating, subclasses 90+ for (1) a structure in which the waste heat of a nominal boiler heats a material heating chamber of the Class 432 type (2) a structure in which the waste heat of a specific furnace heats a closed water chamber or conduit or (3) for a residual combination of a liquid heater and a work heater of the Class 432 type in which the heated liquid is utilized in heating the work.

8 Water firebox:
This subclass is indented under subclass 6. Industrial boilers having a water jacket firebox.

9 Water tube type:
This subclass is indented under subclass 8. Industrial boilers including a firebox the walls of which are provided with water containing tubes.

10 FOR FLUID FUEL BURNER:
This subclass is indented under the class definition. Boilers for generating steam for feeding a fluid fuel burner.

SEE OR SEARCH CLASS:
431, Combustion, subclasses 207+ for a burner assembly including as an element a supply line in which burner feed; e.g., air, oil, or fuel atomizing water; is heated.

11 ROTARY:
This subclass is indented under the class definition. Boilers in which a substantial part or the whole of the fluid-containing chamber is designed to be continuously-rotated while heating the water or generating steam.

12 ROTATABLY SUPPORTED:
This subclass is indented under the class definition. Boilers that are supported in bearings so that the whole boiler or a substantial part thereof may be turned on an axis, generally either vertical or horizontal, after its connecting steam and water pipes have been uncoupled.

13.01 STAND BOILER (E.G., WATER HEATER, ETC.):
This subclass is indented under the class definition. Subject matter comprising heating means applied directly or indirectly to the wall of the fluid containing chamber, where the fluid is water, to provide hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.).

(1) Note. The stand boiler (e.g., water heater, etc.) may be found in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) to provide hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
20, for a subsidiary liquid heater consisting of a pipe, coil, hollow plate, or cylinder in a firebox, combustion chamber, or offtake flue of a furnace

in a boiler to generate steam or hot liquid for other than the boiler.

233, for a horizontal disposed tank combined with a wall of a furnace.

234, for a vertically disposed tank combined with heating means.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclasses 350.1 through 350.2 for a fluid fuel burner other than a top-accessible liquid heating vessel.

220, Receptacles, subclass 567.3 for a stationary tank for a hot water heater or boiler.

392, Electric Resistance Heating Devices, subclasses 322 and 323 for an electrically conductive fluid (e.g., water, etc.) forming part of the circuit that heats the fluid including a reservoir or tank, or subclasses 449-464 for a line-connected tank- or container-type liquid heater.

13.3 And delivery means to dispensing feature:

This subclass is indented under subclass 13.01. Subject matter and means to convey the hot water from the stand boiler to some end use such as a domestic fixture (e.g., faucet, shower, washing machine, dishwasher, etc.).

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 362.1 for a boiler receiving hot liquid or steam from a stove or furnace (e.g., kitchen boiler, range boiler, etc.) having liquid circulation means, or subclass 365.1 for a liquid heater and stovepipe having liquid circulation means.

237, Heating Systems, for an apparatus or process of heating an enclosure, subclass 7 for a combined radiator and boiler having automatic control or subclasses 16-18 for a combined boiler and radiator.

14.1 And condition responsive feature:

This subclass is indented under subclass 13.01. Subject matter and means to sense a state or change in the state of the stand boiler or the water heated by the stand boiler to effect a change in the operation of the stand boiler or the heated water.

SEE OR SEARCH THIS CLASS, SUBCLASS:

448.1 through 448.4, for automatic control of fluid fuel and feed water to a boiler.

504 through 507, for a boiler safety device.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 351.1 for a fluid fuel burner other than a top-accessible liquid heating vessel and a condition responsive feature or subclass 374.1 for an open-top liquid heating vessel that may include a lid and a condition responsive feature.

340, Communications: Electrical, subclasses 500 through 693.12 for an electrical automatic condition responsive indicating system.

14.2 Controls burner:

This subclass is indented under subclass 14.1. Subject matter wherein the condition responsive feature effects change in the burner.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 94 for a condition responsive system where fuel is proportioned or correlated to some boiler or water system condition.

14.21 By other than temperature of water:

This subclass is indented under subclass 14.2. Subject matter wherein the condition responsive feature controls the burner by other than responding to the condition of the water having a degree of hotness or coldness measured on a definite scale.

(1) Note. This may also include a temperature condition responsive means for the liquid.

14.22 By temperature of water in water containing chamber or external tank:
This subclass is indented under subclass 14.2. Subject matter wherein the condition responsive feature controls the burner by responding to the condition of the water having a degree of hotness or coldness measured on a definite scale stored in the water containing chamber or a closed receptacle outside of and for storing water heated by the stand boiler.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclasses 100 through 207 for a temperature measuring device (e.g., thermometer, etc.).

14.3 Having water flow control feature:
This subclass is indented under subclass 14.1. Subject matter wherein the condition responsive feature includes means to effect direction of movement or quantity of the water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
451.1, 451.2, for a feed water heater having automatic control of the feed water flow by thermally responsive means.
456, 457, for a feed water heater having a tank or receptacle that includes automatic control of inlet and outlet valves allowing the feed water to flow by gravity to the boiler.

SEE OR SEARCH CLASS:
137, Fluid Handling, a residual class for process or apparatus, subclasses 87.01 through 87.06 for a condition responsive system where fluid flow in a flow line is proportioned or correlated to some condition of a fluid flowing in another fluid flow line or subclasses 455-543.23 for a valve controlling a flow line responsive to a change in the condition of the fluid.
417, Pumps, subclasses 279 through 311 for a pump having condition responsive control of the pumped fluid.

14.31 Using valve actuated by flow or pressure (e.g., check valve, etc.):
This subclass is indented under subclass 14.3. Subject matter wherein the water flow control feature is an element having a definite predetermined motion to open, close, or partially obstruct a port or passageway and is moved into action by the movement, quantity, or force per unit area of the liquid.

SEE OR SEARCH CLASS:
251, Valves and Valve Actuation, subclasses 12 through 63.6 for a valve actuated or retarded by fluid acting on the actuating means.

15.1 Heated by liquid or steam (e.g., indirect heating, etc.):
This subclass is indented under subclass 13.01. Subject matter wherein the stand boiler uses a hot fluid that is shapeless, virtually incompressible, has a definite volume (e.g., water, etc.) or a vapor emitted from such a fluid to transfer thermal energy to the water in the stand boiler.

(1) Note. This may include a burner for heating the liquid or steam that transfers the thermal energy to the liquid in the stand boiler.

(2) Note. The heating liquid or steam may have a pressure higher than the liquid in the stand boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
32 through 34, for a liquid indirectly heated by a separate heating fluid.

16.1 Solid fuel burner:
This subclass is indented under subclass 13.01. Subject matter wherein the stand boiler is heated by the solid fuel burner.

SEE OR SEARCH THIS CLASS, SUBCLASS:
22, for a residual solid or liquid fueled boiler.
211, for a solid or liquid fueled sectional boiler.
368 through 370, for a residual boiler having a water-jacketed firebox.

SEE OR SEARCH CLASS:
110, Furnaces, a residual class for solid material combustion apparatus or a method of operating solid material combustion apparatus.
126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclasses 367.1 and 368.1 for a liquid heater having a solid fuel burner submerged underneath the surface of the liquid.

17.1 Fluid fuel burner:
This subclass is indented under subclass 13.01. Stand boiler wherein the stand boiler is heated by the fluid fuel burner.

SEE OR SEARCH THIS CLASS, SUBCLASS:
23, for a residual boiler heated by fluid fuel.

SEE OR SEARCH CLASS:
431, Combustion, for a residual process or apparatus of combustion or combustion starting.

17.2 Liquid fuel burner:
This subclass is indented under subclass 17.1. Subject matter wherein the fluid fuel is shapeless, virtually incompressible, and has a definite volume.

18.1 Having heat exchange feature:
This subclass is indented under subclass 17.1. Subject matter wherein the stand boiler includes means to transfer heat from the burned fuel directly or through the interposing fluid to the wall of the water containing chamber without allowing them to mix.

SEE OR SEARCH CLASS:
126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclasses 376.1 through 391.1 for an open-top liquid heating vessel that may include a lid having a heating fluid confining, directing, or shielding feature; or subclass 390.1 for an open-top liquid heating vessel that may include a lid having a heating wall structure.
165, Heat Exchange, for a residual heat transfer apparatus or process.

18.2 Preheater:
This subclass is indented under subclass 18.1. Subject matter wherein the heat exchange feature is used to transfer heat, usually waste heat, to a fluid (e.g., air, liquid, water, etc.) before it is heated by the stand boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
412 through 444, for a feed water heater.

SEE OR SEARCH CLASS:
431, Combustion, for a residual process or apparatus of combustion or combustion starting, subclasses 207 through 248 for a heated fuel line section that feeds a burner.

18.3 Fire tube or flue surrounded by water containing chamber:
This subclass is indented under subclass 18.1. Subject matter wherein the heat exchange feature consists of the fire tube or flue enclosed on all sides by the water containing chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
44.1 through 45, for a residual boiler having a fire tube.
135.1 through 156, for a boiler having a large fire tube or flue wholly or partly surrounded by the water space.

18.31 Penetrates one side of water chamber to another:
This subclass is indented under subclass 18.3. Subject matter wherein the fire tube or flue passes through a wall of the water chamber to an opposing wall.

18.4 Water tube surrounded by burned fuel:
This subclass is indented under subclass 18.1. Subject matter wherein the heat exchange feature consists of the water tube enclosed on all sides by the burned fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

235.11 through 365, for a boiler having a water tube through which the water circulates or passes while being heated.

18.5 And external water tank:

This subclass is indented under subclass 17.1. Subject matter and a closed receptacle outside of and for storing water heated by the stand boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.2, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) and a casing for the stand boiler or an external tank therefor.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclasses 361.1 through 363.1 for a boiler receiving hot liquid or steam from a stove or furnace (e.g., kitchen boiler, range boiler, etc.).

19.1 Water containing chamber or external tank having circulation feature within:

This subclass is indented under subclass 13.01. Subject matter wherein the water containing chamber or a closed receptacle outside of and for storing water heated by the stand boiler having means inside to direct the movement or development of the water.

(1) Note. This may include means to create (e.g., inlet, outlet, mixer, etc.) or prevent (e.g., baffle, dampener, diffuser, etc.) circulation within the water chamber.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 362.1 for a boiler receiving hot liquid or steam from a stove or furnace (e.g., kitchen boiler, range boiler, etc.) having liquid circulation means or subclass 365.1 for a liquid heating stovepipe having liquid circulation means.

392, Electric Resistance Heating Devices, subclass 452 for a line connected tank or container type liquid heater having an immersion heating element and a baffle or guard to direct the liquid.

19.2 And casing feature for stand boiler or external water tank therefor:

This subclass is indented under subclass 13.01. Subject matter and covering, jacketing, or sheathing means for the stand boiler or a closed receptacle outside of and for storing water heated by the stand boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:

18.5, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a fluid fueled burner and an external liquid tank.

494, for a miscellaneous casing surrounding a boiler.

SEE OR SEARCH CLASS:

29, Metal Working, subclass 455.1 for a method of assembling or joining a spaced wall tube or receptacle.

220, Receptacles, subclasses 592.22 and 592.23 for a thermally insulated receptacle for heated contents (e.g., fireless cooker, etc.) or subclass 694.1 for an external covering for a hot water heater or boiler.

312, Supports: Cabinet Structure, subclass 236 for a cabinet structure intended for heating, cooling, or heat exchange means.

20 SUBSIDIARY:

This subclass is indented under the class definition. Steam generators or water heaters located either in the firebox, combustion chamber, or offtake flue of a furnace whose main purpose is not for the generation of steam or the heating of water in such boiler. These boilers may be of any form consisting of mere pipes or coils, hollow plates, or cylinders with or without fire flues or tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

6+, 10, 37, 38, 439, and 498, for analogous structure.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 5 for a cooking and heating stove having a water heater or steam generator, subclass 31 for a cooking stove having a water heater in a flue extension, subclass 34 for a cooking stove having a water back, subclass 101 for a hot air furnace combined with a boiler, subclasses 364.1 and 365.1 for a liquid heater stovepipe, or subclasses 513 and 514 for a fireplace with a liquid heater.

21 CHEMICAL:

This subclass is indented under the class definition. Boilers wholly or partly heated by chemical action other than that of the combustion of fuel. This subclass includes that type of liquid heater and steam generator known in the art as "alkali" generators for steam.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 263.01+ for chemical heaters of general utility.

22 FLUID AND SOLID FUEL:

This subclass is indented under the class definition. Boilers not otherwise classifiable heated by solid or fluid fuel or both combined.

SEE OR SEARCH THIS CLASS, SUBCLASS:

16.1, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a solid fuel burner.

211, for sectional boilers heated by solid or fluid fuel.

23 FLUID FUEL:

This subclass is indented under the class definition. Boilers not otherwise classifiable that are heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

10, for a boiler that generates steam to feed a fluid fuel burner.

17.1 through 18.5, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a fluid fuel burner.

41, for a fluid fueled flash boiler.

43, for a residual fluid fuel boiler having fire and water tubes.

45, for a fluid fueled boiler having a fire tube.

115, for a fluid fueled boiler having a vertically positioned fire tube.

156, for a fluid fueled boiler having a vertically positioned flue.

161, for a fluid fueled boiler having a vertically positioned flue surrounded by a concentrically spaced water shell.

167, for a fluid fueled boiler having a vertically positioned flue where a water tube is within the flue.

177, for a fluid fueled boiler having a vertically positioned flue where a water tube is within and extends transversely across the flue.
179, for a fluid fueled boiler having a vertically positioned flue where a water tube is within the flue and a small fire tube is in alinement with the flue.
183, for a fluid fueled boiler having a vertically positioned flue and a spiral water conduit.
208, for a boiler having a flat plate provided with a zigzag passage heated by a fluid fuel burner.
210, for a sectional boiler heated by a fluid fuel burner.
211, for a sectional boiler able to use either a fluid or solid fuel.
216, for a fluid fueled boiler formed of superimposed horizontal sections that are in fluid communication with each other at their centers.
236, for a fluid fueled boiler having a water tube through which the water circulates or passes while being heated.
243, for a fluid fueled boiler having a tube passage that has an extremely small cross-sectional area as compared with its length.
245, for a fluid fueled boiler having a vertical stand pipe around which extends a tubular coil or loop in direct or indirect fluid communication with the stand pipe.
248, for a fluid fueled boiler having a horizontally coiled water tube.
250, for a fluid fueled boiler having a vertically coiled water tube.
274, for a fluid fueled boiler having a water tube in fluid communication with a longitudinal upper drum.
283, for a fluid fueled boiler having a water tube looped vertically over the firebox.
308, for a fluid fueled boiler having a central stand pipe water tube and a radially projecting spur tube.
319, for a fluid fueled boiler having a vertical spur water tube.
322, for a residual fluid fueled boiler having a standpipe provided with a water tube.
328, for a fluid fueled boiler having a single upper drum, plural lower drums, and water tubes that straddle the combustion chamber.
333, for a fluid fueled boiler having a vertical water tube.
348, for a fluid fueled boiler having a water tube provided with an internal fire tube.
356, for a fluid fueled boiler having a water tube where the water zigzags through the tube.
446, 447, for a boiler using other than automatic means to regulate fluid fuel to a burner and water to the boiler.

24 Explosion:
This subclass is indented under subclass 23. Devices the fuel combustion of which is intermittent and explosive.

SEE OR SEARCH CLASS:
60, Power Plants, where combustion products are used as a motive fluid, subclasses 722 through 39.828 having a combustion products generator or subclasses 784-785 for nominal other than power plant output feature.

25 Superimposed:
This subclass is indented under subclass 23. Devices provided with a plurality of fluid fuel burners one above the other.

26 FRICTION GENERATOR:
This subclass is indented under the class definition. Boilers heated by friction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
380, for boilers having mechanically operated cleaning agitators.
411, for mechanical circulating devices.

SEE OR SEARCH CLASS:
126, Stoves and Furnaces, subclass 247 for other frictional heaters.

27 Surface:
This subclass is indented under the class definition. Boilers heated by a noncombustible hot material, such as slag, bars, or pigs of iron, or brick that does not come into contact with the liquid to be heated.

28 Water in contact:
This subclass is indented under the class definition. Boilers heated by a noncombustible hot material, either introduced into the water or having the water fed upon the hot material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
31.1, for fluid heated by injection of a hot fluid.

29 ANNULAR FIREBOX:
This subclass is indented under the class definition. Boilers not otherwise classifiable which have an annular firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
127, 184, 246, 309, 323, and 335, for other boilers with an annular firebox.

30 MAGAZINE:
This subclass is indented under the class definition. Boilers having fuel magazines and not otherwise classifiable.

SEE OR SEARCH THIS CLASS, SUBCLASS:
5, 46, 66, 92, 117, 124, 128, 136, 157, 158, 162, 168, 212, 219, 222, 237, 251, 272, 310, 320, 334, 339, 344, and 373, for other boilers having fuel magazines.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 293+ and the notes thereunder for other fuel magazines.

31.1 INDIRECTLY HEATED SEPARATE INJECTED FLUID:
This subclass is indented under the class definition. Devices in which heating of a fluid is by the injection of a hot fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
28, for analogous devices used for noncombustible hot material.

31.2 Submerged flame:
This subclass is indented under subclass 31.1. Devices wherein the hot fluid is produced by an underwater combustion.

32 Surface:
This subclass is indented under the class definition. Devices having two separate compartments not in communication, the liquid to be vaporized being in one compartment and heated by a hot fluid in the other compartment.

(1) Note. Slag heated boilers, where the slag heats a fluid like air or water which in turn imparts its heat to the water in the steam making chamber and water evaporating apparatus indirectly heated, provided the structure of such apparatus must act as a vapor or steam generator, are classified in this and its subsidiary subclasses. Even sugar evaporators and vacuum pans are classified here if the structure is such as to be of general application as a steam generator and the discharge outlet for the syrup is only of such a character as to be equally adapted for a blow-off conduit for sludge in a steam generator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
483, for superheaters indirectly heated.

SEE OR SEARCH CLASS:
62, Refrigeration, subclass 45.1 for process and apparatus for vaporizing liquefied gas requiring steps or means involving pressure or temperature control special to liquefied gas and more than required for other liquids.
165, Heat Exchange, appropriate subclasses for a heat exchanger having two noncommunicating chambers not having a vapor separator in a heated chamber.
210, Liquid Purification or Separation, subclasses 175+ for a heater combined with apparatus of that (210) class.

33 Furnace:
This subclass is indented under subclass 32. Devices, provided with a furnace forming a part of the unitary structure.

34 Separator:
This subclass is indented under subclass 32. Devices having an internal vapor or steam separator.

35 ACCUMULATOR:
This subclass is indented under the class definition. Boilers provided with one or more chambers in which the hot boiler water or steam may be stored when less than the normal amount of steam is being used, which may serve as a storage reservoir for heat energy under abnormal demands for steam.

SEE OR SEARCH CLASS:
60, Power Plants, subclass 659 for a heat operated power system including a heat steam or compressed gas storage means.

36 AUXILIARY STEAM HEATER:
This subclass is indented under the class definition. Boilers having means for passing exhaust steam through conduits within the boiler or in surface contact therewith or for passing live steam generated in the same boiler or in another boiler into the water in the boiler. This subclass includes processes for getting up steam by the injection of live steam from one boiler into another boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
27, and 28, for boilers heated by slag or hot brick or bars of iron.
31.1, for boilers heated by the injection of a liquid of a kind that does not mix with the water in the boiler.
32+, for boilers heated indirectly by another hot fluid.
407, for injector circulation systems.
463, for similar structure in steam treating superheaters.
509, for submerged chambers.

37 COMPARTMENT:
This subclass is indented under the class definition. Boilers having separate water chambers, which may or may not be in communication with each other at the top of the boiler. Theses boilers are designed to be used either as steam boilers for generating steam at different pressure or for generating steam and also for heating water when it is desired to have steam for one purpose and water heating for other purposes, as for instance, using the steam for one set of radiators and the water for another set, or for generating steam or hot water for the radiators on one floor of a building and for generating steam or hot water for radiators on another floor, with separate circuits to each compartment.

SEE OR SEARCH THIS CLASS, SUBCLASS:
20, for boilers provided with auxiliary water heaters, where the water is heated or steam generated for separate use.
33, for boilers having separate compartments, where the water is heated or steam generated indirectly by heat from water or steam heated in another compartment of the boiler by a furnace.
83, and 123, for boilers with separate compartments, where the water is fed progressively from one compartment to the next one.
125, 420, 421, and 439, for water heaters heated by furnace gases.

38 Draft regulator:
This subclass is indented under subclass 37. Devices at least one compartment being for heating water to operate a motor for regulating the combustion of the boiler furnace.

39 FILM:
This subclass is indented under the class definition. Boilers in which the liquid flows over the heating surface of the boiler in a thin stream and occupies only a limited portion of the boiler space.

SEE OR SEARCH THIS CLASS, SUBCLASS:
218, and 242+, for capillary tubes.

258, for allied art.
501+, for displacing elements in tubes causing the liquid to spread in a thin film.

SEE OR SEARCH CLASS:
126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 359.1 for a fluid fuel burner other than a top-accessible liquid heating vessel where the liquid flows down a cylindrical or conical surface.

40 FLASHER:
This subclass is indented under the class definition. Boilers in which liquid is flashed into vapor as soon as it enters the vapor generating chamber. The liquid may be preheated in a chamber forming part of the unitary boiler structure or preheated in a chamber separate from the main vapor generator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
39, 242+ and 260, for progressive heaters.
247+, for progressively heated steam generators.
446, 448.1, 449, and 452, for regulating devices for flashers and progressively heated steam generators.

SEE OR SEARCH CLASS:
60, Power Plants, where combustion products are used as a motive fluid subclass 39.3 combined with automatic regulation of power output feature using water or steam, subclasses 39.53-39.59 including addition of steam or water, or subclass 775 for a process of introducing water or steam.
219, Electric Heating, subclasses 271+ for electrically heated flash boilers.

41 Fluid fuel:
This subclass is indented under subclass 40. Flash boilers heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
39, 248 and 250, for progressively heated fluid by a fluid fuel burner.
446, 448.1 and 452, for regulation of boilers.

42 FIRE AND WATER TUBE:
This subclass is indented under the class definition. Boilers provided with both water tubes and fire tubes not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
53+, 68+ and 98, for horizontal fire tube boilers with water tubes.
113, for analogous art.
130+, for vertical fire tube boilers provided with water tubes.
138, 140+, 149+, and 152, for horizontal flue boilers with water tubes.
153+, and 166+, for vertical flue boilers provided with water tubes.
195+, for horizontal cylindrical boilers with water tubes.

43 Fluid fuel:
This subclass is indented under subclass 42. Devices heated by fluid fuel.

44.1 FIRE TUBE:
This subclass is indented under the class definition. Boilers having fire tubes not otherwise classifiable.

(1) Note. The term “fire tube” is used in a sense broad enough to include both small tubes and large tubes forming passages through a chamber when the size of the tube is immaterial to the invention claimed; but patents disclosing boilers provided with large fire tubes or “flues”, where the large size of the tubes is a material feature of the structure and is necessary to the structure of the boiler and its combination with other features, are classified under the “flue” types of boilers, subclass 135, and the subclasses thereunder, except in that type of boiler where the large fire tube or flue be a subsidiary feature of the boiler, which is manifestly of the small fire tube type, in which case it is classified under the fire tube subclasses. See for example, this class, subclasses 47, 48, 50, and 78.

(2) Note. When a large flue in a boiler is essential to the structure and is not a

mere subsidiary feature, such patents are classified in the "flue" type of boiler, although small fire tubes are an essential part of the combination, except those type classified in this class, subclasses 47 and 48.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37, for boilers having separate compartments having fire tubes.

42+, for miscellaneous combinations of fire tube and water tube boilers, but only those that are not specially provided for in the combination fire tube and water tube subclasses under the fire tube or the flue type.

191, through 207, inclusive, under horizontal cylinder, for horizontal cylindrical boilers having water heating structures consisting of water tubes, drums, water walls, and water chambers of various forms, in combination with the boiler or being of such a configuration as to adapt it for use with a horizontal cylindrical boiler provided fire tubes are not essential to the boiler.

44.2 With baffle in flue:

This subclass is indented under subclass 44.1. Devices wherein a static structure regulates the fluid flow in a flue.

45 Fluid fuel:

This subclass is indented under subclass 44. Fire tube boilers heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

115, 156, 161, 167, 179, and 183, for other fire tube or flue boilers heated by fluid fuel.

46 Magazine:

This subclass is indented under subclass 44. Fire tube boilers having a fuel magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:

92, 117, 124, and 128, for other fire tube boilers with magazines.

157, 162 and 168, for other flue boilers with magazines.

212, 219 and 222, for sectional boilers with fuel magazines.

47 Horizontal:

This subclass is indented under subclass 44. Devices having a large horizontal flue, not covered by the definitions of other subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

50, and 78, for analogous art.

136, for horizontal flue boilers with transverse fire tubes.

149, for horizontal flue boilers with return fire tubes within the same part of the boiler as the flue.

48 Vertical:

This subclass is indented under subclass 44. Devices having a large vertical flue not covered by the definitions of other subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

49, and 114+, for other vertical fire tubes.

49 Horizontal and vertical:

This subclass is indented under subclass 44. Fire tube boilers having both horizontal and vertical fire tubes.

50 Flue:

This subclass is indented under subclass 44. Fire tube boilers that are horizontal or somewhat inclined from the horizontal having fire tubes that communicate with a large flue within the boiler, that may serve as a firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:

78, 80, 95, and 149, for special features.

109, for inclined fire tube boilers.

51 Horizontal:

This subclass is indented under subclass 44. Devices comprising fire tube boilers that are horizontal not covered by other subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

47, for fire tube boilers with a large horizontal flue.

49, for horizontal fire tube boilers having vertical fire tubes.

113, for horizontal boilers with transverse fire tubes.
136+, for combinations of horizontal large flue boilers with fire tubes, both horizontal and vertical.

52 Plural:
This subclass is indented under subclass 51. Devices having two or more boilers arranged side by side or superposed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
82, and 137, for horizontal flue boilers with the same arrangement.

53 Water tube:
This subclass is indented under subclass 52. Devices with water tubes in various arrangement.

SEE OR SEARCH THIS CLASS, SUBCLASS:
138, for horizontal flue boilers with water tubes.

54 Double outlet:
This subclass is indented under subclass 51. Devices with a firebox located midway its ends, having outlets for the products of combustion opposite each other.

55 Cylinder:
This subclass is indented under subclass 51. Subject matter relating to the structure of single cylindrical boilers.

(1) Note. The Horizontal cylindrical subclasses for the boiler features without the fire tubes.

56 Rear of bridge wall:
This subclass is indented under subclass 51. Devices having a separate and distinct boiler section provided with fire tubes, located beneath the boiler, at the rear of the bridge wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
81, 85+, 110, and 191, for closely allied art.

57 Alternate smoke return:
This subclass is indented under subclass 51. Devices having a two-part water firebox or the equivalent thereof, with mechanism for passing the products of combustion from one part of the firebox to the other part, in order that the smoke may be consumed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
60, for similar functions with a different structure.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 208+ for similar art.

58 Drop water firebox:
This subclass is indented under subclass 51. Devices having a water firebox united to and extending below the main body of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
73, 74 and 76+, for return fire tube horizontal fire tube boilers with drop water fireboxes.
107, for horizontal fire tube boilers with water walls having a drop water firebox.
139, 141 and 146, for horizontal large flue boilers with drop water fireboxes.

59 Circulation conduit:
This subclass is indented under subclass 58. Devices with a conduit located either inside or outside the boiler to connect the water firebox with the opposite end of the boiler to help the circulation of the water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
91, for water conduits provided with a sediment trap and water heating tubes.

60 Alternate smoke return:
This subclass is indented under subclass 58. Devices made with two compartments, with means for alternately passing the products of combustion from one compartment to the other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
57, for water fireboxes with alternate smoke return features.
95, for plural fireboxes.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 208+ for similar functions in the furnace art.

61 Drop water baffle:
This subclass is indented under subclass 58. Devices with a water baffle depending from the top of the firebox, formed either by walls spaced apart or water tubes, or water tubes combined with fire brick, or water walls.

SEE OR SEARCH THIS CLASS, SUBCLASS:
188, for analogous art.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 324+ for similar art.

62 Front and rear water baffle:
This subclass is indented under subclass 58. Devices with both front and rear water baffles for the products of combustion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
71, for rear baffles having water tubes on which rests brickwork.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 322+, 331+ and 336+ for similar functions in the combustion art.

63 Front water baffle:
This subclass is indented under subclass 58. Devices with a water baffle in the front of the firebox.

64 Interposed combustion chamber:
This subclass is indented under subclass 58. Devices with a separate combustion chamber between the firebox and the fire tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
95, and 100, for other types of boilers with an interposed combustion chamber between the firebox and the fire tubes.

65 Rear water baffle:
This subclass is indented under subclass 58. Devices, with a water baffle in the rear of the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
62, for analogous art.
71, for solid baffles, supported by water tubes.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 331+ and 336+ for similar art.

66 Water coking chamber:
This subclass is indented under subclass 58. Devices containing a water-cooled coking chamber for fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
67, and 92, for analogous art.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 230+ for similar art.

67 Intermediate draft:
This subclass is indented under subclass 58. Devices with a plurality of fuel chambers, one of which at least has a water grate, the products of combustion from the fuel chambers meeting each other. The fuel chambers are generally superposed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
66, for boilers of this type when the upper fuel chamber is a coking chamber.
371+, for grate structure.

68 Water tube:
This subclass is indented under subclass 58. Devices with some form of water chamber, conduits or tubes in the firebox.

69 Check-valved:
This subclass is indented under subclass 68. Devices with check valves so arranged that water from the boiler circulates through the chambers, conduits or tubes until feed water is being fed thereto, when the boiler circulation is cut off.

SEE OR SEARCH THIS CLASS, SUBCLASS:
118, for similar art.
196, for check valved feed heaters for horizontal cylindrical boilers.

70 Feeding air:
This subclass is indented under subclass 68. Devices with air feeding conduits.

71 Solid baffle:
This subclass is indented under subclass 68. Devices with solid baffle brick combined with the tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
61, 65, 68, and 69, for analogous art.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 324+ for similar art disclosed.

72 Projecting into firebox:
This subclass is indented under subclass 51. Devices having the end of the boiler projecting into the firebox or overhanging the fire grate.

73 Drop water firebox:
This subclass is indented under subclass 72. Devices projecting into a drop water firebox.

74 Drop water firebox:
This subclass is indented under subclass 51. Devices having a drop water firebox so arranged that the products of combustion pass a plurality of times through the boiler or underneath, through or over the boiler, and are discharged at the outlet flue located at the end of the boiler farthest from the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
73, for tubes merely projecting into a firebox.

75 Return fire tube:
This subclass is indented under subclass 51. Devices so arranged that the products of combustion pass through the boiler in opposite directions two or more times before they enter the outlet flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
54, 72+, 81, and 85, for other structure which includes return features.
87, for horizontal fire tube boilers having U-shaped couplings for the fire tubes.
149+, for horizontal flue boilers having return fire tubes.

76 Drop water firebox:
This subclass is indented under subclass 75. Devices having a water walled firebox depending from the boiler so arranged that the products of combustion pass directly through the lower tubes and return to the front of the boiler through the upper tubes and are discharged to the outlet flue at this point.

77 Internal water tube:
This subclass is indented under subclass 76. Devices having water tubes within some of the flues or fire tubes, which may extend into the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
141, and 146, for allied art.

78 Flue:
This subclass is indented under subclass 75. Devices having a water firebox of the large flue type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
50, for similar structure in horizontal or inclined tubes.

79 Subjacent water arch:
This subclass is indented under subclass 51. Devices having a water heating arch, formed of metal walls spaced apart, located beneath the boiler, extending either only over the firebox or along the whole combustion chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:

103, and 105, for subjacent water arches formed of water-tubes.

80 Subjacent flue:

This subclass is indented under subclass 51. Devices having one or more cylindrical sections, provided with large flues located below the main boiler and in communication therewith. The large flues generally inclose the fuel grate and serve as a firebox. At the rear of the large flues there may or may not be small fire tubes in alinement therewith.

SEE OR SEARCH THIS CLASS, SUBCLASS:

50, and 241, for analogous art.

81 Subjacent transverse fire tube:

This subclass is indented under subclass 51. Devices having a water chamber depending from the main boiler, provided with transverse fire tubes and located in rear of the bridge wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:

56, 85, 86, 110, and 191, for analogous art.

82 In communication:

This subclass is indented under subclass 51. Devices having a feed water heater located above the main boiler, in the combustion flue, heated by the products of combustion, and in open communication with the water space of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:

443, for superposed feed heaters in communication with the boiler steam space.

83 Transverse diaphragm:

This subclass is indented under subclass 51. Devices having compartments separated by metal diaphragms transversely arranged inside the boiler, or to boilers having a combustion chamber intermediate the ends, with transverse diaphragms at each end of the combustion chamber, or to separate boilers in alinement. This subclass includes patents for progressively heating water fed to the boiler and also where the diaphragm is only for supporting the tubes to prevent vibration or where the diaphragms are for circulation purposes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

101, 123, for vertical fire tube boilers with transverse diaphragms and having separate compartments.

125, 151 and 425, for analogous structure.

84 Great diameter over firebox:

This subclass is indented under subclass 51. Devices having two diameters, with that part of the boiler having the greater diameter over the firebox. The great diameter is offset from the main boiler, and the offset portion has short fire tubes passed therethrough, while long fire tubes extend through the whole length of the boiler. The products of combustion pass out of the firebox and return through the short tubes in the offset portion, and then pass in an opposite direction to the other end of the boiler, where the outlet flue is located, or they may return and pass through the upper short tubes and leave the boiler at the outlet flue located at the firebox end.

SEE OR SEARCH THIS CLASS, SUBCLASS:

56, 81, 85, and 86, for similar art.

85 Small diameter over firebox:

This subclass is indented under subclass 51. Devices having two diameters, the small diameter being over the firebox and the large diameter being beyond the bridge wall. The offset portion of the large diameter is provided with longitudinally extending fire tubes, through which the products of combustion from the firebox pass and then are passed through return fire tubes extending the whole length of the boiler. The products of combustion may then pass to the outlet flue at the front end of the boiler, or they may pass rearwardly above the boiler to the outlet flue located at the rear end, and in their final rearward passage may pass through fire tubes in an upwardly offset portion of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:

56, 81, 86, 110, and 191, for analogous structure.

86 Water firebox:

This subclass is indented under subclass 85. Devices having a water firebox.

87 U-coupling:

This subclass is indented under subclass 51. Devices provided with U-shaped couplings connecting the fire tubes at the ends of the boiler, in order that the products of combustion may flow back and forth through the fire tubes in succession.

SEE OR SEARCH THIS CLASS, SUBCLASS:

75, for miscellaneous boilers of the horizontal fire-tube type where the products of combustion pass back and forth through the fire tubes.

360, for U-couplings.

88 Upper drum:

This subclass is indented under subclass 51. Devices having a superposed horizontal upper-drum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

50, 486 and 492, for special features.

89 Rear of fire tube:

This subclass is indented under subclass 51. Devices provided with a water-cooled arch over the combustion chamber at the rear of the fire tubes. This arch may be formed of plates spaced apart or of water tubes or water tubes combined with solid material like firebrick.

90 Water firebox:

This subclass is indented under subclass 51. Devices having a water firebox that are not otherwise classified.

SEE OR SEARCH THIS CLASS, SUBCLASS:

50, for horizontal or inclined fire tube boilers having a large flue for the firebox.

58+, for horizontal fire tube boilers with drop water fireboxes.

73, for horizontal fire tube boilers with the barrel of the boiler projecting into the firebox, which is of the drop water firebox type.

74, and 75+, for return fire tube boilers with water fireboxes.

107, for water walls with drop water fireboxes.

139, and 141, for water fireboxes with other types of horizontal flue boilers.

149, for boilers having a large flue, with a water firebox.

189, 193+, for water fireboxes for horizontal cylindrical boilers which may or may not have horizontal fire tubes.

91 Trapped circuit:

This subclass is indented under subclass 90. Devices with some form of water heating chamber or conduits within the firebox, connected in circuit with the main part of the boiler, with some form of sediment trap in the water circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

59, for circulating conduits with water heaters in the firebox.

202, for horizontal cylindrical boilers having water heating tubes or chambers in circuit with the boiler, with a sediment trap in the circuit.

380, and 403, for analogous art with a trapped circuit.

92 Magazine:

This subclass is indented under subclass 90. Devices provided with a fuel magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:

46, and 66, for miscellaneous fire tube boilers with a fuel magazine.

93 Offset:

This subclass is indented under subclass 90. Devices, wherein the water firebox is offset at the end of the boiler so that the products of combustion pass from the firebox directly into the fire-tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

189, and 190, for offset water fireboxes so arranged that the products of combustion pass beneath the boiler upon leaving the firebox.

94.1 Water tube type:
This subclass is indented under subclass 93. Devices composed of water tubes in whole or in part.

95.1 Plural with common combustion chamber:
This subclass is indented under subclass 90. Devices, having multiple fireboxes and in communication with a common combustion chamber located between the fireboxes and the fire tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

57, 60 and 96, for horizontal fire tube boilers having a plurality of water fireboxes.

64, and 100, for horizontal fire tube boilers having a water firebox, with a combustion chamber between the firebox and fire-tubes.

95.2 Multiboilers:
This subclass is indented under subclass 95.1. Devices having multiple chambers for heating fluids.

96 Superposed:
This subclass is indented under subclass 90. Devices in which the water fireboxes are superposed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

66, and 67, for special types of superposed fuel chambers.

97 Downdraft:
This subclass is indented under subclass 90. Devices having a downdraft water grate.

98 Updraft:
This subclass is indented under subclass 90. Devices having an updraft water grate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

374, 377 and 378, for structure of grate.

99 Straddle:
This subclass is indented under subclass 90. Devices having water tubes therein straddling the fuel chamber.

100 Interposed flue:
This subclass is indented under subclass 90. Devices of the water tube type constructed wholly or in part of water tubes, with an interposed large flue between the firebox and the fire tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

64, 94 and 95, for combustion chambers interposed between firebox and fire tubes.

101 Water smoke box:
This subclass is indented under subclass 51. Devices having a water cooled smoke-box.

SEE OR SEARCH THIS CLASS, SUBCLASS:

151, 423, 425, and 426, for special features.

102 Over bridge wall:
This subclass is indented under subclass 51. Devices having water tubes extending horizontally over the bridge wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:

154, for horizontal flue boilers with water tubes over the bridge wall.

195+, for horizontal cylindrical boilers having fire tubes, with water tubes extending horizontally over the bridge wall, where it is immaterial whether the boiler is provided with fire tubes or not.

263, for water tube boilers having water tubes horizontal over the bridge wall.

103 Rear of fire tube:
This subclass is indented under subclass 51. Devices having water tubes in the rear of the fire tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
89, and 195, for related art.
150, for closely allied art.
153, for horizontal flue boilers with water tubes.

104 Over bridge wall:
This subclass is indented under subclass 51. Devices having rearwardly declined water tubes over the bridge wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
108, and 154, for horizontal flue boilers, with water-tubes over the bridge wall.
195+, for horizontal cylindrical boilers provided with various kinds of water-tubes in the combustion chamber.
291+, and 296, for rearwardly declined water-tubes over the bridge wall, having a longitudinally posited drum without fire-tubes over the water-tubes.

105 Over bridge wall:
This subclass is indented under subclass 51. Devices having water tubes inclined rearwardly over the bridge wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
108, and 154, for horizontal flue boilers with water tubes over the bridge wall.
265, for rearwardly inclined water tube boilers over the bridge wall.

106 Water wall:
This subclass is indented under subclass 51. Devices having water walls at the sides, front, or rear of the boiler, or at all of said locations. The wall may also extend across the boiler below the combustion chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
107, and 108, for similar art.

107 Drop water firebox:
This subclass is indented under subclass 106. Devices having a water walled firebox depending from the boiler structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76, and 149, for closely related art.

108 Subjacent water tube:
This subclass is indented under subclass 106. Devices having some form of water tubes between the walls in the combustion chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
135+, for closely allied structure.

109 Inclined:
This subclass is indented under subclass 44. Devices placed in inclined position.

SEE OR SEARCH THIS CLASS, SUBCLASS:
47, 50, 51, 54, and 110, for boilers having some of the fire tubes inclined.

110 Horizontal boiler:
This subclass is indented under subclass 44. Subject matter relating to horizontally disposed boilers having transverse fire tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
56, and 191, for analogous art.
81, for horizontal fire tube boilers with transverse fire tubes.
113, for combinations of transverse fire tubes, with water tubes.

111 Vertical boiler:
This subclass is indented under subclass 44. Subject matter relating to vertical boilers having transverse fire tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
187, for vertical flue boilers with transverse fire tubes.

112 Water firebox:
This subclass is indented under subclass 111. Devices having a water firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:

187, for vertical flue boilers having fire tubes extending from the inner large flue to the outside of the boiler.

220, for sectional boilers.

113 Water tube:

This subclass is indented under subclass 44. Devices having fire tubes extending transversely through the boiler and also having water tubes in communication with the boiler.

114 Vertical:

This subclass is indented under subclass 44. Devices placed in vertical position.

SEE OR SEARCH THIS CLASS, SUBCLASS:

20, for boilers having auxiliary water heaters.

37, for vertical fire tube boilers having separate boiler compartments which may or may not be in communication with each other (one of which compartments may be used as a water heater and the other as a steam generator.)

40+, for flash boilers with vertical fire tubes.

42+, for combinations of water tube and fire tube boilers of a miscellaneous character.

48, for combinations of fire tube boilers with vertical flue boilers or fire tube boilers having a large vertical flue of a miscellaneous character.

49, for boilers having both horizontal and vertical tubes.

110, for horizontally disposed boilers with transverse vertical fire tubes.

115, and 119, for vertical cylindrical boilers with vertical fire tubes.

178+, for vertical cylindrical fire tubes above and in alinement with a vertical flue in the boiler.

115 Fluid fuel:

This subclass is indented under subclass 114. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

22, for miscellaneous boilers heated by solid or fluid fuel.

23, for miscellaneous boilers heated by fluid fuel.

24, for boilers heated by fluid fuel which is exploded while burning.

43, for combined fire tube and water tube boilers heated by fluid fuel that are of a miscellaneous nature.

156, for vertical flue boilers heated by fluid fuel.

161, and 183, for other types of vertical flue boilers heated by fluid fuel.

167, 177 and 179, for vertical flue boilers combined with internal water tubes and heated by fluid fuel.

116 Central fire dome:

This subclass is indented under subclass 114. Devices provided with a large space or dome at the lower end of the boiler, extending into the boiler, located over the firebox, with the tubes disposed around the dome.

117 Central magazine:

This subclass is indented under subclass 114. Devices having a centrally disposed fuel magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:

30, for miscellaneous magazine boilers.

128, for vertical fire tube boilers having a water fire box and a central fuel magazine.

157, and 168, for vertical flue boilers with a central fuel magazine.

118 Internal:

This subclass is indented under subclass 114. Devices having sleeves, cylinders, or tubes arranged inside the boiler for aiding the boiler circulation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

159, for similar devices within a vertical flue boiler.

408, for similar structure in circulation devices.

119 Cylinder:
This subclass is indented under subclass 114. Devices in vertical cylindrical boilers.

120 Offset firebox:
This subclass is indented under subclass 114. Devices having an offset firebox out of alinement with the fire tubes. The firebox is generally of the water firebox type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
175, for vertical flue boilers with an offset water firebox.

121 Return fire tube:
This subclass is indented under subclass 114. Devices provided with fire tubes through which the products of combustion pass upon leaving the firebox and also fire tubes through which the products of combustion return to the other end of the boiler before they enter the outlet flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
128, for this type of boiler having a central magazine.
182, for vertical flue boilers having return fire tubes.

122 Water firebox:
This subclass is indented under subclass 121. Devices having a water firebox. The return fire tubes may be through the same boiler section or in another boiler section placed beside the other.

123 Separate compartment:
This subclass is indented under subclass 114. Devices provided with separate compartments either by diaphragms extending across the tubes or by complete boiler sections superposed or placed side by side, and having the feed water introduced into the compartment farthest from the fire box.

SEE OR SEARCH THIS CLASS, SUBCLASS:
83, for horizontal fire tube boilers having a progressive heating of the feed water.
122, and 125, for analogous art.

124 Side magazine:
This subclass is indented under subclass 114. Devices having a fuel magazine disposed on one or more sides of the boiler.

125 Top water chamber:
This subclass is indented under subclass 114. Devices having a separate water chamber above the steam space, through which the fire tubes pass to prevent the leaking of flue joints or to heat feed water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
83, 123 and 164, for similar art.

126 Water firebox:
This subclass is indented under subclass 114. Devices having a water firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
48, and 178+, for analogous structure.
120, for offset fireboxes.
122, for return fire tube vertical fire tube boilers with a water firebox.

127 Annular:
This subclass is indented under subclass 126. Devices in the form of a ring or the like.

SEE OR SEARCH THIS CLASS, SUBCLASS:
29, for annular fireboxes with miscellaneous types of boilers.
184, for vertical flue boilers with an annular firebox.

128 Central magazine:
This subclass is indented under subclass 126. Devices having a water firebox and a central fuel magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
117, for miscellaneous vertical fire tube boilers having a central fuel magazine.
157, and 168, for vertical flue boilers with a central magazine.

129 Downdraft:
This subclass is indented under subclass 114. Devices having a downdraft water grate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
371, for miscellaneous boilers with water grates.

130 Water tube:
This subclass is indented under subclass 114. Devices having some form of water tubes, not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
166+, for vertical flue boilers with water tubes in the flues.

131 Internal:
This subclass is indented under subclass 130. Devices in which the water tubes are within the fire tubes.

132 Radial loop:
This subclass is indented under subclass 130. Devices in which the water tubes are looped and arranged around the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
185, for vertical flue boilers with looped water tubes around a stand pipe within the flue.
244, and 281, for water tube boilers having a stand pipe with water tubes surrounding it.

133 Spur:
This subclass is indented under subclass 130. Devices in which the water tubes are of the spur type.

134 Volute:
This subclass is indented under subclass 44. Devices in which the tubes are in the form of a volute.

SEE OR SEARCH THIS CLASS, SUBCLASS:
261, for water tubes of similar form. (See also the search notes thereunder.)

135.1 FLUE:
This subclass is indented under the class definition. Boilers having one or more large fire tubes or flues wholly or partly surrounded by the water space.

SEE OR SEARCH THIS CLASS, SUBCLASS:
6+, for industrial furnace boilers.
20, 37, 47, and 48, for combinations of miscellaneous fire tube and flue boilers.
368, for miscellaneous water fire boxes.

135.2 Alternative stack:
This subclass is indented under subclass 135.1. Devices having a substitute flue or fire tube.

135.3 Sinusoidal flue:
This subclass is indented under subclass 135.1. Devices wherein the flue turns back on itself in an undulating manner.

136 Horizontal:
This subclass is indented under subclass 135. Subject matter placed horizontally, not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
47, for miscellaneous fire tube boilers having a large horizontal flue.
78, for horizontal return fire tube boilers with a horizontal flue firebox.
80, for horizontal fire tube boilers with a large flue boiler section beneath the boiler.
409+, for similar structure used in regulating circulation.

137 Plural:
This subclass is indented under subclass 136. A plurality of devices either posited side by side or superposed one above the other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
52, for similar arrangement of fire tube boilers.

138 Water tube:
This subclass is indented under subclass 137. Devices having water tubes in communication with the boilers.

SEE OR SEARCH THIS CLASS, SUBCLASS:
53, 102, 104, and 105, for structure including horizontal flue boilers.
140+, for horizontal flue boilers with internal water tubes.
153+, for horizontal flue boilers with water tubes exterior of the boiler.
195, for horizontal cylindrical fire-tube boilers with similar arrangement.

139 Drop water firebox:
This subclass is indented under subclass 136. Devices with a drop water firebox at one end of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
58+, for horizontal fire tube boilers with drop water firebox of analogous structure.
141, 146 and 148, for other types of horizontal flue boilers with drop water fireboxes.

140.1 Internal water tube:
This subclass is indented under subclass 136. Devices having some form of water tubes in the flues.

SEE OR SEARCH THIS CLASS, SUBCLASS:
43, for horizontal flue boilers having internal water tubes heated by fluid fuel.
154, for water tubes within a large horizontal flue.

140.2 Having water tube in flue:
This subclass is indented under subclass 140.1. Devices wherein the water tube is in the flue.

141 Drop water firebox:
This subclass is indented under subclass 140. Devices having a drop water firebox with longitudinal water tubes in the flues.

SEE OR SEARCH THIS CLASS, SUBCLASS:
77, and 146, for allied art.

142 Return fire tube:
This subclass is indented under subclass 140. Devices having return fire tubes, with some form of water tubes within the large flues.

SEE OR SEARCH THIS CLASS, SUBCLASS:
77, for analogous art.
147, for horizontal flue boilers having return fire tubes, with transverse water tubes in the flues.
149+, for horizontal flue boilers with return fire tubes.

143 Spur:
This subclass is indented under subclass 140. Devices having spur water tubes in the flue.

144 Subjacent firebox:
This subclass is indented under subclass 140. Devices having water tubes in the flue, with a firebox located beneath the boiler.

145 Transverse:
This subclass is indented under subclass 140. Devices having water tubes extending across the flues and communicating with the boiler at both ends.

SEE OR SEARCH THIS CLASS, SUBCLASS:
143, for spur tubes in the flue.

146 Drop water firebox:
This subclass is indented under subclass 145. Devices having a drop-water-firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
77, for analogous art.
141, for the same structure with longitudinally placed water tubes in the flue.

147 Return fire tube:
This subclass is indented under subclass 145. Devices having small fire-tubes, through which the products of combustion pass, after leaving the large horizontal flues, in an opposite direction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
142, 146 and 149, for special features.
143, for large flues having spur water tubes therein.

148 Water firebox:
This subclass is indented under subclass 140. Devices having a water firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
77, for similar art.
141, for horizontal flue boilers with a drop water firebox, with water tubes in the flue, running longitudinally.
146, for horizontal flue boilers with transverse water tubes and with a drop water firebox.

149 Return fire tube:
This subclass is indented under subclass 136. Devices having horizontally disposed small fire tubes, through which the products of combustion are returned through the boiler after leaving the large flues. The firebox is generally located in the large flues.

SEE OR SEARCH THIS CLASS, SUBCLASS:
47, for miscellaneous boilers having fire tubes with a horizontal flue.
74, 76 and 107, for related art in the fire tube type of boiler.
141, 146, 150, 151, and 410, for other types of horizontal flue boilers having return fire tubes.

150 Rear water tube:
This subclass is indented under subclass 149. Devices with water tubes at the rear of the flues and fire tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103, for similar art in a fire tube type of boiler.

151 Separate:
This subclass is indented under subclass 150. Devices having a separate compartment at the rear of the fire tubes and flues in which feed water may be heated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
425, for similar structure.

152 Water grate in flue:
This subclass is indented under subclass 136. Devices with some form of water grate within the flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
371+, for structure of water grates.

153 Water tube:
This subclass is indented under subclass 136. Devices having water tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102, through 105, for horizontal fire tube boilers with water tubes.
138, for plural boilers with water tubes.

154 Over bridge wall:
This subclass is indented under subclass 153. Devices in which the water tubes extend over the bridge wall in the flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
77, 102, 104, 105, and 108, for related structure.
141, for closely allied art in the horizontal flue type of boiler.

155.1 Vertical:
Subject matter under subclasses 135.1+ placed upright.

SEE OR SEARCH THIS CLASS, SUBCLASS:
48, for miscellaneous fire tube boilers having a vertical flue.

155.2 With flue baffle:
This subclass is indented under subclass 155.1. Device wherein a static structure regulates the fluid flow in a flue.

155.3 Having exterior heating flue:
This subclass is indented under subclass 155.1. Devices wherein the flue is located on the outside of a fluid tank.

155.4 Having corrugated flue:
This subclass is indented under subclass 155.1. Devices where the flue has parallel and alternating ridges and grooves.

155.5 Having undulating flue:
This subclass is indented under subclass 155.1. Devices wherein the flue is shaped in wavelike or sinusoidal form.

156 Fluid fuel:
This subclass is indented under subclass 155. Vertical flue boilers heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
22, for miscellaneous boilers heated by solid or fluid fuel.
23, for miscellaneous boilers heated by fluid fuel.
115, for vertical fire tube boilers heated by fluid fuel.
161, 167, 177, 179, and 183, for other types of vertical flue boilers heated by fluid fuel.

157 Central magazine:
This subclass is indented under subclass 155. Vertical flue boilers having a centrally posited fuel magazine not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
117, and 128, for vertical fire tube boilers with central magazines.
162, and 168, for other vertical flue boilers having a central fuel magazine.

158 Water jacket:
This subclass is indented under subclass 157. Devices in which the magazine is water jacketed.

159 Internal:
This subclass is indented under subclass 155. Vertical flue boilers having internal tubes, cylinders, or sleeves inside the boiler space for increasing the circulation of water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
118, for similar art.
408, for circulation features of a general character.

160 Concentric shell:
This subclass is indented under subclass 155. Vertical flue boilers comprising a plurality of concentrically posited annular water shells formed of walls spaced apart.

SEE OR SEARCH THIS CLASS, SUBCLASS:
158, for special forms of this type of boiler.

161 Fluid fuel:
This subclass is indented under subclass 160. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
183, for spiral water conduits.

162 Central magazine:
This subclass is indented under subclass 160. Devices having a centrally disposed fuel magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
157+, for more generally constructed boilers with a central fuel magazine.

163 Exterior drum:
This subclass is indented under subclass 155. Vertical flue boilers having a steam or water drum located outside of the main boiler structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
20, for similar art.

164 Insulated outlet flue:
This subclass is indented under subclass 155. Vertical flue boilers having the outlet flue through the steam space of the boiler provided with a heat insulator to prevent heating the steam space. This insulator may be of some packing material or formed by an air chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
125, for vertical fire tube boilers with top water chambers.

165 Internal water heater:
This subclass is indented under subclass 155. Devices within which is some form of water heater other than water tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
160, and 185, for allied art.
166+, for vertical flue boilers having internal water tubes.

166.1 With internal water tube:
Vertical flue boilers under subclasses 155.1+ having water tubes within the flue in communication with the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
131, for vertical water tube boilers with water tubes in the flues.
184, through 187, for vertical flue boilers having a central standpipe provided with water tubes located in the vertical flue.
468, for boilers of that type having steam superheater.

166.2 Loop-type tube:
This subclass is indented under subclass 166.1. Devices wherein the water tube is folded back and joined at the ends.

167 Fluid fuel:
This subclass is indented under subclass 166. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
161, 177, 179, and 183, for other types of vertical flue boilers heated by fluid fuel.

168 Central magazine:
This subclass is indented under subclass 166. Devices with a fuel magazine centrally located in the flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
117, and 128, for vertical fire tube boilers with a central magazine.
158, and 162, for other vertical flue boilers having a central fuel magazine.

169 Coil:
This subclass is indented under subclass 166. Devices having coiled water tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
244+, and 247+, for structure of coiled water tubes.

170 Header:
This subclass is indented under subclass 169. Devices in which the coils communicate with headers located within the flue.

171 Contracted inlet:
This subclass is indented under subclass 166. Devices, with the inlet opening to the flue of smaller diameter than the flue, and having water tubes within the flue. There may or may not be a water firebox below the contracted inlet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
175, and 179, for similar art.

172 Header:
This subclass is indented under subclass 166. Devices having water tubes in communication with headers located within the flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
170, for vertical flue boilers having coiled water tubes communicating with heaters located in the flue.
178, for similar structures of water tubes.

173 Horizontal spur:
This subclass is indented under subclass 166. Devices having horizontal spur water tubes within the flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
133, for vertical fire tube boilers with spur water tubes.
180, and 181, for other types of vertical flue boilers having spur water tubes.

174 Internal fire tube:
This subclass is indented under subclass 166. Devices in which the water tubes are provided with internal fire tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
242+, for capillary tubes of this type.
271, and 348, for vertical water tubes with internal fire tubes.

175 Offset water firebox:
This subclass is indented under subclass 166. Devices provided with an offset water firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
120, for vertical fire tube boilers with offset water fireboxes.

176 Transverse:
This subclass is indented under subclass 166. Devices in which the water tubes extend transversely across the flue and communicating at both ends with the boiler.

177 Fluid fuel:
This subclass is indented under subclass 176. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
179, and 183, for other types of vertical flue boilers heated by fluid fuel.

178 Vertical aligned fire tube:
This subclass is indented under subclass 166. Devices having small fire tubes in alinement with the flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
48, and 126, for analogous structures in the fire tube art.

179 Fluid fuel:
This subclass is indented under subclass 178. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
115, 167 and 171, for analogous art.

180 Spur water tube:
This subclass is indented under subclass 178. Devices having spur water tubes within the large flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
133, for vertical fire tube boilers having spur water tubes.
173, and 181, for vertical flue boilers having spur water tubes without the vertically alined fire tubes.
186, for vertical flue boilers having a spur water tube stand pipe within the flue.

181 Vertical spur:
This subclass is indented under subclass 166. Devices having vertical spur water tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
133, for vertical fire tube boilers, with vertical spur water tubes.

182.1 With return fire tube:
Devices under subclasses 155.1+ having small vertical fire tubes, through which the products of combustion are returned through the boiler after leaving the large flues. The fire tubes may be within the same boiler section as the large flue or in a separate boiler section.

SEE OR SEARCH THIS CLASS, SUBCLASS:
121, and 122, for return fire tube vertical fire tube boilers.

182.2 Having symmetrical arrangement of tubes:
This subclass is indented under subclass 182.1. Devices wherein the fire tubes are ordered in a balanced relationship.

182.3 Having tubes offset from firebox:
This subclass is indented under subclass 182.1. Having tubes offset from firebox: Devices wherein the fire tubes are not directly in line with the combustion chamber.

183 Fluid fuel:
This subclass is indented under subclass 155. Devices comprising one or more annular chambers having spiral water passages vertically posited, with or without a fluid fuel burner.

SEE OR SEARCH THIS CLASS, SUBCLASS:
161, and 501+, for related art.

184 Annular firebox:
This subclass is indented under subclass 155. Devices having a stand pipe provided with water tubes or merely a vertical pipe extending downwardly within the flue through the fuel grate to form an annular firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
29, for miscellaneous boilers with an annular fire tube.
127, for vertical fire tube boilers with an annular water firebox.

185 Loop:
This subclass is indented under subclass 155. Devices having a vertical stand pipe, with looped water tubes located within the flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
215+, for similar art in sectional boilers.
244+, and 281, for structure of stand pipe and water tubes.

186 Spur:
This subclass is indented under subclass 155. Devices having a stand pipe provided with spur water tubes located within the flue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
184, for similar structure.
215+, for similar art in sectional boilers.
307+, for spur water tube stand pipe structure.

187 Transverse fire tube:
This subclass is indented under subclass 155. Devices having fire tubes extending transversely through the annular water chamber formed by the inner and outer walls of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
111, for vertical boilers with transverse fire tubes extending through the whole boiler.

188 Drop water baffle:
This subclass is indented under the class definition. Horizontal cylindrical boilers provided with a depending water-cooled baffle for the products of combustion, formed either of plates spaced apart, water tubes, or the combination of either of these with firebrick or some solid material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
61, for drop baffles in the water firebox.

189 Water roof:
This subclass is indented under the class definition. Horizontal cylindrical boilers having an offset subjacent firebox provided with a water-cooled roof. The firebox in addition to the water roof may also have one or more of its walls water-cooled, thereby forming an offset subjacent water firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
93+, for offset water fireboxes for a horizontal fire tube boiler.
190, for offset fireboxes, for horizontal cylinder boilers.
209, and 213, for this feature in sectional boilers.
238, 336 and 352, for water tube boilers with offset fireboxes.

190 Water tube:
This subclass is indented under the class definition. Horizontal cylindrical boilers having an offset subjacent firebox having water tubes surrounding the fuel space.

SEE OR SEARCH THIS CLASS, SUBCLASS:
194, for analogous art.

191 Beyond bridge wall:
This subclass is indented under the class definition. Horizontal cylindrical boilers having subsidiary fire tube section of the boiler beyond the bridge wall. The fire tubes may be either vertical or horizontal, and if horizontal may extend either longitudinally or transversely of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
56, 81 and 85+, for closely allied structure.

192 Water bridge wall:
This subclass is indented under the class definition. Horizontal cylindrical boilers having a water-cooled bridge wall.

193 Water firebox:
This subclass is indented under the class definition. Horizontal cylindrical boilers having a firebox located beneath one end of the boiler and having one or more water walls forming the sides of the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
58+, and 90+, for horizontal fire tube boilers with various types of water fireboxes.
139, 141 and 146, for horizontal flue boilers with water fireboxes.
188, for drop water baffles.
189, for water cooled roofs.

194 Water tube type:
This subclass is indented under subclass 193. Devices having a series of water tubes either embedded in the walls of the firebox or located just inside the walls surrounding the fuel space.

SEE OR SEARCH THIS CLASS, SUBCLASS:
190, for offset subjacent fireboxes.

195 Water tube:
This subclass is indented under the class definition. Horizontal cylindrical boilers having some form of water tubes, water chambers, or drums in communication therewith. The cylindrical boiler may or may not be provided with fire tubes or flues.

SEE OR SEARCH THIS CLASS, SUBCLASS:
45, 47, 48, 49, 50, and 51+, for various types of horizontal fire tube boilers provided with water tubes, waterwalls, drums, or chambers.
136+, for horizontal cylindrical boilers having large flues therein and provided with water tubes, water walls, drums, or water heating chambers.

196 Check-valved:
This subclass is indented under subclass 195. Devices through which the boiler water circulates and is heated, with check valves so arranged that the feed water when introduced flows through the tubes and is heated therein and is not permitted to enter the boiler directly.

SEE OR SEARCH THIS CLASS, SUBCLASS:
69, for a similar arrangement of valves.

197 Lateral-longitudinal:
This subclass is indented under subclass 195. Devices extending longitudinally on the sides thereof.

198 Lateral-vertical:
This subclass is indented under subclass 195. Devices arranged vertically on the sides thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
51, 53, 138, and 153+, for analogous art.

199 Firebox:
This subclass is indented under subclass 198. Devices in which the tubes are on each side of the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
68, and 94, for analogous art.

200 Over fuel grate:
This subclass is indented under subclass 195. Devices placed over the fuel grate.

201 Subjacent internal fire tube:
This subclass is indented under subclass 195. Devices in which the water tubes are provided with internal fire tubes located in the combustion chamber beneath the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
267, for internal fire tubes within the water tubes.

202 Trapped circuit:
This subclass is indented under subclass 195. Devices having a water tube heating circuit provided with some form of sediment trap in the circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
91, 398 and 404, for analogous art.

203 Downdraft:
This subclass is indented under subclass 195. Devices having a down-draft water grate located beneath the boiler.

204 Intermediate draft:
This subclass is indented under subclass 195. Devices provided with a plurality of fireboxes having fuel grates, at least one of which is a water-cooled grate, so arranged that the products of combustion from the fireboxes meet each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
67, and 287, for analogous art.

205 Multiple series:
This subclass is indented under subclass 195. Devices having a plurality of fire grates, one or more of which are of the water tube type and so arranged that the products of combustion from one grate pass over or through the other grate.

206 Solid and water bar:
This subclass is indented under subclass 195. Devices having a fuel grate consisting of solid bars and water-cooled bars combined.

SEE OR SEARCH THIS CLASS, SUBCLASS:
375, and 377, for grate structure.

207 Updraft:
This subclass is indented under subclass 195. Devices having an updraft water grate located beneath the boiler.

208 Fluid fuel:
This subclass is indented under the class definition. Boilers comprising flat plates provided with zigzag passages heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
356, for zigzag water tube boilers heated by fluid fuel.

209.1 SECTIONAL:
This subclass is indented under the class definition. Boilers made of separate parts generally formed of cast metal sections and not otherwise classifiable.

SEE OR SEARCH THIS CLASS, SUBCLASS:
44+, 135+ and 235+, for sectional water tube boilers having fire tubes, flues or water tubes.

209.2 Feeding air:
This subclass is indented under subclass 209.1. Devices wherein tubes are provided to admit outside air and allow the escape of this air into the fire box once heated.

210 Fluid fuel:
This subclass is indented under subclass 209. Sectional boilers heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
23, for miscellaneous boilers heated by fluid fuel.
211, for sectional boilers heated by either solid or fluid fuel.

211 Fluid or solid fuel:
This subclass is indented under subclass 209. Sectional boilers heated by either solid or fluid fuel or both combined.

SEE OR SEARCH THIS CLASS, SUBCLASS:
16.1, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a solid fuel burner.
22, for a residual solid or liquid fueled boiler.

212.1 With magazine:
Sectional boilers under subclasses 209.1 having a fuel storage area.

SEE OR SEARCH THIS CLASS, SUBCLASS:
30, for miscellaneous magazine boilers and see the notes thereunder for subclasses of boilers with magazines.

212.2 With return or alternate flue:
This subclass is indented under subclass 212.1. Devices wherein a substitute or return flue is provided to preheat air for combustion.

213 Plural firebox:
This subclass is indented under subclass 209. Sectional boilers having a plurality of fireboxes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
232, for sectional boilers having a water grate above the main grate for supporting waste material.

214 Superimposed:
This subclass is indented under subclass 209. Sectional boilers whose sections are superimposed and lie substantially in a horizontal plane.

215 Central connection:
This subclass is indented under subclass 214. Devices the sections being in communication with one another at their centers.

216 Fluid fuel:
This subclass is indented under subclass 215. Devices heated by fluid fuel.

217 Water firebox:
This subclass is indented under subclass 215. Devices with a water firebox.

218 Water firebox:
This subclass is indented under subclass 214. Devices with a water firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
217, for horizontal sections centrally connected with a water firebox.

219 Central magazine:
This subclass is indented under subclass 218. Devices having a central fuel magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
212, for miscellaneous sectional boilers with fuel magazines.

220 Water firebox:
This subclass is indented under subclass 214. Devices having water tubes provided with internal fire tubes, with a water firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
266+, for water tube boilers having internal fire tubes.

221 Annularly positioned:
This subclass is indented under subclass 209. Sectional boilers having vertically disposed sections around the combustion chamber.

222 Central magazine:
This subclass is indented under subclass 221. Devices with a centrally disposed fuel magazine.

223 Longitudinally positioned:
This subclass is indented under subclass 209. Sectional boilers having vertical sections extending longitudinally of the boiler.

224 Casing:
This subclass is indented under subclass 223. Devices, having an inclosing casing spaced apart from the sections to allow passage for the products of combustion around the sections.

225 Transversely positioned:
This subclass is indented under subclass 209. Sectional boilers having sections vertically placed transversely of the boiler. A plane cutting the section and lying therein would be vertical and at right angles to the general course of the products of combustion.

226 Casing:
This subclass is indented under subclass 225. Devices with an inclosing casing, so that the products of combustion come into contact with the outer edges of the sections.

SEE OR SEARCH THIS CLASS, SUBCLASS:
345, for similar art in water tube boilers.

227 Divided section:
This subclass is indented under subclass 226. Devices having two-part vertical sections transversely arranged, with a casing around the sections and spaced therefrom.

228 Divided section:
This subclass is indented under subclass 225. Devices whose sections are made in two parts.

SEE OR SEARCH THIS CLASS, SUBCLASS:
227, for boilers of this type having an inclosing casing.

229 Water grate:
This subclass is indented under subclass 225. Devices provided with a water grate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
232, for miscellaneous sectional boilers with water grates.

230 Two-section:
This subclass is indented under subclass 209. Sectional boilers consisting of only two vertical sections.

231 Accessories:
This subclass is indented under subclass 209. Subject matter relating to specific parts, such as joints, fireboxes, ashpits, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
360, for headers.
511, and the search notes thereunder, for tubes and connections.

232 Water grate:
This subclass is indented under subclass 209. Sectional boilers having a water grate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
229, for vertical sectional boilers having a water grate.
371, for miscellaneous boilers with water grates, and see the the list of subclasses thereunder of boilers with water grates.

233 Horizontal:
This subclass is indented under the class definition. Boilers consisting of a horizontally disposed closed chamber. Includes the combination of such a closed chamber with the furnace walls.

SEE OR SEARCH THIS CLASS, SUBCLASS:
13.01 through 19.2, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.).

SEE OR SEARCH CLASS:
126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclasses 361.1 through 363.1 for a boiler receiving hot liquid or steam from a stove or furnace (e.g., kitchen boiler, range boiler, etc.).
220, Receptacles, subclass 567.3 for a stationary tank for a hot water heater or boiler.

234 Vertical:
This subclass is indented under the class definition. Boilers consisting of a closed chamber vertically disposed, in combination with means for heating it.

SEE OR SEARCH THIS CLASS, SUBCLASS:
13.01 through 19.2, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building,

restaurant, laundry, recreational vehicle, etc.).

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclasses 361.1 through 363.1 for a boiler receiving hot liquid or steam from a stove or furnace (e.g., kitchen boiler, range boiler, etc.).

220, Receptacles, subclass 567.3 for a stationary tank for a hot water heater or boiler.

235.11 WATER TUBE:

This subclass is indented under the class definition. Boilers whose heating surface consists substantially of tubes, through which the water circulates or passes while being heated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

11, for rotary water tube boilers.

18.4, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a fluid fueled burner for a water tube surrounded by the burned fuel.

42, 476 and 477, for combined fire and water tube boilers of a miscellaneous character.

53, 68+, 77, 94.1, 99, 100, 102 to 105, 113, and 130+, for fire tube boilers with water tubes.

138, 140+, 153, and 166+, for flue boilers with water tubes.

195+, for water tubes in horizontal cylinder boilers.

459+, for water tube boilers with superheaters.

SEE OR SEARCH CLASS:

110, Furnaces, subclasses 322+ for baffles and heat retainers in water tube boilers.

235.12 Wall structure:

This subclass is indented under subclass 235.11. Devices having specific wall structure of the water tubes.

235.13 With fuel burners having posts and tuyeres:

This subclass is indented under subclass 235.11. Devices having specific structure of the combustor, pipe, nozzle or opening through which air is forced to facilitate combustion.

235.14 Tube structure:

This subclass is indented under subclass 235.11. Devices having specific tube structure.

235.15 Headers and connections:

This subclass is indented under subclass 235.11. Devices having specific structure to the joint where multiple tubes come together.

235.16 For plural fluids:

This subclass is indented under subclass 235.11. Devices having multiple fluids which are heated in the boiler.

235.17 Having baffles:

This subclass is indented under subclass 235.11. Devices having a static structure to control the fluid flow in the water tubes.

235.18 Having seals:

This subclass is indented under subclass 235.11. Devices having means to make the water tubes vapor tight.

235.19 D-type tube:

This subclass is indented under subclass 235.11. Devices wherein the water tubes are shaped in a square loop pattern.

235.21 Multiple D-type tubes:

This subclass is indented under subclass 235.19. Devices wherein the water tubes have plural squared patterns.

235.22 Wall loop:

This subclass is indented under subclass 235.11. Devices wherein a plurality of tubes are connected together and arranged to form at least a portion of the boundary wall of a gas-tight enclosure.

235.23 Having specific tube patterns:
This subclass is indented under subclass 235.11. Devices wherein specific arrangements of the tube are provided.

235.24 Screens:
This subclass is indented under subclass 235.11. Devices wherein the tubes are arranged to form a partition in a chamber.

235.25 Floor screens:
This subclass is indented under subclass 235.24. Devices wherein the tubes forming the screen are placed in a lower section of the chamber.

235.26 Having slag and ash disposal:
This subclass is indented under subclass 235.11. Devices having means to remove left over products of combustion.

235.27 Locomotive-type:
This subclass is indented under subclass 235.11. Devices wherein the water tubes are used in a railroad engine.

235.28 Having rotary flame:
This subclass is indented under subclass 235.11. Devices wherein the burners are angularly spaced apart and all the jet axes of the burners are tangential to a vertical imaginary cylinder.

235.29 Having forced circulation system:
This subclass is indented under subclass 235.11. Devices wherein a means other than convection is used to move a fluid through the tube.

235.31 Having specific internal drum and head structure:
This subclass is indented under subclass 235.11. Device wherein there is specific structure to the steam drum and central connection for the fluid circulation system.

235.32 With combustion:
This subclass is indented under subclass 235.11. Devices wherein there are specific conditions for burning the fuel.

235.33 With convection zone regulation:
This subclass is indented under subclass 235.11. Devices wherein means are provided to control the flow of combustion gases.

235.34 With parallel multiple fireboxes:
This subclass is indented under subclass 235.11. Devices wherein a plurality of combustion chambers are arranged symmetrically around a central core.

235.35 With serial multiple fireboxes:
This subclass is indented under subclass 235.11. Devices wherein a plurality of combustion chambers are arranged in succession.

236 Fluid fuel:
This subclass is indented under subclass 235. Water tube boilers heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
23, and see the note therewith for all subclasses for boilers heated by fluid fuel.

237 Magazine:
This subclass is indented under subclass 235. Water tube boilers provided with fuel magazines, not otherwise classifiable.

SEE OR SEARCH THIS CLASS, SUBCLASS:
30, and see the note therewith for all subclasses for boilers having magazines.
251, 272, 310, 320, 334, 339, and 344, for water tube boilers with a fuel magazine.

238 Offset firebox:
This subclass is indented under subclass 235. Water tube boilers having a firebox offset from the main part of the boiler structure that do not fall within the definitions of the other subclasses of water tube boilers having an offset firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
93, 94, 120, 175, 189, 190, 209, and 213, for other types of boilers provided with offset fireboxes.

336, 337 and 352, for other types of water tube boilers with offset fireboxes.

239 Superimposed firebox:
This subclass is indented under subclass 235. Water tube boilers having a plurality of superimposed fireboxes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
2, 25, 67, 204, 205, 214, 240, and 372, for boilers with fireboxes or fluid fuel burners superimposed one above the other.

240.1 Having plural fireboxes:
This subclass is indented under subclass 235.11. Water tube boilers having multiple fireboxes not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
23, for other types of fluid-fuel burners.
25, for boilers heated by a plurality of superimposed fluid-fuel burners.
53, 138, 204, and 205, for other types of boilers having water tubes and a plurality of fireboxes.
287, 294, 304, and 330, for water tube boilers of various types with plural fireboxes.

240.2 Series-connected:
This subclass is indented under subclass 240.1. Devices wherein the multiple fireboxes are connected end to end in a sequence.

240.3 Parallel connected:
This subclass is indented under subclass 240.1. Devices wherein the multiple fireboxes are connected inlet to inlet and outlet to outlet.

241 Firebox in drum:
This subclass is indented under subclass 235. Water tube boilers having a drum, within which the firebox is located.

SEE OR SEARCH THIS CLASS, SUBCLASS:
50, and 80, for analogous art.

242 Capillary:
This subclass is indented under subclass 235. Devices whose tube passages have an extremely small cross-sectional area as compared with their length.

SEE OR SEARCH THIS CLASS, SUBCLASS:
39, for boilers whose water is heated by passing over the heating surface in a thin film.
40+, for similar structure in flasher types boilers.
260, for flat-tube boilers.
501+, for water tubes containing a displacing element, that renders the tube similar in action to a capillary tube.

243 Fluid fuel:
This subclass is indented under subclass 242. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
348, for vertical water tube boilers having internal fire tubes.

244 Central standpipe:
This subclass is indented under subclass 235. Water tube boilers comprising a vertical stand pipe, around which extends coils or loops of tubes in either direct or indirect communication with the stand pipe.

SEE OR SEARCH THIS CLASS, SUBCLASS:
132, for vertical fire tube boilers provided with radial loops.
133, for vertical fire tube boilers provided with radial spurs.
169+, for similar structure located within a vertical flue.
185, for vertical stand pipes provided with radial loops located in a vertical flue.
186, for stand pipes provided with radial spur tubes located within a vertical flue.
245, and 246, for analogous art.
281, for stand pipes provided with loops over a firebox.
307+, for central standpipes provided with spur tubes.

323, for miscellaneous water tube boilers with central stand pipes.

245 Fluid fuel:
This subclass is indented under subclass 244. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
283, for analogous art.
322, for miscellaneous central stand pipe water tube boilers heated by fluid fuel.

246 Annular firebox:
This subclass is indented under subclass 244. Devices extending below the grate and forming an annular firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
184, for a stand pipe, provided with water tubes located in a vertical flue boiler and having an annular firebox.
335, for miscellaneous water tube boilers with an annular firebox.

247 Coil:
This subclass is indented under subclass 235. Water tube boilers provided with coils of tubes not coming within the definitions of other subclasses covering water tube boilers of the coil type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
169+, for vertical coiled water tubes located within a vertical flue.
244+, 248 and 249+, for various types of coil tube boilers.
355+, for analogous water tube boilers incorrectly said to be coil boilers.

248 Fluid fuel:
This subclass is indented under subclass 247. Devices heated by a fluid fuel burner, the axes of the coils being horizontal.

249 Vertical:
This subclass is indented under subclass 247. Devices, the axes of the coils being vertical.

SEE OR SEARCH THIS CLASS, SUBCLASS:
183, for flues with spiral water conduit.

250 Fluid fuel:
This subclass is indented under subclass 249. Devices heated by fluid fuel.

251 Central magazine:
This subclass is indented under subclass 249. Devices having a central fuel magazine.

252 Water firebox:
This subclass is indented under subclass 249. Devices provided with a water firebox.

253 Cross:
This subclass is indented under subclass 235. Water tube boilers whose tubes are so arranged as to cross one another and includes cross tube boilers that are not specially provided for by other subclass definitions.

(1) Note. There is a close analogy between the cross loop type and the zigzag and the cross tube type of water tube boilers.

SEE OR SEARCH THIS CLASS, SUBCLASS:
99, for water tubes straddling the fuel chamber.
145, 146, 147, 176, 177, 253-257, 278, 311, 326, and 329, for different types of boilers provided with cross water tubes.
355+, for zigzag tubes.

254 Over bridge wall:
This subclass is indented under subclass 253. Devices inclined in opposite directions over the bridge wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
277, for loop tubes over the bridge wall.

255 Drum:
This subclass is indented under subclass 253. Devices in which the tubes are over the firebox, inclined in opposite directions longitudinally of the boiler and each bank of tubes being in communication with headers at each end, which headers are in turn in either direct or

indirect communication with one or more drums.

256 Drum:
This subclass is indented under subclass 253. Devices, each bank of tubes being in communication with headers at each end, which in turn are in communication with a drum above the tubes.

257 Drum:
This subclass is indented under subclass 253. Devices in which the tubes cross each other transversely of the boiler, each tube being in communication with headers at each end, which headers are in either direct or indirect communication with a drum located above the water tubes.

258 Downflow:
This subclass is indented under subclass 235. Water tube boilers provided with means for causing a downward flow of water in the tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
39, for analogously operating boilers.
209, and 218, for sectional boilers with a down flow of water through the sections.

259 Drum type:
This subclass is indented under subclass 235. Boilers composed of very large tubes or drums.

260 Flat:
This subclass is indented under subclass 235. Water tube boilers having flat tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
39, for film type boilers.
40+, for flasher boilers.
242+, for capillary tubes.

261 Volute:
This subclass is indented under subclass 260. Devices in which the tubes are coiled about a central axis, each winding being spaced apart.

SEE OR SEARCH THIS CLASS, SUBCLASS:
134, for volute fire tube boilers.

262 Horizontal:
This subclass is indented under subclass 235. Water tube boilers that are horizontal and do not fall within the definitions of other subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102, for horizontal fire tube boilers having horizontal water tubes over the bridge wall.
197, 201, and 203 to 207, for horizontal cylindrical boilers provided with horizontal water tubes.
236, for horizontal water tube boilers heated by fluid fuel, except the zigzag type noted in the other notes.
267, for horizontal tubes provided with internal fire tubes.
279, for horizontally disposed looped tubes.
285, 286, 287, 289, and 354, for horizontal water tube boilers with water grates.
316, for horizontal spur tubes over the firebox.
353, for water tube water grates.

263 Over bridge wall:
This subclass is indented under subclass 262. Devices in which the tubes are over the bridge wall.

264 Over firebox:
This subclass is indented under subclass 262. Devices in which the tubes are disposed over the firebox.

265 Inclined:
This subclass is indented under subclass 235. Water tube boilers not otherwise classifiable having water tubes inclined from a vertical or a horizontal line.

SEE OR SEARCH THIS CLASS, SUBCLASS:
266+, 275+, 290+, 305+, 324+, and 355+, for more specifically associated inclined water tubes.

266 Internal fire tube:
This subclass is indented under subclass 235. Water-tube boilers provided with water tubes within which there is a fire tube forming an annular water space.

SEE OR SEARCH THIS CLASS, SUBCLASS:
242+, for capillary tubes constructed in this manner.
348, for vertical water tubes having internal fire tubes.

267 Horizontal:
This subclass is indented under subclass 266. Devices whose water tubes are horizontally disposed.

268 Inclined:
This subclass is indented under subclass 266. Devices whose water tubes are inclined.

SEE OR SEARCH THIS CLASS, SUBCLASS:
269, for plural fire tubes within the water tubes.
270, for the tubes placed over a firebox.

269 Plural fire tube:
This subclass is indented under subclass 266. Devices whose water tubes have a plurality of fire tubes within them.

270 Straddle:
This subclass is indented under subclass 266. Devices inclined toward each other over the combustion chamber or firebox. The tubes are generally provided with headers at top and bottom, and the headers may be in communication with drums extending longitudinally of the boiler.

271 Vertical:
This subclass is indented under subclass 266. Devices whose tubes are in a substantially vertical position.

SEE OR SEARCH THIS CLASS, SUBCLASS:
348, for that type of boiler heated by fluid fuel.

272 Central magazine:
This subclass is indented under subclass 271. Devices having a centrally disposed fuel magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
339, for vertical water tube boilers provided with a centrally disposed fuel magazine when the water tubes do not contain fire tubes.

273 Longitudinal upper drum:
This subclass is indented under subclass 235. Water tube boilers having an upper longitudinal drum with miscellaneous types of water tubes communicating therewith not provided for in the definitions of other water tube boiler subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:
275+, for similar structure in looped water tube boilers.
291+, 298, 312, 346, 347, 351, and 357, for more specifically associated longitudinal upper drums.
324+, for similar structure in straddle tube boilers.

274 Fluid fuel:
This subclass is indented under subclass 273. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
250, 283, 328, 348, and 356, for analogous art.
331, for transverse horizontal drum boilers.

275 Loop:
This subclass is indented under subclass 235. Miscellaneous water tube boilers whose tubes are in the form of loops.

SEE OR SEARCH THIS CLASS, SUBCLASS:
132, and 185, for other types of boilers provided with looped water tubes.
244+, for boilers of the water tube type having either looped or coiled tubes or both combined.
355+, for analogous structure.

276 Firebox enclosing:
This subclass is indented under subclass 275. Devices having a firebox located within the loops.

277 Over bridge wall:
This subclass is indented under subclass 275. Devices in which the loops extend over the bridge wall.

278 Cross:
This subclass is indented under subclass 275. Devices in which the loops cross each other over the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
311, for crossed spur water tubes over the firebox.
355, for crossed zigzag tubes.

279 Horizontal:
This subclass is indented under subclass 275. Devices in which the loops extend over the firebox, their axes being substantially horizontal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
316, for similar boilers whose tubes are of the spur type.

280 Bridge wall header:
This subclass is indented under subclass 275. Devices having one or more headers vertically posited at the bridge wall, and in which the looped tubes extend over and in rear of the firebox or only in the rear thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
306, for similarly constructed water tube boilers provided with spur tubes.

281 Standpipe:
This subclass is indented under subclass 275. Devices having a stand pipe with the looped tubes over the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
132, for vertical fire tube boilers provided with looped water tubes.
185, for vertical flue boilers having a looped tube stand pipe.
244+, 308 and 309, for spur tube boilers having a stand pipe, with tubes over the firebox.

282 Vertical:
This subclass is indented under subclass 275. Devices in which the looped tubes are over the firebox, their axis and plane being substantially vertical.

SEE OR SEARCH THIS CLASS, SUBCLASS:
318+, for vertical spur tubes.
359, for zigzag tubes.

283 Fluid fuel:
This subclass is indented under subclass 282. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
319, for similar boilers having spur tubes.
356, for similar devices having zigzag tubes.

284 Headers at right angles:
This subclass is indented under subclass 235. Water tube boilers having water tubes extending over the bridge wall and in communication with headers at each end, which are substantially at right angles to each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
288, for similar structure over a firebox.

285 Transverse water baffle:
This subclass is indented under subclass 235. Water tube boilers having banks of water tubes substantially parallel extending over the bridge wall and having a transverse water baffle for the products of combustion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
280, and 306, for analogous art.
293, for water tube boilers with longitudinal water baffles between the tubes.

286 Downdraft:
This subclass is indented under subclass 235. Water tube boilers having water tubes extending over the bridge wall and provided with a downdraft water grate.

287 Intermediate draft:
This subclass is indented under subclass 235. Water tube boilers having water tubes extending over the bridge wall and a plurality of fireboxes, the products of combustion from one firebox meeting those from the other firebox and the fuel grate of at least one firebox being of the water grate type. The firebox with the water grate is generally located above the other firebox and the draft is down through the water grate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
67, and 204, for other types of boilers having intermediate draft water grates.

288 Headers at right angles:
This subclass is indented under subclass 235. Water tube boilers having water tubes located over the firebox and communicating with headers at each end at right angles with each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
284, for similar art.

289 Updraft:
This subclass is indented under subclass 235. Water tube boilers having water tubes over the firebox and with an updraft water grate.

290 Front and rear header:
This subclass is indented under subclass 235. Water tube boilers having banks of water tubes rearwardly declined over the bridge wall and being in communication with a front header or drum and a rear header or drum.

SEE OR SEARCH THIS CLASS, SUBCLASS:
265, 297, 331, and 474, for analogous structure.

291 Horizontal-longitudinal drum:
This subclass is indented under subclass 290. Devices in which the drums are horizontally and longitudinally posited and are elevated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
104, 268, 295, 472, and 473, for allied art.

SEE OR SEARCH CLASS:
110, Furnaces, subclass 98 for baffles in furnaces of water tube boilers.

292 Firebox tube:
This subclass is indented under subclass 291. Devices having heating tubes extending over, through, or around the firebox, forming distinct circulation and heating conduits from the main banks of tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
407, for injector type circulation means.

293 Longitudinal water baffle:
This subclass is indented under subclass 291. Devices having water baffles extending longitudinally of the water tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
285, for transverse baffles over the bridge wall.

294 Water wall:
This subclass is indented under subclass 291. Devices, provided with water walls on two or more sides of the combustion chamber, consisting of metal sheets spaced apart or formed of water tubes. There may or may not be cross water tubes extending through the combustion chamber.

295 Internal water tube:
This subclass is indented under subclass 290. Devices in which the tubes have within them and spaced therefrom smaller tubes communicating with separate compartments of the headers, and such tubes not being of the spur tube or "Field" tube type. These headers may be in communication with longitudinally or transversely disposed drums.

SEE OR SEARCH THIS CLASS, SUBCLASS:

305+, for spur tubes.

474, for super heaters for water tube boilers having banks of tubes over the bridge wall.

296 Longitudinal-declined drum:

This subclass is indented under subclass 290. Devices in which the front and rear headers are in either direct or indirect communication with one or more drums substantially parallel with the tubes and rearwardly declined longitudinally of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:

471, for superheaters of similar construction.

297 Transverse drum:

This subclass is indented under subclass 290. Devices in which the front and rear headers are in communication, either directly or indirectly, with one or more transverse drums.

SEE OR SEARCH THIS CLASS, SUBCLASS:

277, for devices in which the water tubes are in the form of loops extending over the bridge wall.

331, for other heater tube boilers having transverse horizontal drums.

478, for super heaters having transverse drums.

298 Horizontal-longitudinal drum:

This subclass is indented under subclass 235. Devices having banks of water tubes declined rearwardly over the firebox, in communication with front and rear headers, which are in turn in communication, directly or indirectly, with one or more horizontally and longitudinally fixedly positioned drums above the tubes.

299 Transverse drum:

This subclass is indented under subclass 235. Devices having banks of water tubes substantially parallel, rearwardly declined over the firebox, and in communication with front and rear headers, which are in turn either directly or indirectly in communication with one or more transversely fixedly positioned drums.

SEE OR SEARCH THIS CLASS, SUBCLASS:

265, for water tube boilers in which the tubes are inclined.

300 Tubes beyond side wall:

This subclass is indented under subclass 235. Devices consisting of banks of water tubes rearwardly declined over the firebox and in communication with front and rear headers, which may also be in communication with some form of drums above the tubes, and also having banks of tubes beyond side walls of the main combustion chamber.

301 Plural lower transverse drum:

This subclass is indented under subclass 235. Devices consisting of rearwardly declined banks of water tubes in communication with a plurality of horizontally and transversely disposed drums, both at the top and at the bottom of the tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

352, for analogous structures on vertical water tube boilers.

478, for super heaters having transverse drums.

302 Single lower transverse drum:

This subclass is indented under subclass 235. Devices consisting of banks of tubes rearwardly declined and communicating with a plurality of upper transverse horizontal drums at the top and with a single transverse horizontal drum at the bottom, or the tubes may be in communication with a header at the bottom, which is in turn in communication with the lower drum.

303 Transverse drum:

This subclass is indented under subclass 235. Devices having banks of substantially parallel water tube rearwardly inclined over the firebox and in communication with front and rear headers, which are in turn in either direct or indirect communication with one or more transversely fixedly positioned drums.

SEE OR SEARCH THIS CLASS, SUBCLASS:

265, for water tube boilers in which the tubes are inclined.

304 Opposite fireboxes:

This subclass is indented under subclass 235. Devices provided with separate banks of water tubes over separate fireboxes disposed on opposite sides of the unitary boiler structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

240, for water tube boilers with a plurality of fireboxes that do not come within the definition of this subclass.

305 Spur:

This subclass is indented under subclass 235. Devices having spur tubes projecting from a drum or equivalent, communicating therewith at one end and having the other end closed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

133, 143, 173, 180, 181, 186, 342, and 462, for other boilers having spur tubes which form some substantial part of the heating surface.

275+, for water tube boilers of similar types having looped tubes.

306 Bridge wall header:

This subclass is indented under subclass 305. Devices having a vertical header located at the bridge wall, and in which the spur tubes extending over the firebox and in rear thereof or extending in the rear of the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:

280, for boilers of similar structure provided with looped tubes.

307 Central standpipe:

This subclass is indented under subclass 305. Devices having a central stand pipe in which the spur tubes are radial.

SEE OR SEARCH THIS CLASS, SUBCLASS:

133, for vertical fire tube boilers provided with radial spur tubes.

143, for horizontal flue boilers provided with spur water tubes internally.

173, for vertical flue boilers provided with internal horizontal spur tubes.

180, for vertical flue boilers with vertically aligned fire tubes and having spur water tubes.

181, for vertical flue boilers with vertical spurs.

244+, for stand pipes provided with coiled or looped tubes.

281, for stand pipe boilers of the water tube type provided with radial looped tubes over the firebox.

342, for spur tube drums.

475, for this type of boiler with a superheater.

308 Fluid fuel:

This subclass is indented under subclass 307. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

245, for water tube boilers having a central stand pipe provided with coiled or looped tubes and heated by fluid fuel.

281, for water tube boilers having stand pipes provided with looped tubes.

322, for miscellaneous water tube boilers provided with stand pipes and heated by fluid fuel.

309 Annular firebox:

This subclass is indented under subclass 307. Devices in which the central stand pipe extends below the fire grate, forming an annular firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:

186, for vertical flue boilers with a spur tube stand pipe and an annular firebox.

246, for boilers of the water tube type provided with a central stand pipe having coils or loops and an annular firebox.

323, for miscellaneous water tube boilers with a central stand pipe and an annular firebox.

310 Central magazine:
This subclass is indented under subclass 307. Devices having a fuel magazine within the stand pipe.

SEE OR SEARCH THIS CLASS, SUBCLASS:
168, for vertical flue boilers with central magazines with internal water tubes.

311 Cross:
This subclass is indented under subclass 305. Devices in which the spur tubes cross each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
278, for cross looped tubes.

312 Horizontal-longitudinal drum:
This subclass is indented under subclass 305. Devices in which the drum is horizontal and longitudinal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
195, for horizontal cylindrical water tube boilers.
273+, for other boilers having longitudinal drums.
317, for drums provided with spur tubes that straddle the combustion chamber.

313 Over bridge wall:
This subclass is indented under subclass 305. Devices in which the spur water tubes extend over the bridge wall.

314 Central header:
This subclass is indented under subclass 305. Devices in which the spur tubes are located over the firebox on both sides of a vertical central header.

SEE OR SEARCH THIS CLASS, SUBCLASS:
319, for water tube boilers having vertical spur water tubes heated by fluid fuel.

315 Declined:
This subclass is indented under subclass 305. Devices in which the spur tubes are declined over the firebox.

316 Horizontal:
This subclass is indented under subclass 305. Devices in which the spur water tubes are horizontally disposed over the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
279, for horizontal loop tubes over the firebox.

317 Straddle:
This subclass is indented under subclass 305. Devices in which the spur water tubes straddle the combustion chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
99, and 270, for spur tubes having internal fire tubes straddling the combustion chamber.
324+, for other types of water tube boilers of the straddle type.

318 Vertical:
This subclass is indented under subclass 305. Devices in which the spur tubes are vertical.

SEE OR SEARCH THIS CLASS, SUBCLASS:
133, for vertical fire tube boilers with vertical spur tubes.
181, for vertical flue boilers having vertical spur water tubes within the flue.
271, for internal fire-tube type water-tube boiler in which the tubes are vertical.
282, for water tube boilers having vertical looped tubes over the firebox.
348, for fluid fuel heated internal fire tube type water-tube boilers in which the tubes are vertical.

319 Fluid fuel:
This subclass is indented under subclass 318. Devices which are heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
179, 283, 333, and 348, for other types of vertical water tube boilers heated by fluid fuel.

320 Central magazine:
This subclass is indented under subclass 318. Devices having a centrally disposed fuel magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
168, for vertical flue boilers with internal spur tubes.
339, and 344, for other types of water tube boilers with vertical tubes and a central magazine.

321 Standpipe:
This subclass is indented under subclass 235. Devices having a vertical pipe relatively large in cross section and provided with some form of water tubes and not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
13+, for range or kitchen boilers, called in the art "stand boilers", which are provided with a heater.
132, 133, 184, 185, 186, 215+, and 218, for sectional stand pipe boilers.
281, 307+ and 475, for stand pipes provided with spur water tubes.

322 Fluid fuel:
This subclass is indented under subclass 321. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
216, for sectional stand pipe boilers heated by fluid fuel.
245, for coiled or looped tube boilers with a stand pipe and heated by fluid fuel.
308, for stand pipes provided with spur water tubes and heated by fluid fuel.

323 Annular firebox:
This subclass is indented under subclass 321. Devices in which the stand pipe extends downwardly below the fire grate, forming an annular firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
184, 246, 309, and 475, for stand pipes provided with spur tubes having an annular firebox.

324 Straddle:
This subclass is indented under subclass 235. Devices having water tubes that straddle the combustion chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
99, 270 and 317, for other types of straddle water tube boilers.

325 Plural lower drum:
This subclass is indented under subclass 324. Devices in which the tubes are either in communication with headers at top and bottom, which are in turn in communication with separate upper and lower drums, or in communication directly with separate upper and lower drums.

SEE OR SEARCH THIS CLASS, SUBCLASS:
240, for miscellaneous fire tube boilers having a plurality of fireboxes.
351, for vertical water tube boilers having a plurality of upper and lower drums.

326 Cross:
This subclass is indented under subclass 325. Devices having the tubes cross over the combustion chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
329, for this type of boiler having a single upper drum.

327 Plural lower drum:
This subclass is indented under subclass 324. Devices in which the water tubes are either in direct communication with a single upper drum and with a plurality of lower drums or in direct communication with headers, which are in turn in communication with the drums.

SEE OR SEARCH THIS CLASS, SUBCLASS:
99, and 329, for boilers of this type having the tubes crossing each other.

328 Fluid fuel:
This subclass is indented under subclass 327. Devices heated by fluid fuel.

329 Cross:
This subclass is indented under subclass 327. Devices in which the tubes cross each other.

330 Plural firebox:
This subclass is indented under subclass 327. Devices having two or more fireboxes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
240, for miscellaneous water tube boilers having a plurality of fireboxes.

331 Transverse horizontal drum:
This subclass is indented under subclass 235. Devices having one or more transverse horizontal drums provided with water tubes that are not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
255, 257, 277, 290, 297, 299, 301, 302, 303, 332, 346, 352, and 358, for water tube boilers with transverse horizontal drums.

332 Vertical:
This subclass is indented under subclass 235. Devices having vertical tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103, 171, 198, 199, 247+, 266+, 275+, and 281, for vertical columns provided with looped tubes extending over the firebox.
282, 305+, for spur tube boilers.
318, 355 and 359, for vertical columns surrounding the combustion chamber, with zigzag water tubes communicating with the columns.

333 Fluid fuel:
This subclass is indented under subclass 332. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167, 174, 250, 283, 319, and 348, for other boilers heated by fluid fuel.

334 Side magazine:
This subclass is indented under subclass 332. Devices having a fuel magazine at the side of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
339, and 344, for other types of fuel magazines with vertical water tube boilers.
373, for analogous art.

335 Annular firebox:
This subclass is indented under subclass 332. Devices having an annular or surrounding firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
246, for coiled or looped water tubes around a stand pipe having an annular firebox.
309, for water tube boilers having a central stand pipe provided with spur tubes and extending below the fire grate to form an annular firebox.

336 Offset firebox:
This subclass is indented under subclass 332. Devices having an offset firebox exterior of the main boiler structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
175, for other types.
209, for sectional boilers with offset fireboxes.
213, for sectional boilers with plural fireboxes, one of which may be offset.
221, 238 and 352, for other offset fireboxes.

337 Elevated:
This subclass is indented under subclass 336. Devices in which the offset firebox is at the top of the boiler.

338 Annular upper drum:
This subclass is indented under subclass 332. Devices, in which the water tubes communicate with the upper and the lower drums, which are of ring or equivalent form.

339 Central magazine:
This subclass is indented under subclass 338. Devices having a centrally disposed fuel magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
251, 320 and 344, for boilers of a similar type having a central magazine, but whose upper drum is not annular in form.

340 Tubes over firebox:
This subclass is indented under subclass 338. Devices in which the water tubes are within the space inclosed by the vertical tubes over the firebox.

341 Fire tube upper drum:
This subclass is indented under subclass 332. Devices in which the water tubes communicate with an annular lower drum and with an upper drum provided with fire tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
342, and 343, for boilers of similar structure, but whose upper drum is not provided with fire tubes.

342 Spur tube upper drum:
This subclass is indented under subclass 332. Devices in which the water tubes communicate with an annular lower drum and an upper drum provided with spur water tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
341, and 343, for boilers of similar structure without the spur tubes on the upper drum.

343 Upper drum:
This subclass is indented under subclass 332. Devices in which the water tubes communicate with an annular lower drum and with an upper drum.

344 Central magazine:
This subclass is indented under subclass 343. Devices, having a central magazine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
339, for similar boilers in which the upper drum is annular.

345 Beyond bridge wall:
This subclass is indented under subclass 332. Devices in which the vertical water tubes are beyond the bridge wall and may or may not be around or over the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
226, for analogous art in sectional boilers.
352, for boilers with an offset firebox.

346 Gas return:
This subclass is indented under subclass 345. Devices having vertical water tubes beyond the bridge wall and above the firebox, with any type of drums or headers communicating with the tubes and so arranged that the products of combustion pass over the bridge wall and upwardly through a separate passage to the front of the boiler before they are discharged.

SEE OR SEARCH THIS CLASS, SUBCLASS:
350, for similar art where there are boilers with vertical tubes wholly over the firebox and having the products of combustion pass out at one end of the firebox and return through the vertical tubes above the firebox.

347 Longitudinal lower drum:
This subclass is indented under subclass 345. Devices having vertical water tubes in the rear of the bridge wall and communicating with a longitudinal upper and a longitudinal lower drum. There may or may not be water tubes above the firebox, but the products of combustion do not return.

SEE OR SEARCH THIS CLASS, SUBCLASS:
346, for vertical water tube boilers having horizontal longitudinal upper and lower drums where the products of combustion pass also rearwardly through the tubes.
444, for miscellaneous combinations of means for heating the feed water in a

water tube boiler either outside or inside the water space of the boiler.

348 Fluid fuel:
This subclass is indented under subclass 332. Devices in which the vertical water tubes are provided with internal fire tubes and heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
174, for vertical flue boilers having vertical water tubes provided with internal fire tubes.
243, and 271, for vertical water tube boilers provided with internal fire tubes and heated by solid fuel.

349 Over firebox:
This subclass is indented under subclass 332. Devices in which the vertical water tubes communicate with drums or headers and are located over the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
282, for water tube boilers having looped tubes over the firebox, the axis and plane of the loop being substantially vertical.
318, for water tube boilers having vertical spur tubes.
333, for boilers with vertical water tubes heated by fluid fuel.

350 Gas return:
This subclass is indented under subclass 349. Devices in which the products of combustion pass out of the firebox at the rear and return over the firebox between the water tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
346, for such devices in which the water tubes are located beyond the bridge wall and above the firebox and arranged so that the products of combustion pass over the bridge wall and upwardly through a separate passage to the front of the boiler before they are discharged.

351 Plural lower longitudinal drum:
This subclass is indented under subclass 332. Devices in which the vertical water tubes are in communication with a plurality of horizontally and longitudinally posited upper and lower drums forming a plurality of fireboxes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
240, for water tube boilers having a plurality of fireboxes not otherwise provided for.

352 Offset firebox:
This subclass is indented under subclass 332. Devices having a plurality of upper transverse drums and a plurality of lower transverse drums with vertical water tubes connecting the upper and lower drums and with a firebox offset from the main boiler structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
238, 301 and 336, for analogous art.

353 Water grate:
This subclass is indented under subclass 235. Devices with water grates that are not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
286, 287, 289, and 354, for other water tube boilers with water grates.

354 Downdraft:
This subclass is indented under subclass 353. Devices having downdraft water grates.

355 Zigzag:
This subclass is indented under subclass 235. Devices having the water tubes so arranged that the water passes back and forth in a zigzag manner through the tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
247+, and 258, for zigzag tubes where the water flows downwardly through the tubes.
275+, for looped tube boilers where the water flows through one tube and back through another.

305+, for spur tube boilers provided with an internal tube or partition, so that the water will flow out and back through the same tube.

356 Fluid fuel:
This subclass is indented under subclass 355. Devices heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
208, for plate boilers with zigzag conduits.
250, for vertical coil water tube boilers heated by fluid fuel.

357 Longitudinal drum:
This subclass is indented under subclass 355. Devices having a longitudinally posited drum above the tubes, which extend in a zigzag manner over the bridge wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
273+, for other types of water tube boilers having a longitudinal drum.

358 Transverse drum:
This subclass is indented under subclass 355. Devices having water tubes that extend over the bridge wall in a zigzag manner and in communication with one or more transversely posited drums.

SEE OR SEARCH THIS CLASS, SUBCLASS:
331+, for other types of water tube boilers having transversely posited drums.

359 Over firebox:
This subclass is indented under subclass 355. Devices whose tubes are located over the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
249, and 258, for zigzag boilers having tubes over the firebox when the flow of fluid is in a downward direction.
356, for zigzag boilers heated by fluid fuel.

360 Closures and couplings:
This subclass is indented under subclass 235. Devices involving the structure of headers for water tube boilers; also includes the coupling connection between the headers and water tubes and the closures for the hand holes in the headers when the form of the header is involved in the claims.

SEE OR SEARCH THIS CLASS, SUBCLASS:
511, for boiler tubes, flues and connections not provided for elsewhere.

SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, for structure of boiler tubes, per se, particularly subclass 95 for return bend closures.
220, Receptacles, subclasses 200+ for manholes and closures of general application, whether applied to a boiler or boiler header, where the structure of the boiler or header is not involved.
285, Pipe Joints or Couplings, subclasses 189+ for couplings and unions between a tube and plate of general application.

361 Cleaning:
This subclass is indented under subclass 360. Subject matter comprising the structure of the header, with its connections, when formed for the purpose of cleaning the header or boiler tubes, either inside or outside.

SEE OR SEARCH THIS CLASS, SUBCLASS:
379+, for the general apparatus for cleaning boilers of the kind classified in class 122.

362 Concentric tube:
This subclass is indented under subclass 360. Subject matter comprising the structure of the header and tube connections of specific application for a water tube boiler when two tubes concentrically arranged are coupled to a header.

SEE OR SEARCH CLASS:
159, Concentrating Evaporators, for pertinent subclass(es) as determined by schedule review.

363 Drum:
This subclass is indented under subclass 360. Subject matter comprising the structure of headers of the drum type and tube connections therefor and closures for the drum hand holes when the drum structure is involved.

SEE OR SEARCH THIS CLASS, SUBCLASS:
365, for general structure of drums for water tube boilers.
393, for the structure of mud drums and modifications in boilers for their application.

SEE OR SEARCH CLASS:
220, Receptacles, subclasses 200+ for closures of general application.

364 Tube closures:
This subclass is indented under subclass 360. Subject matter comprising headers and tubes provided with valves for closing the flow of water through the tubes or headers.

SEE OR SEARCH THIS CLASS, SUBCLASS:
507, for automatically closed valves classified in Class 122.

SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclasses 89+ for pipe closures.
220, Receptacles, subclasses 200+ for closures of general application.

365 Drums and couplings:
This subclass is indented under subclass 235. Subject matter comprising the structure of drums and couplings and unions between the drum and the header or the drum and the water tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
192, for drums.
363, for headers of drum form.
393, for structure of mud drums unless of general application.
434, for special combinations of drums and feed water heaters.
511, and 512, for couplings of specific form for boilers.

366 WICK:
This subclass is indented under the class definition. Boilers provided with an absorbent wick within the fluid chamber for raising water from one part of the chamber to another to increase the generation of vapor.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclasses 357+ for a strand with structure and not provided for in any other class.

367.1 HEAT TRANSMITTER:
This subclass is indented under the class definition. Boilers with some special heat transmitting structure not otherwise classifiable. Most of these devices include tubes or boiler walls provided with flanges or heat conducting pins.

SEE OR SEARCH CLASS:
165, Heat Exchange, subclass 179 for a tube having heat transmitters penetrating the tube wall, and subclass 185 for a heat transmitter of more general application.

367.2 Double immersed heat transmitters:
Devices under subclasses 367.1 wherein the heat transmitting tubes have an inner shell and an outer shell both of which transfer heat to a fluid.

367.3 Corrugated and finned heat transmitters:
This subclass is indented under subclass 367.1. Devices wherein the heat transmitting tubes have projecting vanes or a series of parallel and alternating ridges and grooves.

367.4 Pebble furnaces:
This subclass is indented under subclass 367.1. Devices wherein the heat transmitting tube contains granular material to hold the heat.

368 WATER FIREBOX:
This subclass is indented under the class definition. Boilers not otherwise classifiable having water fireboxes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
2, for garbage burning plants disclosing boilers with water fireboxes.

8+, for industrial furnaces having water fireboxes.

16.1, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a solid fuel burner that may include a water-jacketed firebox.

44+, for fire tube boilers.

135+, for most of the patents for boilers with water fireboxes, but claiming or disclosing more than a water firebox.

189, 190, 193+, for horizontal cylindrical boilers with water fireboxes.

209+, for boilers made of separate parts.

235+, for special combinations of water fireboxes with water tube boilers, and especially subclasses 241 and 252, for water fireboxes.

369 Mud ring:

This subclass is indented under subclass 368. Subject matter comprising the construction of the lower part of a water firebox and mud ring or spacing member forming the bottom of the water walls.

SEE OR SEARCH THIS CLASS, SUBCLASS:

385, for boilers provided with an internal conduit located within the water firebox above the mud ring.

370 Plural:

This subclass is indented under subclass 368. Subject matter comprising miscellaneous water firebox boilers having a plurality of water fireboxes not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:

57, 60, 95, 96, 213, 229, 372, for other types of water firebox boilers having a plurality of water fireboxes.

371 WATER GRATE:

This subclass is indented under the class definition. Boilers having water grates that do not come within the definitions of other subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

2, 5, 66, 67, 97, 98, 129, 152, 203-207, 229, 232, 286, 287, 289, 321, 323, 353, 354, for other water grates.

SEE OR SEARCH CLASS:

110, Furnaces, subclasses 267+ for progressive feed, and subclasses 298+ for hollow air-cooled grates.

126, Stoves and Furnaces, subclasses 152+ for other stove and furnace grates.

372 Updraft:

This subclass is indented under subclass 371. Subject matter comprising boilers not otherwise classified having superimposed fireboxes with at least one of the fuel grates of the water grate type. This type of boilers is generally used for the burning of garbage or other waste material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

2, for garbage plants having water grate boilers of this type.

207, 232, 353, for water tube boilers with superposed updraft water grates.

373 Cage:

This subclass is indented under subclass 371. Devices having a water grate of cage-like or basket-like structure.

SEE OR SEARCH CLASS:

110, Furnaces, subclass 294 for furnaces with a magazine the lower part of which has perforations or bars on opposite sides, the air entering on one side and the flame passing out on the other side.

126, Stoves and Furnaces, subclasses 513+ for fireplace heaters that are provided with water or steam generating backs and designed to be connected up to heat radiators in distant rooms.

374 Grate structure:

This subclass is indented under subclass 371. Subject matter comprising the structure of water grates themselves except the cage grate type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

321, for water tube boilers having a vertical pipe relatively large in cross section and provided with some form of water tubes and not otherwise provided for.

373, 375, for other water grate structures.

375 Solid and water bar:

This subclass is indented under subclass 374. Devices having both solid and water bars.

SEE OR SEARCH THIS CLASS, SUBCLASS:

206, for horizontal cylindrical boilers with this type of grate.

374, for the structure of water grates except those of the cage grate type.

376 Progressive feed:

This subclass is indented under subclass 371. Devices having a water-cooled progressive fuel feeding grate having means for moving the fuel along the grate.

377 Updraft:

This subclass is indented under subclass 371. Devices not otherwise provided for having a water firebox with an updraft fuel grate composed of both solid bars and water bars.

SEE OR SEARCH THIS CLASS, SUBCLASS:

206, 213, 229, 353, for other boilers with this type of water grate.

375, for the grate structure of this type of grate.

378 Updraft:

This subclass is indented under subclass 371. Devices not otherwise provided for having a water firebox with an updraft water grate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

98, 229, 232, 289, 353, for other boilers with water grate structure.

379 CLEANING:

This subclass is indented under the class definition. Devices comprising boilers provided with mechanism for cleaning the boiler or purifying the water while the boiler is in operation and so united therewith that it remains in position when the boiler is in operation, or the mechanism is of such specific application that it is adapted for use with no other art, and not provided for in other subclasses in this class. In general, this subclass, and indented subclasses take cleaning apparatus combined with boiler structure and cleaning processes combined with steps of boiler operation, for example, such operations as are provided for below under the titles "Blow-off" and "Trapped circuit". It also takes apparatus and processes, per se, for cleaning boilers not elsewhere provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:

91, for horizontal fire tube boilers with water heating circulating tubes with a sediment trap.

202, for horizontal cylindrical boilers with water heating and circulating tubes provided with a sediment trap.

360, for structure of headers for water tube boilers with hand openings and closures therefor, when the structure of the header is modified.

361, for headers provided with special boiler cleaning devices.

364, for headers provided with tube closures.

429, and 433, for feed heaters with automatically operated valves for reversing the flow of water through the trap when the blow-off is opened.

431, for feed water heaters with a filter inside the boiler.

SEE OR SEARCH CLASS:

15, Brushing, Scrubbing, and General Cleaning, appropriate subclasses for cleaning apparatus, which involve at least one of the following means. A gas blast or vacuum, brushing, beating, scraping, shaking, wiping, shotting, the use of a squeegee, with or without detergents.

134, Cleaning and Liquid Contact With Solids, for cleaning processes and apparatus including the cleaning and/or pickling of metal.

148, Metal Treatment, appropriate subclasses for metal cleaning processes

(1) of any kind combined with other metal treating steps.

165, Heat Exchange, subclass 95 for a heat exchanger with cleaning means.

196, Mineral Oils: Apparatus, subclass 122 for mineral oil vaporizers provided with means to remove carbon from the oil or from the vaporizer.

204, Chemistry: Electrical and Wave Energy, subclasses 196.01 through 196.38 for electrolytic protection apparatus (e.g., to keep the surfaces of liquid heaters and vaporizers clean, etc.).

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 724 through 740 for processes of electrolytic protection of metal objects (e.g., to keep the surfaces of liquid heaters or vaporizers clean, etc.).

208, Mineral Oils: Processes and Products, subclass 48 for mineral oil conversion processes which include some procedure for preventing the formation of deleterious carbon accumulations or removing such accumulations from the equipment.

210, Liquid Purification or Separation, subclasses 175+ for a heater in combination with separating apparatus, especially subclasses 177+ having means to add a treating material.

220, Receptacles, subclasses 200+ for boiler manholes and closures.

252, Compositions, for boiler compounds or mixtures and chemicals for introducing into boilers for preventing the formation of scale or for removing the scale from the boiler when formed, and processes involving the mere use of the composition even though the thing or surface treated be specified.

261, Gas and Liquid Contact Apparatus, for boiler purposes.

380 Agitating circulator:

This subclass is indented under subclass 379. Devices having mechanically operated agitators or circulators for the water in the boiler or scrapers so arranged that the sediment will be carried to the clean-out end of the boiler or mud drum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

411, for mechanical circulating devices within the boiler.

381 Bottom and surface:

This subclass is indented under subclass 379. Devices having means for blowing off the water both at the surface and at the bottom.

382 Bottom:

This subclass is indented under subclass 379. Devices provided with means for blowing off the boiler at the bottom and removing the sediment.

SEE OR SEARCH THIS CLASS, SUBCLASS:

381, for devices for blowing off the boiler both at the bottom and the surface of the water.

383 Internal conduit:

This subclass is indented under subclass 382. Devices having a conduit extending into the boiler along the bottom, either fixed or movable, adapted to remove the sediment.

384 Ejector:

This subclass is indented under subclass 383. Devices having one or more conduits extending along the bottom of the boiler, provided with a steam ejector.

385 Mud ring:

This subclass is indented under subclass 383. Devices provided with an internal conduit located within the water firebox above the mud ring.

SEE OR SEARCH THIS CLASS, SUBCLASS:

369, 405, for analogous art.

386 Pan:

This subclass is indented under subclass 383. Devices having a sediment pan or receptacle at the bottom of the boiler and provided with a blow-off conduit communicating with the pan.

SEE OR SEARCH THIS CLASS, SUBCLASS:
393, 394, for pans without blow-off conduits.

387 Scraper:
This subclass is indented under subclass 383. Devices provided with scrapers for removing the incrustation or sediment.

SEE OR SEARCH THIS CLASS, SUBCLASS:
379, for scrapers attached to the boiler, but movable and not having a blow-off conduit,
384, for steam ejectors.

SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, subclass 104.16 for mechanical boiler cleaners that are not attached to the boiler.

388 Valved:
This subclass is indented under subclass 383. Devices in which the conduit is provided with one or more valved ports.

SEE OR SEARCH THIS CLASS, SUBCLASS:
45, for conduits with washout nozzles.

389 Surface exit:
This subclass is indented under subclass 379. Devices having means for blowing off or removing the surface water of the boiler, i.e., "skimmers".

SEE OR SEARCH THIS CLASS, SUBCLASS:
400, for combinations of skimmers with a trapped circulating conduit.

390 Fluid jet:
This subclass is indented under subclass 379. Devices comprising fluid jet cleaners for removal of soot and ashes when either the structure of the boiler or of the furnace is modified for the reception of the cleaner when in operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
361, for structure of headers with cleaners for water tube boilers.

SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, see the reference to Class 15 under "Search Class" in the class definition of this class (122).

391 Horizontal fire tube boiler:
This subclass is indented under subclass 390. Devices comprising a horizontal fire tube boiler and cleaner attached permanently to the boiler or to the furnace walls.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 147, 150, 188+, 199+, 296+, and 297+ for feeding air and steam jets that are intended to aid combustion, but which might also act as fluid jet cleaning devices.

392 Water tube boiler:
This subclass is indented under subclass 390. Devices comprising a water tube boiler with the cleaner attached either to the furnace walls or boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
361, for structure of headers.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 98, 147, 150, 188+, 199+, 296, and 297+, for devices for feeding air and steam to assist the combustion of fuel that would also serve as cleaning jets.

393 Mud drum:
This subclass is indented under subclass 379. Devices comprising mud drums and the necessary modifications in the boiler structure for their application.

SEE OR SEARCH THIS CLASS, SUBCLASS:
52, 137, 192, for drums forming bridgewalls for horizontal cylindrical boilers.
259, 363, 365, for water tube boiler drums.

444, for drums for water tube boilers with special feed heating means.

394 Pans:
This subclass is indented under subclass 379. Devices comprising receptacles, either open at the top or closed, but having openings for the passage of water therethrough, for receiving the sediment precipitated from the water. The pan may have a conduit leading to the mud drum.

SEE OR SEARCH THIS CLASS, SUBCLASS:
386, for pans with blow-off conduits leading from the pan to the outside of the boiler.
430, for boilers provided with an internal conduit for delivering feed water to the mud drum.

395 Sandblast:
This subclass is indented under subclass 379. Devices comprising sand blast cleaning devices.

SEE OR SEARCH CLASS:
406, Conveyors: Fluid Current, appropriate subclasses for fluid current conveying of solid material in general.
451, Abrading, subclasses 75+ for a sandblast machine.

396 Systems:
This subclass is indented under subclass 379. Devices comprising apparatus and processes for cleaning and filling boilers where an interchange of heat is effected between the blow-off water and the clean filling water.

397 Trapped circuit:
This subclass is indented under subclass 379. Devices provided with one or more conduits, through which the boiler water is caused to pass, and having some form of trap or filter in the circuit, after passing which the water is returned to the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
91, and 202, for boilers also having trapped circuits.
414, and 415, for circulation features without the sediment trap.

398 Feeding water:
This subclass is indented under subclass 397. Devices provided with means for introducing feed water into the circulating conduit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
403, for a feed water means with a heater.
414, for similar arrangement of conduit with feed water introduction without the sediment trap.

399 Surface and bottom exit:
This subclass is indented under subclass 397. Devices with means for withdrawing the water from the boiler into the circulation conduits from the top or the bottom, or both.

SEE OR SEARCH THIS CLASS, SUBCLASS:
202, and 381, for blow-off devices taking the water from either the surface or the bottom.
382+, for special features of outlets.
389, for surface blow-off devices and for "skimmers" adapted to be used on the surface outlets of the circuit devices of this subclass.

400 Surface exit:
This subclass is indented under subclass 397. Devices in which water is caused to pass from the surface of the boiler through the conduits.

SEE OR SEARCH THIS CLASS, SUBCLASS:
91, and 202, for a water tube circuit with sediment trap.
389, for "skimmers".
399, for combination of surface and bottom outlets to a trapped circuit.
415, for surface exit circulating circuits without a trap in the circuit, but having a forced circulation by means of a mechanical pump, with feed water introduced into the circuit.

401 Chemical feeder:
This subclass is indented under subclass 400. Devices with means for feeding a chemical or some composition to the circuit for precipitating the salts in the water.

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, subclasses 177+ for a heater, chemical feeder and separator combination. See the search notes thereunder.

402 Circulating pump:
This subclass is indented under subclass 400. Devices in which a circulating pump is in the circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
404, for similar arrangement of conduit and trap, with a steam jet for circulating the water.

403 Feed heater:
This subclass is indented under subclass 400. Devices having in combination therewith a heater for the feed water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
415, for allied art without the sediment trap.

404 Steam injector:
This subclass is indented under subclass 400. Devices in which the circulation is aided by means of a steam jet located at some point of the circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
384, for steam jet blow-offs.
402, for this subject matter where the circulation is maintained by a mechanical pump.

405 Wash-out nozzle:
This subclass is indented under subclass 379. Devices comprising nozzles or conduits having one or more discharge orifices, either permanently attached to the inside of the boiler or of such structure that they are not of general application in other arts, for washing the sediment from the tubes or boiler walls.

SEE OR SEARCH THIS CLASS, SUBCLASS:
383, for structures that are also adapted to serve as washout nozzles.
390+, for structure of nozzles.

406.1 CIRCULATION:
This subclass is indented under the class definition. Devices not otherwise classified comprising means for regulating the circulations of water in the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
11, for rotary boilers.
36, and 407, for steam and water jets that help the circulation.
39, and 59, for horizontal fire tube boilers with a drop water firebox having a conduit located either outside or inside the boiler for aiding the circulation.
69, and 196, where the boiler circulation ceases through certain parts when feed water is fed to the boiler and the parts serve as a feed water heater.
83, for horizontal boilers with fire tubes having transverse diaphragms for assisting the circulation.
91, 118 and 159, for vertical fire tube and vertical flue boilers with internal tubes or sleeves for increasing the circulation.
123, for vertical fire tube boilers with transverse diaphragms.
202, for horizontal cylindrical boilers having a sediment trap through which the water circulates.
258, for boilers in which the circulation is downward through water tubes.
292, and 366, for absorbent wicks, within the boiler space.
379+, for circulation devices in combination with means for cleaning the boiler or purifying the water.
414, 415, 418, 419, 428+, 442, and 444, for circulation features combined with the heating and introduction of feed waters.
488, for combined separators for steam and circulation devices.
495, for circulation devices for protecting the crown sheet.
501, and 502, for displacing elements within water tubes.

SEE OR SEARCH CLASS:

417, Pumps, appropriate subclasses for pumps, per se.

418, Rotary Expansible Chamber Devices, for rotary expansible chamber pumps, per se.

406.2 Having anticavitation devices:

This subclass is indented under subclass 406.1. Devices wherein means are provided to prevent the formation of a vortex in a circulating fluid.

406.3 Having restrictors or orifices:

This subclass is indented under subclass 406.1. Devices having outlets or means to confine a fluid during circulation.

406.4 Once through:

This subclass is indented under subclass 406.1. Devices wherein the fluid is turned to steam on a single circuit through the heater.

406.5 With start up operations:

This subclass is indented under subclass 406.1. Devices having a specific set of initial conditions.

407 Injector:

This subclass is indented under subclass 406. Devices comprising an injector or tubes connected in such a manner as to act like an injector and having means for heating part of the water to a higher temperature in a separate compartment or conduit that delivers the water heated in the separate compartment to the injector for increasing the circulation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

384, 398 and 404, for related art on the injector action.

408.1 Having internal conduit:

This subclass is indented under subclass 406.1. Devices comprising boilers having conduits located inside the boiler and generally below the water line for accelerating the circulation of the water in the boiler. These conduits may consist of tubes, inverted bells, cylinders, or even plates spaced apart from each other or spaced from the boiler walls or tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

36, and 407, for special types of circulating devices.

59, for conduits, either internal or external, for aiding the circulation of horizontal fire tube boilers with a drop water firebox.

83, for plates or diaphragms, arranged transversely of a horizontal fire tube boiler for aiding the circulation.

118, for internal circulation tubes, cylinders, or sleeves for vertical fire tube boilers.

159, for internal circulation tubes, cylinders, or sleeves for vertical flue boilers.

379+, for internal circulating conduits combined with water purifying and boiler cleaning apparatus.

412+, for circulation features combined with feed water heaters.

488, for circulation devices combined with a steam separator.

408.2 With internal geyser tube:

This subclass is indented under subclass 408.1. Devices wherein a conduit is placed such that heated fluid at a low level is transported rapidly to a higher level.

409 Horizontal flue boiler:

This subclass is indented under subclass 408. Devices comprising horizontal large flue boilers.

410 Return fire tube:

This subclass is indented under subclass 409. Devices having return fire tubes.

411 Internal:

This subclass is indented under subclass 406. Devices comprising mechanical devices located inside the boilers for circulating or agitating the water.

SEE OR SEARCH THIS CLASS, SUBCLASS:

380, for agitators and water circulators of a mechanical type when they have the additional function of removing sediment from the boiler or transferring it from one part of the boiler to another.

412 FEED HEATERS:

This subclass is indented under the class definition. Subject matter comprising means for preheating water being fed to a boiler or principal heater.

(1) Note. In order that devices for heating feed water shall be classified in any of the boiler subclasses they must be so intimately connected and combined with the boiler structure that they are inseparable therefrom or not of general application for heating water and not excluded therefrom by the main definition of this class. Devices for heating water that may be used for boiler purposes or for any other purposes, are not classified in this class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1, and 3, for combinations of feed heaters with other elements that form a boiler plant.

20, for structure of devices for heating water that could readily be applied for heating feed water (this is a very closely related subclass).

36, for boilers having means for heating the water by steam jets or tubes before the boiler is fired up.

37, for closures of boilers having separate compartments, one compartment being used for impure water full of mud or salt, the steam passing to the other compartment which contains purified water, and feed heaters.

40+, for flash boilers having a preheater for the water intimately associated with the flash boiler.

62, 63 and 65, for heating water introduced into the heaters in the firebox.

68+, and 196, for boilers provided with heating tubes through which the boiler water circulates and is heated, but when the feed water is being fed to the boiler the boiler circulation is stopped by means of automatically operated valves and the feed water is heated in the tubes before it is conducted to the main part of the boiler.

82, for horizontal fire tube boilers with superposed feed water heaters in open communication with the boiler, delivering water to the bottom of the boiler from the feed heater.

83, and 123, for horizontal fire tube and vertical fire tube boilers, respectively, that have transverse diaphragms, the feed water entering the compartment farthest from the firebox and being progressively heated as it approaches the firebox.

89, for water arches at the rear of horizontal fire tube boilers that serve as feed water heaters.

106, for horizontal fire tube boilers having water walls that may be used as a feed water heater.

118, and 159, for special types.

125, for similar structure for feed heaters.

151, for horizontal flue boilers having return fire tubes, with a smokebox closure having a separate comparment that may serve as a feed water heater.

189, 190, 193+, and 202, for boilers where water is introduced into a certain part of the structure before passing to the main part of the boiler.

192, for water bridge walls and drums where water is introduced and heated.

195+, for means for heating feed water when it is introduced (these are really main boiler structures with means for incidentally heating the water when it is introduced before it enters the horizontal cylinder).

371+, for water grates (water grates used as feed water heaters will be found in the various types of boilers having water grates; a complete list of boilers with water grates is given in the "search notes" to subclass 371).

379+, for feed water heaters combined with boiler cleaning devices, traps, and filters.

396, for combined cleaning and feed water heating system where the blow-off water is used to heat the feed water when refilling the boiler (especially used for cleaning and filling locomotive boilers).

398, for boilers having a circulating conduit provided with a sediment trap or filter, the water being introduced into the circulating conduit.

403, for feed heaters having a sediment trap (compare also subclasses 91 and 202).
457, and 458, for gravity boiler feeders with incidental feed water heater.
477, for combination of a water tube boiler with a steam superheater and a feed water heater.
494, for surrounding casings to prevent radiation of heat from a boiler which heats feed water.
497, for feed heating furnace and boiler front.
498, for water-cooled doors for heating feed water.
499, and 500, for furnace mouths or fuel door openings provided with water heaters and used for heating feed water.

SEE OR SEARCH CLASS:
60, Power Plants, appropriate subclasses for feed water heaters in power plants.
165, Heat Exchange, appropriate subclasses for a heat exchanger, per se, even though disclosed as a feed water heater.
210, Liquid Purification or Separation, subclasses 175+ for a heater or heat exchanger combined with a separator, and subclasses 198.1+ for a separator with means to add treating material, e.g., steam.
261, Gas and Liquid Contact Apparatus, appropriate subclasses for apparatus that contact a liquid with a gas not limited to heat exchange but which may be disclosed as a feed water heater.

413 Ash pan:
This subclass is indented under subclass 412. Feed heaters that are either located in the ash pan or ash box or form part of the structure thereof.

414 Feed-injected:
This subclass is indented under subclass 412. Subject matter in which a conduit is in circuit with a boiler, with means for introducing feed water into the circuit, thereby mixing the feed with the boiler water before introduction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
398, 403 and 415, and structural subclasses of boilers generally, for the special structure of boilers having means for introducing feed water into certain parts of the boiler circulating system.

415 Feed-injected:
This subclass is indented under subclass 412. Subject matter having a circulating conduit communicating with a boiler at the water level, having a mechanical pump in the circuit for withdrawing water from the boiler at the water line and returning it to the boiler at some other point and having means for heating the feed water by means of either the surface or jet type and injecting the feed water into the boiler or conduit, but so arranged that the water level in the boiler will be maintained.

SEE OR SEARCH THIS CLASS, SUBCLASS:
398, 402, 403, and 406, for combinations of circulating pump with boiler.
414, for feed water introduced into the circuit.

417 Drip plate in boiler:
This subclass is indented under subclass 412. Feed heaters located in the steam space of a boiler and consisting of plates or receptacles superimposed in such a way that the feed water falls from one to the other. The heater may or may not have means for trapping the sediment and blowing it out of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
435+, 438 and 443, for other pan or tray structures used in feed heater structures.

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, subclasses 198.1+ for separating means with means to add a treating material, e.g., steam.
261, Gas and Liquid Contact Apparatus, for structure of plates and receptacles in Gas and Liquid Contact Apparatus of general utility.

418 Attached:
This subclass is indented under subclass 412. Subject matter combined with fire engine boilers with the water heater attached to the boiler or some part of the engine apparatus for keeping the water in the boiler hot when the boiler is not fired up.

419 Detachable:
This subclass is indented under subclass 412. Water heaters for keeping water in a fire engine boiler hot when the fire engine is in the engine house and the firebox is not in use, which consist of a stationary water heater located in the engine house, adapted to be coupled to the fire engine boiler to establish a water circulation.

SEE OR SEARCH CLASS:
237, Heating Systems, subclass 12.2 for combinations of this heating device with the heating system of the engine house.

420 Furnace gases:
This subclass is indented under subclass 412. Feed water heaters which are heated by furnace gases only.

(1) Note. See the structural subclasses under the different types of boilers for feed heaters heated by furnace gases where the heater forms a part of the boiler, and boiler water circulates therethrough other than when the feed water is being fed to the feed water heating section and not merely as an alternate operation. For certain specialized feed heaters see "Search this class" below.

SEE OR SEARCH THIS CLASS, SUBCLASS:
371, and the subclasses listed in the search notes thereunder, for water grates that serve as feed water heaters.
412, and the subclasses listed in the search notes thereunder for further directions as to feed water heaters.

421 Offtake flue:
This subclass is indented under subclass 420. Feed water heaters not of general application in other arts for heat transference, located in the waste heat flue or "offtake" flue of the boiler, between the boiler and smokestack.

422 Furnace gases and steam:
This subclass is indented under subclass 412. Feed water heaters heated by furnace gases and steam.

SEE OR SEARCH THIS CLASS, SUBCLASS:
403, 425, 432, and 434, for special types of heaters of this nature.

423 Smoke box:
This subclass is indented under subclass 412. Feed water heaters in horizontal fire tube boilers and located either within the smokebox or forming a part of the smoke box structure.

(1) Note. A "smokebox" is distinguished from a "smoke chamber" in that the former consists of a closed chamber at the end of the boiler, into which the products of combustion pass directly from the fire tubes and thence to the smokestack, while a "smoke chamber" is a chamber at the end of the boiler, into which the products of combustion enter either from the fire tubes or from the flue outside of the boiler and do not pass directly out of the chamber, but may return through other boiler flues.

SEE OR SEARCH THIS CLASS, SUBCLASS:
151, for a return fire tube boiler having a smoke box containing water tubes.

424 Exhaust pipe:
This subclass is indented under subclass 423. Subject matter comprising a water-jacketed exhaust "lift" pipe.

425 Furnace gases and steam:
This subclass is indented under subclass 423. Feed water heaters heated both by furnace gases and by steam, which may or may not come into contact with the feed water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
422, 432 and 440, for other types of feed heaters heated by furnace gases and steam in combination.

426 Water tube:
This subclass is indented under subclass 423. Feed water heaters consisting of either water tubes located in smokebox or of a water walled casing, forming the smokebox, provided with water tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
465, for similar structure used as a steam superheater.

427 Smoke chamber:
This subclass is indented under subclass 412. Feed heaters for horizontal fire tube boilers located in the smoke chamber at the rear of the boiler or having one side exposed to the heat of the products of combustion as they pass through the chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
423, (1) Note, for distinction between "smokebox" and "smoke chamber".

428 Internal conduit:
This subclass is indented under subclass 412. Subject matter comprising a conduit located inside a boiler for heating the water before it is finally delivered to the boiler from the conduit. The feed water may or may not be mixed with boiler water or steam before its final delivery to the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
36, and 444, for device where feed water is injected into the boiler water tubes for heating the water and increasing circulation.

429 Automatic sediment valve:
This subclass is indented under subclass 428. Subject matter in which the conduit has a sediment trap provided with one or more valves automatically operated when the blow-off valve of the trap is opened to change the course of flow of the water and clear the trap of sediment.

430 Blow-off delivery:
This subclass is indented under subclass 428. Subject matter in which the conduit delivers it toward the blow-off end or mud drum of the boiler.

431 Filter in boiler:
This subclass is indented under subclass 428. Subject matter in which a filter is located in the conduit inside the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
428, and 429, for traps inside the boiler.

432 Furnace gases:
This subclass is indented under subclass 428. Subject matter connected in series with a furnace, gas type. That is, the water is heated in a conduit heated by products of combustion and then passes into a conduit within the boiler, where it is heated before delivery thereto, or is heated in conduits passing through the boiler and then in a furnace gas heated chamber or conduit and then delivered to the boiler.

433 Trap outside boiler:
This subclass is indented under subclass 428. Subject matter where there is a trap or filter outside the boiler, through which the water passes before it enters such feed heater.

434 Locomotive tender:
This subclass is indented under subclass 412. Subject matter combined with the water tank of a locomotive tender.

435 Pan in steam space:
This subclass is indented under subclass 412. Subject matter comprising an open receptacle or pan located within the steam space of the boiler, in which water is fed and heated. The pan may be provided with devices for intercepting the sediment that is precipitated and for blowing it off.

SEE OR SEARCH THIS CLASS, SUBCLASS:
417, and 438, for structure of pans and sprayers.

436 Spray:
This subclass is indented under subclass 435. Subject matter with means for spraying feed water to the pan. The pan is generally provided with means for collecting the sediment and blowing it off.

437 Safety valve:
This subclass is indented under subclass 412. Subject matter comprising a conduit leading from a boiler safety valve to a water receptacle for heating the water when the steam escapes from the safety valve.

438 Spray to steam space:
This subclass is indented under subclass 412. Subject matter comprising means for spraying water into the steam space of a boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
417, and 436, for structure of spraying devices in other types of feed water heaters.

SEE OR SEARCH CLASS:
239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclasses for related spray structures which may be used to inject water into a boiler.

439 Stack:
This subclass is indented under subclass 412. Subject matter wherein the feed water heater either forms part of a stack or is located in a smokestack.

SEE OR SEARCH THIS CLASS, SUBCLASS:
20, for water heaters of general application located in the smokestack or chimney.
123, and 440, for stack feed water heaters heated by both furnace gases and steam.

441 Steam:
This subclass is indented under subclass 412. Subject matter comprising means for heating the feed water by means of live or exhaust steam.

442 Injected:
This subclass is indented under subclass 441. Subject matter where the live or exhaust steam comes into contact with the water to be heated. This is a miscellaneous subclass for steam injected feed water heaters not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
434, 435, 436, 437, 438, 443, and 444, for special types of heaters using steam.
457, and 458, and search note thereunder, for devices mixing water with exhaust steam and returning it to the boiler.

SEE OR SEARCH CLASS:
60, Power Plants, subclass 654 for devices for mixing water with exhaust steam and returning it to the boiler of power plants.
210, Liquid Purification or Separation, subclasses 198.1+ for separating means with means to add a treating material, e.g., steam.
261, Gas and Liquid Contact Apparatus, for feed water heaters and purifiers not connected with the boiler structure of the steam injected type.

443 Open to steam space:
This subclass is indented under subclass 442. Subject matter comprising closed chambers or receptacles located over a boiler in open communication with the steam space and means for injecting water thereto that it may be heated by contact with the steam before it enters the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
425, and 442, for similar parts.

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, subclasses 198.1+ for separating means with means to add a treating material e.g., steam.
261, Gas and Liquid Contact Apparatus, for gas and liquid contact apparatus not limited to heat exchanging.

444 Water tube boiler:
This subclass is indented under subclass 412. Miscellaneous subject matter wherein the feed water is heated in a water tube boiler, whether the water be heated outside or inside the water space of the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
347, and 365, for disclosures of feed water heating devices within the steam and water drum of a water tube boiler.
477, for combinations of feed heaters and superheaters.

446 Fluid fuel:
This subclass is indented under the class definition. Devices for feeding both fluid fuel to the burner and water to the boiler that are not automatically regulated.

447 Cutoff:
This subclass is indented under subclass 446. Devices with automatic mechanism for cutting off the fuel supply when the water level in the boiler becomes either too high or too low or both.

SEE OR SEARCH CLASS:
236, Automatic Temperature and Humidity Regulation, for such controls, per se.

448.1 AUTOMATIC CONTROL OF FLUID FUEL AND WATER:
This subclass is indented under the class definition. Devices for controlling automatically both the feed of fluid fuel to the burner and the feed of water to the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
14.1 through 14.31, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a condition responsive feature.

SEE OR SEARCH CLASS:
126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 351.1 for a fluid fuel burner other than a top-accessible liquid heating vessel and a condition responsive feature; or subclass 374.1 for an open-top liquid heating vessel that may include a lid and a condition responsive feature.
137, Fluid Handling, subclass 94 for a condition responsive system where fuel is proportioned or correlated to some boiler or water system condition.
236, Automatic Temperature and Humidity Regulation, appropriate subclass, for the control, per se, for the fuel feed.
417, Pumps, subclasses 279+ for pumps having condition responsive control of the pumped fluid.

448.2 Having fuel or feed bypass:
This subclass is indented under subclass 448.1. Devices wherein means are provided to deflect water feed or return excess fuel based on steam pressure.

448.3 Multiple boiler regulation:
This subclass is indented under subclass 448.1. Devices wherein a plurality of boilers are controlled.

448.4 Once through:
This subclass is indented under subclass 448.1. Devices wherein the fluid is turned to steam on a single circuit through the heater.

449 Solid fuel:
This subclass is indented under the class definition. Devices for automatically controlling the combustion of solid fuel and the regulation of the water feed to boilers, depending upon the conditions within the boiler. This is accomplished either by steam pressure or the temperature of the water or steam.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 103 and 188 for boiler controlled fuel feeders.

450 Suspended boiler:

This subclass is indented under the class definition. Subject matter comprising boilers that are movably supported to control either the combustion of the fuel or water feed or both.

451 FEEDERS:

This subclass is indented under the class definition. Devices for introducing water to boilers and controlling the introduction not otherwise provided for. Those devices that are of general application for feeding water to tanks, either open or closed, whether a boiler be disclosed or claimed in a general way, are not classified in class 122 at all, but are placed in classes that will be noted below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for boiler plants having a boiler feeder in combination.

11, where the movement of the boiler is combined with the feeding of water.

40, and 41, for boilers of the flasher type having special means for introducing water into the boiler combined therewith.

365, 428 and 444, for devices disclosing feed introducing apparatus for water tube boilers.

366, for absorbent wicks for feeding water from one portion of the boiler to another.

396, for combined cleaning, heating, and feeding devices.

398, and 403, for combined purifiers, circulators, heaters and feed introduction.

406, for feed introduction combined with circulation.

414, for injecting water into a circuit taking water from the boiler.

415, for boilers having a circuit communicating with the boiler and provided with a pump for withdrawing water from the water level in the boiler, introducing feed water, mixing it with the boiler water in the circuit, and maintaining the water level.

417, 435, 436, and 438, for devices for introducing water into the steam space.

431, and 433, for feed water conduits provided with traps and filters.

446, for combinations of fuel and water feeders.

446, through 449, under Regulation, Fuel and Water, Automatic control for automatic control of both fuel and water to the boiler.

447, for feeders with automatic cut-off for the fluid fuel upon the occurrence of an abnormal water level.

450, where the feed is governed by the movement of the boiler itself.

452, for art in this class where the feed is controlled by the pressure inside the boiler.

495, when water is fed upon the crown sheet.

SEE OR SEARCH CLASS:

60, Power Plants, subclass 667 for a power plant energized by externally applied heat in which the boiler feed is automatically controlled.

95, Gas Separation: Processes, subclasses 241+ for degasification of liquid, especially subclass 244 for plural successive degassing treatments of boiler feed water.

96, Gas Separation: Apparatus, subclasses 155+ for degasifying means for liquid.

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 380.1 for an open-top liquid heating vessel that may include a lid and a supply of liquid to the vessel.

137, Fluid Handling, subclasses 156+ for gas pressure discharge of a liquid as to a boiler, subclasses 171+ for steam traps, subclasses 386+ for liquid level responsive control of a valve.

200, Electricity: Circuit Makers and Breakers, subclass 84 for electrical switches for controlling feed valves of boilers operated by a float.

236, Automatic Temperature and Humidity Regulation, subclasses 55 through 60 for thermostatically operated steam traps; and subclass 52 for combinations of thermostatic valves and float

valves or pressure operated valves in steam traps.

237, Heating Systems, subclasses 9+ for automatically controlled heating systems having means for introducing or controlling the introduction of water to boilers.

417, Pumps, subclasses 36+ for liquid level responsive control of a motor driving a pump, subclass 182.5 for liquid level responsive control of a jet pump and subclass 211.5 for liquid level responsive control of a pump displacement or drive transmission.

451.1 Thermally controlled:

This subclass is indented under subclass 451. Devices for automatically controlling flow of feed-water to a boiler by thermal responsive means, usually a thermostat of the expanding-solid type, which is exposed more or less to the steam as the water-level varies.

SEE OR SEARCH THIS CLASS, SUBCLASS:

14.3, 14.31, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) and a condition responsive feature that controls the flow of the water.

504.2, for thermal means which operate a valve, on drop of water-level below a certain limit, to operate an alarm or indicator.

451.2 Pressure-operated valve:

This subclass is indented under subclass 451.1. Devices in which the controlling-valve is operated by fluid-pressure means, which may be the pressure generated in a thermostat of the expanding-fluid type.

452 Boiler pressure:

This subclass is indented under subclass 451. Devices having means for controlling the supply by boiler pressure. This subclass also contains patents having claims to boiler structure combined with the feeding mechanism.

SEE OR SEARCH THIS CLASS, SUBCLASS:

448.1, and 449, for the combination of the feed water and the fuel controlling devices depending on boiler pressure.

SEE OR SEARCH CLASS:

417, Pumps, subclasses 279+ for pumps having condition responsive control of the pumped fluid.

456 Automatic:

This subclass is indented under subclass 451. Devices consisting of one or more closed tanks or receptacles having automatically controlled inlet and outlet valves for admitting water to the tank and discharging it therefrom, and also having means for equalizing the pressure between the tank and the boiler, whereby the water will fall by gravity into the boiler, the tank being located above the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:

14.3, 14.31, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) and a condition responsive feature that controls the flow of the water.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 156+ for gas pressure discharge of a liquid in general, and subclasses 386+ for liquid level responsive valves.

457 Heater:

This subclass is indented under subclass 456. Devices having means for heating the feed water.

SEE OR SEARCH THIS CLASS, SUBCLASS:

458, for hand operated gravity feeders with a heater.

458 Heater:
This subclass is indented under subclass 451. Gravity feeders having means for heating the feed water, but not of the automatic type.

459 STEAM TREATMENT:
This subclass is indented under the class definition. Apparatus and methods for treating steam or vapor, either by superheating or cooling it, or by expanding or compressing it, or by any combination of operations.

SEE OR SEARCH THIS CLASS, SUBCLASS:
487, for superheaters having means for injecting water into the steam.

SEE OR SEARCH CLASS:
219, Electric Heating, for electric heating devices for superheating steam.

460 Boilers with superheaters:
This subclass is indented under subclass 459. Subject matter comprising general combinations of boilers of a miscellaneous structure with steam superheaters, not defined in other subclasses. Superheaters of use only as a steam superheater are classified here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
477, for combinations of water tube boilers with steam superheaters and feed water heaters.
485, for superheaters with a separate furnace.

461 Superheater:
This subclass is indented under subclass 459. Subject matter comprising steam superheaters in combination with horizontal fire tube boilers or flue boilers of a miscellaneous character.

SEE OR SEARCH THIS CLASS, SUBCLASS:
469, and 481, for superheaters related to fireboxes.

462 From smoke box:
This subclass is indented under subclass 461. Devices relating to the structure and arrangement of a steam tube superheater having steam tubes extending from the smokebox of a horizontal fire tube boiler into the fire tubes.

463 Internal fire tube:
This subclass is indented under subclass 461. Devices comprising horizontal fire tube boilers having a steam space within the boiler separate from the main steam space, in which are fire tubes for superheating the steam.

SEE OR SEARCH THIS CLASS, SUBCLASS:
482, for boilers having fire tubes in the steam space of a boiler for superheating the steam.

464 Fire tube:
This subclass is indented under subclass 461. Devices relating to the structure and arrangement of a superheater for steam having fire tubes passing through the steam chamber of the superheater, located at the smokebox end of a horizontal fire tube boiler.

465 Steam tube:
This subclass is indented under subclass 461. Devices relating to the structure and arrangement of a steam tube superheater at the smokebox end of a horizontal fire tube boiler and generally located in the smokebox.

466 Superheater and feed heater:
This subclass is indented under subclass 459. Subject matter comprising fire tube boilers or large flue boilers having both a steam superheater and a feed water heater combined therewith.

467 Superheater:
This subclass is indented under subclass 459. Subject matter relating to the structure and general arrangement of superheaters for vertical fire tube boilers, except those located in the firebox.

SEE OR SEARCH THIS CLASS, SUBCLASS:
468, and 481, for analogous superheaters.

468 Superheater:
This subclass is indented under subclass 459. Subject matter comprising vertical flue boilers having water tubes within the flue, in combination with a steam superheater.

469 Rear of firebox:
This subclass is indented under subclass 459. Subject matter comprising superheaters located at the rear of the firebox or back of the bridge wall of miscellaneous boilers extending horizontally. The boiler is generally of the horizontal cylindrical type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
464, for general combination of superheater with horizontal fire tube boilers.
481, for superheaters located in the firebox.

470 Waste-heat flue:
This subclass is indented under subclass 459. Subject matter relating to the structure and arrangement of a superheater in the waste heat flue of a horizontally located boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
412+, and especially subclass 421 for heat exchange features in feed heaters.

SEE OR SEARCH CLASS:
165, Heat Exchange, subclasses 157+ for a tube assembly in a casing or flue of general utility.

471 Superheater:
This subclass is indented under subclass 459. Subject matter relating to the structure and general arrangement of a steam superheater within the combustion space of a water tube boiler having banks of water tubes rearwardly declined over the bridge wall and in communication with front and rear headers, which are in communication with a declined drum posited above the water tubes.

472 Superheater:
This subclass is indented under subclass 459. Subject matter relating to the structure and general arrangement of a superheater in the combustion space of a water tube boiler having banks of water tubes rearwardly declined over the bridge wall and communicating with headers at each end, which headers communicate with a longitudinal drum posited above the water tubes.

473 Superheater:
This subclass is indented under subclass 459. Subject matter comprising superheaters for water tube boilers having a longitudinal drum not otherwise provided for.

SEE OR SEARCH THIS CLASS, SUBCLASS:
472, for longitudinal drum superheaters.

474 Superheater:
This subclass is indented under subclass 459. Subject matter comprising superheaters for water tube boilers having banks of tubes over the bridge wall.

475 Superheater:
This subclass is indented under subclass 459. Subject matter relating to the structure and general arrangement of a steam superheater in the combustion space of a water tube boiler having a stand pipe provided with spur water tubes.

476 Superheater:
This subclass is indented under subclass 459. Subject matter comprising water tube boilers having superheaters for steam combined with the boiler in the same heating chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
474, for superheaters for water tube boilers of a miscellaneous type, with water tubes over the bridge wall.
477, for water tube boilers having a superheater for steam and a feed water heater.

477 Superheater and feed heater:
This subclass is indented under subclass 459. Subject matter comprising water tube boilers provided with both a superheater for steam and a feed water heater.

478 Superheater:
This subclass is indented under subclass 459. Subject matter relating to superheaters for water tube boilers having one or more transverse drums.

479.1 Automatic heat regulation of superheater:
This subclass is indented under subclass 459. Subject matter relating to steam superheaters having means for automatically regulating the temperature of the superheated steam.

SEE OR SEARCH THIS CLASS, SUBCLASS:
448.1, 449 and 452, for closely allied art and special features of controlling devices.

SEE OR SEARCH CLASS:
60, Power Plants, subclass 666 for the automatic control of the by-pass of a superheater in a power plant.
126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 351.1 for a fluid fuel burner other than a top-accessible liquid heating vessel and a condition responsive feature.
236, Automatic Temperature and Humidity Regulation, for structure of the controlling device.

479.2 Having gas recirculation:
This subclass is indented under subclass 479.1. Devices wherein the products of combustion are returned to an earlier stage of combustion.

479.3 Having flame positioning:
This subclass is indented under subclass 479.1. Devices wherein the location of the combustion flow can be varied.

479.4 With variable firing:
This subclass is indented under subclass 479.1. Devices wherein the firing order of the burners can be changed.

479.5 Having dampers:
This subclass is indented under subclass 479.1. Devices wherein an adjustable plate controls the draft.

479.6 Plural furnaces:
This subclass is indented under subclass 479.1. Devices wherein there are multiple combustion chambers.

479.7 Once through:
This subclass is indented under subclass 479.1. Devices wherein the fluid is turned to steam as a single circuit through the heater.

480 Damper-controlled:
This subclass is indented under subclass 459. Subject matter relating to superheaters having a damper for varying the amount of heat to which the superheater is subjected and their arrangement with the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
479.1, for superheater automatic heat regulation.

481 Firebox:
This subclass is indented under subclass 459. Subject matter relating to superheaters located in the firebox of any type of boiler, or the superheater may be located around the firebox.

482 Fire tube in steam space:
This subclass is indented under subclass 459. Subject matter relating to boilers having fire tubes in the steam space of the boiler for superheating the steam.

SEE OR SEARCH THIS CLASS, SUBCLASS:
463, for fire tubes heating a separate steam chamber in the boiler.
486, for superheated steam domes.

483 Indirectly heated:
This subclass is indented under subclass 459. Subject matter relating to devices for superheating steam indirectly by heating a fluid or fusible solid and transferring the heat of the fluid or melted mass to the steam.

(1) Note. Compare the subclasses, in this class, indented under Indirectly heated, separate fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
479.1, for this type of superheater having an automatic temperature regulator.

484 Separate charges:
This subclass is indented under subclass 459. Subject matter relating to superheaters provided with means for heating the steam in separate charges, each charge or portion being cut off and isolated from the main steam line while being superheated.

485 Separate furnace:
This subclass is indented under subclass 459. Subject matter relating to steam superheaters having a separate furnace for heating them.

486 Steam dome:
This subclass is indented under subclass 459. Subject matter relating to steam domes provided with means for drying or superheating the steam, excluding mere steam separators.

SEE OR SEARCH THIS CLASS, SUBCLASS:
492, for steam domes with separators.
508, for steam domes without separators.

487 Water-injected:
This subclass is indented under subclass 459. Subject matter relating to means for injecting water into superheated steam or to structure of superheaters with water injection mechanism.

SEE OR SEARCH CLASS:
236, Automatic Temperature and Humidity Regulation, subclasses 12.1+ for structure of the control device.
261, Gas and Liquid Contact Apparatus, for desuperheating apparatus of this type when independent of the boiler.

488 Boiler circulation:
This subclass is indented under the class definition. Devices located within the boiler for separating the steam from the water as it circulates in the boiler.

SEE OR SEARCH THIS CLASS, SUBCLASS:
408+, for circulating conduits with incidental steam separators.

489 Boiler return:
This subclass is indented under the class definition. Separators located in the steam main leading from the boiler with means for automatically returning the water to the boiler.

SEE OR SEARCH CLASS:
96, Gas Separation: Apparatus, for apparatus for gas separation, per se.

490 For tilting boilers:
This subclass is indented under the class definition. Subject matter relating to mechanism for preventing water being carried out of the boiler into the steam main when the boiler is tilted or inclined from a normal horizontal position, as, for instance, when a ship is pitching or rolling or when a traction engine or locomotive is ascending or descending a grade.

SEE OR SEARCH THIS CLASS, SUBCLASS:
495, for allied art, and see the notes thereto.

491 Interior of boilers:
This subclass is indented under the class definition. Subject matter relating to steam separators located either within the steam space of a boiler or in the steam space, in combination with a separator in the steam dome or steam main or at the outlet of the boiler, so that the water will fall back into the boiler when steam is being discharged. Includes separators of the nature defined, although they may be used in a sugar evaporator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
488, and see the notes thereunder, for means for separating steam from the water circulation of the boiler.
489, for separators in the steam main with means for returning the water to the boiler.
492, for steam domes with separators.

SEE OR SEARCH CLASS:
96, Gas Separation: Apparatus, for apparatus for gas separation, per se.
137, Fluid Handling, subclasses 171+ for steam and water separator traps.

236, Automatic Temperature and Humidity Regulation, subclasses 53 through 60, for steam traps.

492 Steam dome:

This subclass is indented under the class definition. Subject matter relating to steam separators located in the steam dome of the boiler or to the structure of the steam dome having steam separating apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:

486, for steam domes with superheaters.

508, for steam domes without steam separators.

SEE OR SEARCH CLASS:

55, Gas Separation, subclasses 417 and 418+ for separators and flow control means combined and 440 for parallel and continuous nonplanar separating members.

493 BRACES AND STAYS:

This subclass is indented under the class definition. Subject matter comprising miscellaneous braces and stays and their general arrangement with the boiler walls not included in the definitions of other subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

83, for supports for fire tubes for horizontal fire tube boilers.

360+, for braces and stays for headers and header structure.

496, for the general arrangement of stays and the structure of crown sheets.

SEE OR SEARCH CLASS:

411, Expanded, Threaded, Driven, Headed, Tool-Deformed, or Locked-Threaded Fastener, subclasses 367 and 370, respectively, for a threaded fastener and nut having a stay bolt spacer sleeve or having a stay bolt bearing washer; and subclasses 379+ for a threaded stay bolt, per se; and subclass 505 for an unthreaded stay bolt, per se.

494 CASINGS:

This subclass is indented under the class definition. Subject matter relating to inclosures surrounding a boiler of a miscellaneous nature not specially provided for in other subclasses in this or any other main class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.2, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) and a casing for the stand boiler or an external tank therefor.

SEE OR SEARCH CLASS:

52, Static Structures (e.g., Buildings), appropriate subclasses for masonry or concrete constructions.

106, Compositions: Coating or Plastic, particularly subclasses 40, 41, 75, 86+, and 122 for insulating compositions.

110, Furnaces, subclasses 336+ for wall structures forming part of the furnace which covers the boiler.

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 273.5 for a domestic oven using a heat accumulator (e.g., fireless cooker, etc.) or subclass 375.1 for an open-top liquid heating vessel that may include a lid having a heat accumulator.

138, Pipes and Tubular Conduits, particularly subclasses 32 through 35 for thawing and steam protection of pipes.

220, Receptacles, for casing structure of general utility.

252, Compositions, subclass 62, for heat insulating compositions.

428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a stock material product in the form of a

single or plural layer web or sheet, where either the material or the structure of the product may inherently influence the loss or gain of heat; see particularly subclasses 304+, 426+, 457+, and 920+ (a cross-reference art collection).

495 CROWN SHEETS PROTECTING:
This subclass is indented under the class definition. Subject matter relating to boilers having means to prevent the crown sheet over the firebox from being uncovered by water when the boiler is tilted from the normal horizontal position.

SEE OR SEARCH THIS CLASS, SUBCLASS:
490, for allied art.

SEE OR SEARCH CLASS:
180, Motor Vehicles, subclass 39 for devices to keep the boiler of a steam traction engine level when going up or down grade.
280, Land Vehicles, subclass 7 for means for levelling a tank or boiler vehicle when on uneven ground.

496 CROWN SHEETS AND STAYS:
This subclass is indented under the class definition. Subject matter relating the structure of crown sheets and braces and stays therefor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
58, and 493, for miscellaneous braces and stays.

497 FRONTS:
This subclass is indented under the class definition. Subject matter relating to water-cooled fronts for boilers.

498 Doors:
This subclass is indented under subclass 497. Subject matter relating to furnace doors. There may or may not be a circulatory communication with the boiler. The door may be employed to heat water for any purpose or to generate steam.

SEE OR SEARCH CLASS:
110, Furnaces, subclass 180 for air-cooled furnace doors.
202, Distillation: Apparatus, subclasses 242+ for distillation apparatus closures.

499 Mouths:
This subclass is indented under subclass 497. Subject matter relating to the same structure of the fuel feed opening of a firebox having water heating chambers or conduits. The feed water may be heated in this structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
93, 94, 189, 190, 193, and 194, for related art.

500 Water firebox:
This subclass is indented under subclass 499. Subject matter relating to a water firebox.

501 FLUID-DISPLACER:
This subclass is indented under the class definition. Subject matter relating to boilers whose steam or water space or some part thereof contains fluid displacing elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:
40, 242, 243, 406, and 509, for related art.

502 Fluid fuel:
This subclass is indented under subclass 501. Subject matter wherein the boiler is heated by fluid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
243, and 406, for related art.

503 FUEL BAFFLES:
This subclass is indented under the class definition. Subject matter relating to the structure and arrangement of a water-cooled baffle, which is generally located in the firebox for receiving the impact of the burning fuel, either fluid or comminuted solid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
10, for fluid fuel burners.

504 SAFETY DEVICES:

This subclass is indented under the class definition. Subject matter comprising devices not otherwise provided for to prevent explosions or injury to boilers.

SEE OR SEARCH THIS CLASS, SUBCLASS:

14.1 through 14.31, for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a condition responsive feature.

125, 164, 364, 437, 447, 450, and 490, for tilting boilers.

493, for braces and stays.

494, and 495, for different types of safety devices in this class.

510, for supports.

SEE OR SEARCH CLASS:

55, Gas Separation, subclasses 309+ for separator bypass or gas pressure relief means.

73, Measuring and Testing, subclasses 290+ for liquid level or depth gauges.

96, Gas Separation: Apparatus, subclasses 399+ for gas separation apparatus having automatic control means for gas cutoff or diversion.

126, Stoves and Furnaces, subclass 35 for safety valves.

137, Fluid Handling, subclasses 455+ for line condition change responsive valves, particularly subclasses 460, 486+ and 498 for valves which close in response to an excessive flow as when the line breaks.

165, Heat Exchange, subclasses 279+ for a heat exchanger with a pressure or temperature responsive device, and subclass 134.1 for a heat exchanger with a protective device.

200, Electricity: Circuit Makers and Breakers, subclass 84 for special safety switches.

220, Receptacles, for diaphragms for boilers and tanks that break under a given pressure and for boiler manholes and closures with safety attachments.

236, Automatic Temperature and Humidity Regulation, subclass 53 for related art.

237, Heating Systems, subclass 80 for steam traps that are heated to prevent freezing.

261, Gas and Liquid Contact Apparatus, for safety devices for condensers.

411, Expanded, Threaded, Driven, Headed, Tool-Deformed, or Locked-Threaded Fastener, subclasses 367 and 370, respectively, for a threaded fastener and nut having a stay bolt spacer sleeve or having a stay bolt bearing washer; and subclasses 379+ for a threaded stay bolt per se; and subclass 505 for an unthreaded stay bolt, per se.

504.1 Fusible control:

This subclass is indented under subclass 504. Subject matter containing a fusible element which fuses, generally when the water-level falls below a certain limit, and sounds an alarm or allows the steam-pressure to fall.

504.2 Alarms or indicators:

This subclass is indented under subclass 504. Subject matter which operate an alarm or indicator should dangerous conditions arise in the boiler, usually by a thermally-operated means which is exposed to the steam when the water-level falls below a certain limit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

504.1, for fusible controls.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 500+ for electrical automatic condition responsive indicating systems.

504.3 Fusible control:

This subclass is indented under subclass 504. Subject matter relating to devices controlled by fusible means for admitting steam or water to the firebox or otherwise extinguishing or dampening fire.

SEE OR SEARCH CLASS:
220, Receptacles, subclasses 89.1 through 89.4 for frangible or fusible receptacle attachments.

505 Float-controlled:
This subclass is indented under subclass 504. Subject matter relating to float controlled devices for admitting steam or water to the firebox or for otherwise extinguishing or dampening the fire.

SEE OR SEARCH CLASS:
169, Fire Extinguishers, for fire extinguishers, per se.
236, Automatic Temperature and Humidity Regulation, subclass 56 for related art.

506 Pressure-controlled:
This subclass is indented under subclass 504. Subject matter relating to devices for extinguishing or dampening the fire of the boiler when a certain pressure inside the boiler is attained. This includes combined safety valves and fire extinguishers.

507 Self-closing valve:
This subclass is indented under subclass 504. Subject matter relating to boilers with valves that close automatically when some part of the boiler bursts in order to prevent steam or water from escaping.

SEE OR SEARCH THIS CLASS, SUBCLASS:
364, for hand operated valves for closing tubes and headers.

SEE OR SEARCH CLASS:
96, Gas Separation: Apparatus, subclasses 408+ for gas separation apparatus having automatic control means for regulation of separated constituent discharge.

508 STEAM DOMES:
This subclass is indented under the class definition. Subject matter relating to the structure of the steam receiving and storing chambers for boilers with which the steam main communicates which do not come within the definition of other subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:
88, and 305, for steam and water drums for water tube boilers.
463, and 509, for steam collecting chambers located within the body of the boiler.
486, for steam domes or chambers having means for superheating the steam.

509 SUBMERGED STEAM CHAMBER:
This subclass is indented under the class definition. Subject matter relating to boilers provided with a steam chamber or receiver inside the boiler below the water line.

SEE OR SEARCH THIS CLASS, SUBCLASS:
36, and 463, for special combinations.

510 SUPPORTS:
This subclass is indented under the class definition. Subject matter relating to mechanism and structure for supporting boilers of various types when the structure of the boiler or the general arrangement is claimed in combination with the support.

SEE OR SEARCH THIS CLASS, SUBCLASS:
11, and 12, for rotatably supported boilers.
450, for normally supported boilers for regulating the feed water or heat generation.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 336+ for structure of furnace walls.

511 TUBES AND CONNECTIONS:
This subclass is indented under the class definition. Subject matter relating to the structure of tubes and flues for boilers not of general application and their connection with the boiler and couplings for tubes or flues, not specially provided for in other subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:
360+, and 365, for tube couplings for headers and drums and the structure of the headers and drums.

SEE OR SEARCH CLASS:

110, Furnaces, subclasses 322+ for protecting devices for the ends of boiler tubes.

138, Pipes and Tubular Conduits, for tubes of general utility.

165, Heat Exchange, subclasses 177+ for a tubular structure of more general utility specialized to heat exchange.

285, Pipe Joints or Couplings, subclasses 189+ for couplings for tubes of boilers and condensers or feed-water heaters to the tube sheet.

512 TUBE SHEETS:

This subclass is indented under the class definition. Subject matter relating to structure of the tube sheet for boilers not of general application.

SEE OR SEARCH THIS CLASS, SUBCLASS:

365, for drums and couplings.

511, for tubes and connectors.

FOREIGN ART COLLECTIONS

The definitions below correspond to abolished subclasses from which these collections were formed. See the Foreign Art Collection schedule of this class for specific correspondences. [Note: The titles and definitions for indented art collections include all the details of the one(s) that are hierarchically superior.]

FOR 100 STAND BOILER:

Foreign art collection for subject matter relating to closed water chambers, tanks or receptacles usually known in the art as "range" or "stand" boilers, whose structure is modified for the purposes of applying heat directly to the boiler.

FOR 101 Electric:

Foreign art collection for devices where the means to apply heat is an electric heater.

FOR 102 Fluid fuel:

Foreign art collection for stand boilers heated by fluid fuel.

FOR 103 Solid fuel:

Foreign art collection for stand boilers having a solid fuel furnace forming a part of the unitary structure of the stand boiler.

FOR 104 Fluid fuel, fire tube and water tube:

Foreign art collection for stand boilers provided with both fire tubes and water tubes adapted to be heated by a fluid fuel burner.

FOR 105 Fluid fuel, fire tube:

Foreign art collection for stand boilers provided with fire tubes and heated by a fluid fuel burner.

FOR 106 Fluid fuel, water tube below boiler:

Foreign art collection for stand boilers provided with water tubes located below the boiler and heated by a fluid fuel burner.

FOR 107 Fluid fuel, water tube casing:

Foreign art collection for stand boilers provided with water tubes and surrounded by a casing and heated by a fluid fuel burner.

END