

**CLASS 110, FURNACES****SECTION I - CLASS DEFINITION**

This class provides for the following:

Solid material combustion (\*) apparatus with or without the capability of utilizing auxiliary gaseous or liquid fuel (\*);

Solid material combustion apparatus convertible to a gaseous or liquid fuel combustion apparatus;

Combustion apparatus for incinerating (\*) solid or liquid refuse (\*);

Solid material combustion apparatus subcombinations and structure not provided for elsewhere;

Methods of operating solid material combustion apparatus not provided for elsewhere.

**SCOPE OF THE CLASS**

Placement of an original patent into Class 110 requires the following minimum structure or steps of operating such structure: (1) means or a step to either convey or support solid combustible material during combustion; (2) means or a step to supply either directly or indirectly a noncombustible fluid to the solid combustible material; and (3) means or a step to enclose or control the combustion reaction.

Class 110 further provides for the following subcombination devices peculiar to solid material combustion apparatus, the following of which is a partial list: (1) Fuel Feeders. (2) Spark Arresters. (3) Spark and Smoke Conductors. (See Subclass Reference to this Class, below, for map to these subclasses.)

Class 110 also provides for the following types of structure peculiar to solid material combustion apparatus, the following of which is a partial list: (1) Baffle or Heat Retainer Structure. (2) Solid Fuel Feed Structure. (3) Arch or Roof Structure. (4) Wall Structure. (See Subclass Reference to this Class, below, for map to these subclasses.)

**SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS**

RELATIONSHIP TO CLASSES INVOLVING, PER SE, FURNACES

**A. THE CLASSES OF ELECTRICAL HEATING:**

See Search Notes below for class of Industrial Electric Heating Furnaces, for furnace structure with characteristics limited to electric heating.

See Search Notes below for class of Electric Heating, for electric heating characteristics including furnace structure.

**B. THE CLASSES OF HEATING:**

See Search Notes below for class of Stoves and Furnaces, provides for furnaces for ordinary domestic uses, cooking and heating stoves; fireplaces; and hot-air furnaces.

See Search Notes below for class of Combustion, providing for furnaces for burning of gaseous or liquid fuel material, particularly for fluid-fed furnaces with or without other noncombustible fluids; and for a furnace in which the fluid fuel is fed tangentially to the wall of a circular combustion chamber.

**C. THE CLASSES OF PLASTIC AND PLASTIC TYPE MATERIAL SHAPING AND TREATING:**

See Search Notes below for class of Glass Manufacturing, provides for furnaces specially adapted for making glass, particularly for a glass melting furnace having a structurally defined delivery or refining zone; and for a glass annealing or tempering furnace including means to control the rate of cooling.

See Search Notes below for class of Mineral Oils: Apparatus, for furnaces specially adapted for oil treatment.

See Search Notes below for class of Metallurgical Apparatus, provides for furnaces specially adapted for metallurgical processes, particularly for furnaces treating ores or extracting metals, and for furnaces for melting or vaporizing metal.

**D. THE CLASSES OF PLANT AND ANIMAL HUSBANDRY:**

See Search Notes below for class of Butchering, for furnaces specially adapted for singeing hogs.

**RELATIONSHIP TO COMBINATION CLASSES**

**A. THE CLASSES OF MISCELLANEOUS TREATING:**

See Search Notes below for class of Drying and Gas or Vapor Contact With Solids for a furnace combined with a chamber limited to drying work other than fuel or refuse.

**B. THE CLASSES OF HEATING:**

See Search Notes below for class of Liquid Heaters and Vaporizers for a furnace combined with a boiler, particularly for grates through which water circulates with or without connection to the boiler.

See Search Notes below for class of Automatic Temperature and Humidity Regulation, provides for furnaces combined with automatic temperature and humidity regulators wherein the furnace or furnace structure is broadly recited or claimed, particularly for furnaces controlled by thermostats and humidistats.

See Search Notes below for class of Heating, the residual class for a furnace combined with means for applying heat so as to treat material or work rather than for incinerating refuse or burning solid fuel for the production of transferable heat.

**C. THE CLASS OF PHYSICAL SEPARATION:**

See Search Notes below for class of Concentrating Evaporators, for furnaces combined with evaporator structure peculiar to the concentration of solids held in solution or suspension.

**D. THE CLASS OF COMMINUTING:**

See Search Notes below for class of Solid Material Comminution or Disintegration, for comminuting processes and apparatus in combination with furnaces to apply heat to the material.

**E. THE CLASSES OF VEHICLES:**

See Search Notes below for class of Railway Rolling Stock, for the combination of a furnace with a steam locomotive.

**RELATIONSHIP TO OTHER CLASSES**

**A. THE CLASSES OF EARTHWORKING:**

See Search Notes below for class of Excavating for furnace devices for snow excavators and melters.

**B. THE CLASSES OF FLUID HANDLING:**

See Search Notes below for class of Excavating, Pipes and Tubular Conduits for furnace devices used in thawing pipes.

**C. THE CLASSES OF MOTORS, ENGINES, AND PUMPS:**

See Search Notes below for class of Power Plants for furnaces for burning solid fuel for the production of products of combustion intended to be used as a motive fluid.

**D. THE CLASS FOR DEALING WITH NONNUCLEAR HAZARDOUS OR TOXIC WASTE.**

See Search Notes below for class of Hazardous or Toxic Waste Destruction or Containment for the process of burning hazardous or toxic waste, and for the apparatus used in the treating of hazardous and toxic waste.

**SECTION III - SUBCLASS REFERENCES TO THE CURRENT CLASS**

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 101+, for Fuel Feeders.
- 119+, for Spark Arresters.
- 145+, for Spark and Smoke Conductors.
- 267+, Solid Fuel Feed Structure.
- 322+, for Baffle or Heat Retainer Structure.
- 331+, for Arch or Roof Structure.
- 336+, for Wall Structure.

**SECTION IV - REFERENCES TO OTHER CLASSES**

**SEE OR SEARCH CLASS:**

- 34, Drying and Gas or Vapor Contact With Solids, provides for a furnace combined with a chamber limited to drying work other than fuel or refuse. See the notes in that class definition for the line with Class 110.
- 37, Excavating, subclasses 227+ provides for furnace devices for snow excavators and melters.
- 60, Power Plants, subclasses 39.461+ provides for furnaces for burning solid fuel for the produc-

- tion of products of combustion intended to be used as a motive fluid.
- 65, Glass Manufacturing, provides for furnaces specially adapted for making glass, particularly subclass 347 for a glass melting furnace having a structurally defined delivery or refining zone; and subclasses 349+ for a glass annealing or tempering furnace including means to control the rate of cooling.
- 105, Railway Rolling Stock, subclasses 37+ provide for the combination of a furnace with a steam locomotive.
- 122, Liquid Heaters and Vaporizers, provides for a furnace combined with a boiler. See particularly subclasses 371+ of Class 122 for grates through which water circulates with or without connection to the boiler.
- 126, Stoves and Furnaces, provides for furnaces for ordinary domestic uses, such as subclasses 1+, cooking and heating stoves; subclasses 500+, fireplaces; and subclass 99, hot-air furnaces.
- 138, Pipes and Tubular Conduits, subclasses 32+ provide for furnace devices used in thawing pipes.
- 159, Concentrating Evaporators, provides for furnaces combined with evaporator structure peculiar to the concentration of solids held in solution or suspension. See particularly subclasses 29 and 32.
- 196, Mineral Oils: Apparatus, subclasses 116+ provide for furnaces specially adapted for oil treatment.
- 219, Electric Heating, subclasses 420+ provide for electric heating characteristics including furnace structure.
- 236, Automatic Temperature and Humidity Regulation, provides for furnaces combined with automatic temperature and humidity regulators wherein the furnace or furnace structure is broadly recited or claimed, particularly subclass 15 for furnaces controlled by thermostats and humidistats.
- 241, Solid Material Comminution or Disintegration, provides for comminuting processes and apparatus in combination with furnaces to apply heat to the material. See section (6) of the definition of that class for a statement of the line between these classes.
- 266, Metallurgical Apparatus, provides for furnaces specially adapted for metallurgical processes, particularly subclasses 171+ for furnaces treating ores or extracting metals, and subclasses 200+ for furnaces for melting or vaporizing metal.
- 373, Industrial Electric Heating Furnaces, provides for furnace structure with characteristics limited to electric heating.
- 431, Combustion, provides for furnaces for burning of gaseous or liquid fuel material, particularly subclasses 159+ for fluid-fed furnaces with or without other noncombustible fluids; and subclasses 173+ for a furnace in which the fluid fuel is fed tangentially to the wall of a circular combustion chamber. See the head notes of Class 431 for the general class line with this class.
- 432, Heating, is the residual class for a furnace combined with means for applying heat so as to treat material or work rather than for incinerating refuse or burning solid fuel for the production of transferable heat.
- 452, Butchering, subclass 73 provides for furnaces specially adapted for singeing hogs.
- 588, Hazardous or Toxic Waste Destruction or Containment, subclasses 313 through 320 for the process of burning hazardous or toxic waste. Additionally, see cross-reference art collection, subclass 900, for the apparatus used in the treating of hazardous and toxic waste.

## SECTION V - GLOSSARY

### COMBUSTION

The chemical action resulting from the direct combination of oxygen gas, generally in air, with a combustible material accompanied by the evolution of heat and light.

### COMBUSTION CHAMBER

The structure immediately surrounding the combustion reaction and generally above the fuel (\*) or refuse (\*) grate and designed to support or promote the combustion reaction.

### FUEL

A combustible material having good combustible properties such as a relatively low ignition temperature, a long burning time, and a minimum of impurities which hinder combustion and used primarily to produce heat.

### INCINERATION

The combustion of refuse (\*) for primary purpose of disposing of that refuse rather than for producing heat.

## NONCOMBUSTIBLE FLUID

A gas or liquid which itself does not burn but which is capable of supporting or promoting combustion (i.e., air, steam, or water).

## REFUSE

A combustible waste material which is burned for the sole or primary purpose of disposing of that material.

## SUBCLASSES

**101 FUEL FEEDERS:**

This subclass is indented under the class definition. Devices for feeding fuel to furnaces not provided for above.

- (1) Note. In this subclass are collected fuel feeders having automatic control except those belonging in subclasses 103 and 186+.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 196+, for straw feeders.  
235+, for wet fuel feeders.  
263+, for devices for feeding fine fuel which is burned in suspension.  
267+, for progressive feed stokers and grates.

SEE OR SEARCH CLASS:

- 48, Gas: Heating and Illuminating, subclass 86 for cupola chargers.  
198, Conveyors: Power-Driven, appropriate subclasses, for conveyor structure.  
202, Distillation: Apparatus, subclasses 262+ for feeding apparatus for stills.  
241, Solid Material Comminution or Disintegration, appropriate subclasses, for fuel feeders, per se, including means to comminute the material.  
414, Material or Article Handling, subclass 146 for charging or discharging means adapted for use with a nuclear reactor, subclasses 147+ for the combination of a chamber of a type utilized for a heating function and material charging or discharging means therefor, and subclasses 568+ for a device or element associated

with the handling or moving of a charge for a heating-type chamber.

**102 Shavings and sawdust:**

This subclass is indented under subclass 101. Fuel-feeding devices especially adapted for feeding shaving and sawdust to furnaces.

- (1) Note. Where the structure is capable of feeding coal and other fuel also, it is classified under the other fuel-feeding subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 196, for feed-chutes located on straw-burning furnaces.

**103 Boiler controlled:**

This subclass is indented under subclass 101. Devices for feeding fuel whose operation is controlled by the pressure of steam in the boiler heated by the fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 186+, for furnaces having progressive-feed grates whose movements and feeding mechanism are controlled by the pressure of steam in the boiler.  
188+, for boiler controlled devices for feeding air and steam.

SEE OR SEARCH CLASS:

- 236, Automatic Temperature and Humidity Regulation, subclass 26 for boiler pressure controlled regulating mechanism.

**104 Blower:**

This subclass is indented under subclass 101. Devices for blowing the fuel into the firebox either by air or steam or both conjoined together, with devices for conveying the fuel to the blower into the path of the fluid current, and all devices for preparing the fuel by pulverizing it if subsequently delivered to the furnace by a fluidjet.

SEE OR SEARCH CLASS:

- 198, Conveyors: Power-Driven, subclasses 638+ for a thrower-type conveyor.

- 406, Conveyors: Fluid Current, appropriate subclasses for means to convey solids with a fluid current. Class 406 will take a nominally recited furnace combined with a fluid current conveyor.
- 417, Pumps, subclass 151, for jet pumps.
- 105 Hopper:**  
This subclass is indented under subclass 104. Feeders in which the fuel is fed from a hopper and delivered to furnace by a blast of air or steam, such hopper being immediately attached to the furnace.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
104, for devices in which the hopper feeds into a conduit a long distance from the furnace.
- 105.5 Locomotive stoker type:**  
This subclass is indented under subclass 104. Devices in which a solid fuel feeder has fluid jet means for distributing the fuel over a fire bed or grate. These devices are generally known as the locomotive stoker type of blower feeders though some are not disclosed for use on locomotives.
- SEE OR SEARCH CLASS:  
105, Railway Rolling Stock, subclasses 232+ for coal feed structure on locomotive tenders.  
198, Conveyors: Power-Driven, appropriate subclasses for conveyors of particular types, including reciprocating and screw-type conveyors often used for feeding bulk material to furnaces.  
222, Dispensing, subclass 637 for a solid fuel feeder having a fluid jet for blasting the fuel as it issues from a feeder.  
241, Solid Material Comminution or Disintegration, subclass 276 for locomotive-type stokers provided with comminuting means, but including no furnace structure. See the general line stated in section 6 of the main class definition of Class 241.
- 105.6 Underfeed to jet only:**  
This subclass is indented under subclass 105.5. Devices in which the fuel feeding means causes the fuel to be elevated from below and presented directly to the front of the fluid jets.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
105.5, for plural diverse species, and devices having additional jets to which the fuel is not underfed.
- 106 Pulverizer:**  
This subclass is indented under subclass 104. Devices having a fan blower where the fuel is passed through the fan casing and is pulverized by the fan blades, and it includes also those devices having a fan blower and a rotary grinder in the same casing or in a casing in close proximity to the fan casing for pulverizing the fuel, and the fuel is passed on by the air-current to the firebox.
- SEE OR SEARCH CLASS:  
241, Solid Material Comminution or Disintegration, subclasses 18 and 38+ for comminution provided with means to apply fluid to the material for some purpose other than to support combustion. See the line stated in section (6) of the main class definition of that class.
- 107 Bridgewall:**  
This subclass is indented under subclass 101. Devices for feeding fuel to the furnace at the bridge wall.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
269+, for those that feed at the bridge wall upon a chain grate.
- 108 Hopper:**  
This subclass is indented under subclass 101. Subject matter relating to feed-hoppers, per se.
- 109 Reciprocating:**  
This subclass is indented under subclass 108. Devices in which the fuel is simply pushed into the furnace by a reciprocating member.

- 110 Screw:**  
This subclass is indented under subclass 108. Devices that push the fuel into the body of fuel in the firebox by a rotary screw.
- 111 Carrier:**  
This subclass is indented under subclass 101. Devices that have a carrier for taking the fuel into the furnace over the fire and scattering it thereon, such carrier not passing through the door.
- SEE OR SEARCH CLASS:  
198, Conveyors: Power-Driven, generally for various forms or carriers.  
202, Distillation: Apparatus, subclasses 262+ for similar feeding apparatus for stills.  
414, Material or Article Handling, subclasses 147+ (as explained in subclass 101 of Class 110), and particularly subclasses 172+ thereunder.
- 112 Door:**  
This subclass is indented under subclass 111. Devices for carrying fuel through the furnace door over the fire and scattering it thereon.
- 113 Oscillating:**  
This subclass is indented under subclass 101. Devices having an oscillating fuel spreader that scatters the fuel delivered upon it over the fire.
- SEE OR SEARCH CLASS:  
414, Material or Article Handling, subclasses 172+ (as explained in subclass 111 of Class 110), and particularly subclass 194 thereunder.
- 114 Reciprocating plunger:**  
This subclass is indented under subclass 101. Devices that deliver the fuel before a plunger that scatters the coal over the fire.
- SEE OR SEARCH CLASS:  
414, Material or Article Handling, subclasses 172+ (as explained in subclass 111 of Class 110), and particularly subclass 198 thereunder.
- 115 Rotary:**  
This subclass is indented under subclass 101. Devices having a rotary fuel-spreader that scatters the fuel delivered to it over the fire.
- SEE OR SEARCH CLASS:  
414, Material or Article Handling, subclasses 172+ (as explained in subclass 111 of Class 110), and particularly subclass 195 thereunder.
- 116 Door:**  
This subclass is indented under subclass 101. Devices for feeding fuel through a gravity-feed chute to the furnace through the furnace doorway.
- 117 Multiple charge:**  
This subclass is indented under subclass 116. Devices for charging furnaces with fuel at intervals, either motor or clock operated or operated by hand, at the will of the operator, such being fed through the doorway of the furnace.
- 118 Vertical drop:**  
This subclass is indented under subclass 101. Devices for delivering fuel to the firebox by gravity feed when the fuel is fed from overhead and falls directly upon the fire from above.
- SEE OR SEARCH CLASS:  
48, Gas: Heating and Illuminating, subclass 86 for similar structure in cupola chargers.  
266, Metallurgical Apparatus, subclasses 176+ for chargers for metallurgical furnaces.  
414, Material or Article Handling, subclasses 147+ (as explained in subclass 101 of Class 110), and particularly subclasses 167+ and 199+ thereunder.
- 119 SPARK ARRESTERS:**  
This subclass is indented under the class definition. Devices for preventing live sparks from passing out of the stack or chimney. This is accomplished either by screens, baffles, steam or water spray located either in the smokebox or smokestack and in some cases by screens in the boiler flues.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 120, for devices for returning only the sparks to a firebox.  
 145+, for devices wherein the sparks and smoke are conducted away to the ground from the locomotive or over the train.  
 203+, for structure wherein both the smoke and sparks are returned to the firebox.  
 322+, for furnaces having ordinary baffles and heat-retainers.
- SEE OR SEARCH CLASS:  
 96, Gas Separation: Apparatus, appropriate subclasses, for gas separation apparatus having no significant furnace structure, especially subclasses 243+ for gas separation apparatus combined with gas and liquid contact means.  
 126, Stoves and Furnaces, subclass 280, for soot catchers.  
 261, Gas and Liquid Contact Apparatus, for devices in which the separation is effected by gas and liquid contact only.  
 454, Ventilation, subclasses 3+ for outlet cowls.
- 120 Furnace conductor:**  
 This subclass is indented under subclass 119. Devices in which the sparks are returned to the furnace, either to the firebox or ashpan.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 203+, for structure in which smoke and sparks both are returned to the firebox.
- 121 Combined stack and smokebox:**  
 This subclass is indented under subclass 119. Devices in which the arrester is contained in both the stack and smokebox.
- SEE OR SEARCH CLASS:  
 55, Gas Separation, subclasses 447+ for fixed gas whirler or rotator deflection separators.
- 122 Smokebox:**  
 This subclass is indented under subclass 119. Devices located in the smokebox for arresting sparks.
- 123 Draft regulator:**  
 This subclass is indented under subclass 122. Subject matter including also draft regulation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 126, for devices including regulation of vertical drum type.
- 124 Divided:**  
 This subclass is indented under subclass 122. Devices having two compartments, into one of which the sparks are precipitated.
- 125 Hood:**  
 This subclass is indented under subclass 122. Devices having a hood over the boiler tubes, through which the products of combustion must pass.
- 126 Vertical drum:**  
 This subclass is indented under subclass 122. Devices where the arrester is hollow, somewhat cylindrical in form, and vertically arranged, through which the exhaust-steam passes.
- SEE OR SEARCH CLASS:  
 417, Pumps, subclasses 155+ for flue-type jet pumps.
- 127 Ejector:**  
 This subclass is indented under subclass 122. Devices for ejecting the sparks from the smokebox by a jet of steam, air, water, fan, or other means.
- 128 Water receptacle:**  
 This subclass is indented under subclass 122. Devices where the sparks are precipitated into a water receptacle in the smokebox and also includes devices with a steam or water spray in combination with the receptacle.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 124, for structure in which sparks are precipitated into a separate compartment

of the smokebox, but not into a water receptacle.

class, see subclasses 297+, for feeding air or feeding steam.

**129 Discharge valve:**

This subclass is indented under subclass 122. Devices including discharge-valves for dumping the sparks from the smokebox.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 285+, for ordinary dampers for stoves and furnaces and their operating mechanism.

**145 SPARK AND SMOKE CONDUCTORS:**

This subclass is indented under the class definition. Devices applied to a stack or smokebox for conducting the smoke and sparks and discharging them upon the ground or into the air. They need not necessarily be conduits but may be shields or deflectors. Includes conduits applied the stack of a boiler used for threshing purposes on a farm, the conduit being carried at a distance from the boiler or engine and discharging into a water receptacle to prevent the sparks setting fire to the straw.

236, Automatic Temperature and Humidity Regulation, appropriate subclasses for automatic damper controls.

417, Pumps, subclasses 151+ for jet pumps.

454, Ventilation, subclasses 1+ for chimney or stack structure, per se.

SEE OR SEARCH THIS CLASS, SUBCLASS:

120, for furnace conductor spark arresters.  
198+, for smoke and gas return devices.

**148 Separation of gases:**

This subclass is indented under subclass 147. Devices for separating the heavy gases and drawing them off, allowing only the lighter gases to pass through the stack.

**150 Steam injector:**

This subclass is indented under subclass 147. Devices in which steam is injected into the path of the products of combustion to regulate its velocity.

**146 Train:**

This subclass is indented under subclass 145. Devices having a conduit extending from the smoke-discharge end of the locomotive past the cars of the train to carry away the smoke and sparks and discharge them at the rear of the train.

**157 Feeding air:**

This subclass is indented under subclass 147. Devices for admitting air to the smokebox or base of stack to retard the draft.

SEE OR SEARCH CLASS:

237, Heating Systems, subclass 12.5 for devices which use the heat from the smoke to heat the cars.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclasses 372+ for gas separation apparatus including inlet means for diverse gas or solid for gas treatment.

**147 DRAFT REGULATORS:**

This subclass is indented under the class definition. Devices which act directly on the products of combustion after they leave the firebox to affect the velocity of said products. Also devices that act directly on the fire as blowers for the fire, in combination with steam or air jets that either increase or decrease the draft; and exhaust mechanisms that have exhaust nozzles.

**158 Door operated:**

This subclass is indented under subclass 157. Devices having an air-opening valve controlled by movement of a furnace door.

SEE OR SEARCH THIS CLASS, SUBCLASS:

174, for doors having means for feeding air or steam.

192, for time controls.

(1) Note. Where air or steam is injected into the products for the sole purpose of more completely consuming the smoke and gases, such devices are classified in this



**159 Portable:**

This subclass is indented under subclass 147. Devices applied to a stack for a limited time to assist the draft, especially in firing up a locomotive.

**160 Air jet:**

This subclass is indented under subclass 147. Devices for forcing a jet of air into a stack or chimney to regulate the draft by induction.

SEE OR SEARCH THIS CLASS, SUBCLASS:

162, for fan-type exhausts.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclasses 372+ for gas separation apparatus including inlet means for diverse gas or solid for gas treatment.

**161 Steam injected:**

This subclass is indented under subclass 160. Devices comprising a jet of steam.

SEE OR SEARCH THIS CLASS, SUBCLASS:

267+, for undergrate steam feeders.

**162 Fan exhaust:**

This subclass is indented under subclass 147. Devices in which the products of combustion or a part of them are drawn through a fan to increase the draft.

SEE OR SEARCH THIS CLASS, SUBCLASS:

159, for portable fans designed to be applied to a smokestack to assist the draft of the fire and capable of being readily detached.

SEE OR SEARCH CLASS:

55, Gas Separation, subclasses 400+ for separators mounted for continuous motion.  
454, Ventilation, air pump subclasses.

**163 Damper:**

This subclass is indented under subclass 147. Devices movable in the path of the products of combustion for regulating the cross sectional area of said path or for closing one path in

order to pass them through another or longer course.

SEE OR SEARCH THIS CLASS, SUBCLASS:

192, for time control devices.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 285+ especially subclasses 292-297 for dampers in the outlet-flue or stack with its operating mechanism.

**165 ASH RECEIVING AND HANDLING DEVICES:**

This subclass is indented under the class definition. Devices for receiving and removing ashes, including ashpit structures, ashpans and conveyors when furnace structure is included.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 242+ for devices for domestic stoves and furnaces.

138, Pipes and Tubular Conduits, appropriate subclasses for tubular conductors, per se.

198, Conveyors: Power-Driven, for form of conveyor.

202, Distillation: Apparatus, subclasses 227+, for quenchers of that class.

209, Classifying, Separating, and Assorting Solids, subclasses 233+ for sifters.

**166 Ashpans:**

This subclass is indented under subclass 165. Devices comprising receptacles under a furnace-grate for receiving the ashes as they fall therefrom, except the ash-pit itself. The pan must be a removable receptacle suspended from the furnace or resting on a support beneath the grate or permanently attached to the furnace, as in some locomotive structures.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 242+ for ashpans for domestic stoves and furnaces.

**167 Dumping:**

This subclass is indented under subclass 166. Devices relating to mechanical devices for emptying the ashpan, including pans having

- scrapers or carriers, valves in the bottom for allowing the ashes to fall out when opened, or pans allowing the whole bottom to swing down to dump the ashes.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
171, for water or steam ejectors.
- SEE OR SEARCH CLASS:  
105, Railway Rolling-Stock, subclasses 239+ for dumping car bodies.
- 168 Conjoined floor sections:**  
This subclass is indented under subclass 167. Devices whose bottoms are made of a plurality of sections pivoted at each end and connected to a common operating-bar.
- 169 Reciprocating discharge valve:**  
This subclass is indented under subclass 167. Ashpans that dump the contents by reciprocating one or more valves in the bottom of the pan.
- 170 Scraper:**  
This subclass is indented under subclass 167. Ashpans that have a scraper for pushing the contents out of the pan.
- 171 Steam and water attachments:**  
This subclass is indented under subclass 166. Devices where water or steam is injected into the ashpan for the purpose of ejecting the ashes or extinguishing sparks.
- 172 FRONTS:**  
This subclass is indented under the class definition. Constructions for furnace-fronts, including door structures in furnace-fronts.
- SEE OR SEARCH CLASS:  
122, Liquid Heaters and Vaporizers, subclasses 497+ for boiler fronts.
- 173 DOORS:**  
This subclass is indented under the class definition. Subject matter relating to closures for openings in furnace-walls.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
172, for doors in front structure.
- 192, for devices which feed air or steam to the furnace for a limited time.
- SEE OR SEARCH CLASS:  
48, Gas: Heating and Illuminating, subclass 124, for lids for retorts.  
49, Movable or Removable Closures, appropriate subclasses for closures of the type provided for and see the search notes in section IV of Class 49 for the loci of closures in other classes.  
122, Liquid Heaters and Vaporizers, subclass 498 for doors with water circulation connected with the boiler.  
126, Stoves and Furnaces, subclasses 190+ for stove doors.  
202, Distillation: Apparatus, subclasses 242+ for still closures.
- 174 Feeding air and steam:**  
This subclass is indented under subclass 173. Doors through which air and steam or steam are fed to the fire and also where air and steam or steam is fed to the fire when the valve controlling the admission of the fluid is operated by the door, whether the fluid passes through the door or not.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
192, for time limit controls.
- 175 Feeding air:**  
This subclass is indented under subclass 173. Doors which admit air to the furnace either by ports or conduits through the door structure or having means for keeping the door partly open where the construction is especially adapted for admitting air other than by simply opening a door of common construction.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
192, for time limit controls.
- 176 Operators:**  
This subclass is indented under subclass 173. Devices for opening and closing doors aside from the ordinary latch.

## SEE OR SEARCH CLASS:

- 49, Movable or Removable Closures, subclasses 324+ for other closure operators.
- 212, Traversing Hoists, subclass 166 for discrete apparatus for removing a furnace door from above and shifting it horizontally.
- 414, Material or Article Handling, subclass 684.3 for furnace door removers which are disengaged from the furnace door after replacement.

**177 Motor:**

This subclass is indented under subclass 176. Devices including a motor.

## SEE OR SEARCH CLASS:

- 49, Movable or Removable Closures, subclass 334 for a motor operated closure and see the search notes thereto for the loci of other motor operated closures.

**178 Pedal:**

This subclass is indented under subclass 176. Devices using foot-power directly.

## SEE OR SEARCH CLASS:

- 49, Movable or Removable Closures, subclasses 263+ for pedal operated closures of the type provided for.

**179 Fluid screens:**

This subclass is indented under subclass 173. Devices for preventing the heat, gases, or flames from passing out of the furnace when the door is opened either by a spray of steam, air, or water or by causing air to be drawn into the door or having means to draw the gases through a bypass when the door is opened. These devices also serve to prevent the cold outside air from cooling the boiler.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 163, for devices for preventing the chilling of the fire and boiler-flues.

## SEE OR SEARCH CLASS:

- 48, Gas: Heating and Illuminating, subclass 87 for cupola screens.

**180 Cooling:**

This subclass is indented under the class definition. Subject matter relating to doors and casings that are kept cool by the circulation of steam or air through them.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 182, for doors and casings where the fluid after passing through them is fed to the fire.

## SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, subclasses 497+ for boiler fronts.
- 202, Distillation: Apparatus, subclasses 243+ for fluid cooled still closures.
- 432, Heating, subclass 237 for the subcombination of a material heating chamber comprising a door, door frame or chamber cover having protective cooling structure.

**181 DOOR CASINGS AND ARCHES:**

This subclass is indented under the class definition. Subject matter relating to the construction of casings and arches for furnace doors.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 180, for casings containing conduits.
- 331+, for furnace arch construction.

## SEE OR SEARCH CLASS:

- 52, Static Structures (e.g., Buildings), subclasses 85, 86+, 245+, and 639+ for a curvilinear building construction of more general application.

**182 Feeding air:**

This subclass is indented under subclass 181. Arches and casings with circulation conduits through which air or air and steam are passed to be fed to the furnace.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 180, for casings having conduits for cooling them through which air, steam, or water circulates, such steam or air not passing into the furnace.
- 192, for time limit controls.

## SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclass 112 for devices for feeding air to hot air furnaces.

**182.5 TUYERES:**

This subclass is indented under the class definition. Subject matter relating to conduits for feeding air to furnaces.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

297+, for feeding of air to a firebox.

## SEE OR SEARCH CLASS:

122, Liquid Heaters and Vaporizers, subclasses 6.6+ for tuyeres in boilers.  
266, Metallurgical Apparatus, subclasses 186+, 218+, and 265+ for tuyeres used in a metallurgical furnace.

**182.6 Forge:**

This subclass is indented under subclass 182.5. Tuyeres for a type used in a forge and in which the direction of the air blast is usually vertical.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

195, for forge furnace structure.

## SEE OR SEARCH CLASS:

122, Liquid Heaters and Vaporizers, subclass 6.7 for forge tuyeres in boilers.

**184 SMOKESTACKS:**

This subclass is indented under the class definition. Subject matter relating to metal smokestacks of locomotives and portable boilers.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

160+, for stacks having air jet draft regulators.

## SEE OR SEARCH CLASS:

52, Static Structures (e.g. Buildings), subclasses 218, 219, and 245+ for flues or curvilinear constructions there provided for.  
104, Railways, subclass 52 for locomotive smokejacks.  
114, Ships, subclass 187 for ship smoke stacks.

454, Ventilation, subclass 2 for vehicle stacks, per se.

**185 WITH CONTROL MEANS RESPONSIVE TO A SENSED CONDITION:**

This subclass is indented under the class definition. Apparatus provided with detection means for sensing a particular state, property, or characteristic or a change in the state, property, or characteristic of the apparatus or combustion constituents or combustion products used or produced by the apparatus and with a mechanism, actuated by or responsive to the detection means, for regulating the operation of the apparatus.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

191+, for apparatus under the class definition provided with means designed to control the apparatus in a particular mode or for a particular time duration.

## SEE OR SEARCH CLASS:

236, Automatic Temperature and Humidity Regulation, for a furnace with a control. See headnote V, B, 2 of these definitions.  
266, Metallurgical Apparatus, subclasses 78+ for metallurgical furnaces provided with control means responsive to a sensed condition.  
373, Industrial Electric Heating Furnaces, subclasses 8+ for such furnace provided with environmental control system.  
431, Combustion, subclasses 18+ for liquid or gaseous fuel burning apparatus provided with control means responsive to a sensed condition.  
432, Heating, subclasses 36+ for apparatus for generating heat and applying same to materials provided with control means responsive to a sensed condition.

**186 Feed control:**

This subclass is indented under subclass 185. Apparatus wherein the mechanism is provided for regulating the supply of combustion constituents to the apparatus.

(1) Note. The term "combustion constituents" includes solid fuel or combustible

refuse singularly or combined with fluid fuel as well as a noncombustible fluid such as air, water, or steam.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 101+, for subcombination fuel feeders, per se.
- 103, particularly for a boiler controlled subcombination fuel feeder.
- 267, for furnaces provided with means for feeding solid fuel to same.

SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, subclass 449 for the combination of boiler structure with means to control the combustion of solid fuel and the regulation of water feed to the boiler structure.
- 198, Conveyors: Power-Driven, subclasses 750.1+ for a reciprocating-type conveyor provided with control means responsive to a sensed condition; and subclass 810 for an endless belt conveyor provided with control means responsive to a sensed condition.
- 414, Material or Article Handling, subclasses 18+ for apparatus for charging a chamber used for a heating function provided with a control system responsive to supply or discharge of material to the chamber.

**187 Supplemental burner:**

This subclass is indented under subclass 186. Apparatus wherein means are provided for controlling the addition of supplemental heat.

SEE OR SEARCH CLASS:

- 236, Automatic Temperature and Humidity Regulation, subclasses 14 and 15 for regulation of fuel and air supply by condition of furnace or by combined boiler and furnace.

**188 Of noncombustible fluid; e.g., air, etc:**

This subclass is indented under subclass 186. Apparatus wherein the constituent being supplied is air, steam, or water.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 297+, for furnace structure provided with fluid supply means.

**189 Pressure sensor:**

This subclass is indented under subclass 188. Apparatus wherein the sensed state, property, or characteristic is the force per unit area existing at a point within the combustion chamber or in fluid lines connected thereto.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 103, for a subcombination fuel feeder controlled by boiler pressure.

SEE OR SEARCH CLASS:

- 266, Metallurgical Apparatus, subclass 89 for metallurgical treating apparatus provided with control means responsive to pressure variations.
- 431, Combustion, subclass 19 for a fluid fuel burner provided with control means responsive to sensed pressure within its burning chamber.

**190 Temperature sensor:**

This subclass is indented under subclass 188. Apparatus wherein the sensed state, property, or characteristic is sensible heat.

SEE OR SEARCH CLASS:

- 266, Metallurgical Apparatus, subclass 87 for metallurgical treating apparatus provided with control means responsive to temperature.
- 431, Combustion, subclass 68 for a fluid fuel burner provided with control means responsive to temperature.

**191 WITH PROGRAMMED OR CYCLIC CONTROL MEANS:**

This subclass is indented under the class definition. Apparatus provided with (a) means for storing coded instructions or other data necessary to regulate the operation of the apparatus, or (b) means repetitively regulating the sequence of operational steps performed in or by the apparatus.

- SEE OR SEARCH CLASS:  
 4, Baths, Closets, Sinks, and Spittoons, subclass 111.2 for dry closets having cyclic control means.  
 266, Metallurgical Apparatus, subclass 96 for a metallurgical treating apparatus provided with programmable control means.  
 431, Combustion, subclasses 18+ for a fluid fuel burner provided with programmable control means.  
 432, Heating, subclasses 51+ for heating apparatus provided with programmable control means.
- 192 Timer:**  
 This subclass is indented under subclass 191. Apparatus wherein means are provided to control any or all of the operation(s) or operational step(s) of the apparatus for a specific duration.
- SEE OR SEARCH CLASS:  
 126, Stoves and Furnaces, subclass 285.5 for a damper provided with a timer control means.  
 266, Metallurgical Apparatus, subclasses 97+ for a metallurgical apparatus provided with a timer control means.
- 193 WITH SAFETY MEANS:**  
 This subclass is indented under the class definition. Apparatus provided with means to prevent direct injury to the apparatus or to a human being.
- SEE OR SEARCH CLASS:  
 122, Liquid Heaters and Vaporizers, subclasses 504+ for a boiler provided with safety devices.  
 266, Metallurgical Apparatus, subclass 174 for an ore treating or metal extracting furnace provided with a safety device; and subclass 903 for a cross-reference art collection to safety devices.
- 194 CREMATORY:**  
 This subclass is indented under the class definition. Apparatus specially adapted for the burning of human corpses or animal carcasses.
- 195 FORGE:**  
 This subclass is indented under the class definition. Apparatus specially adapted for building a blacksmith's fire generally consisting of an open firepot and means for feeding air thereto, together with other combustion features peculiar to such an organization.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 182.6, for a subcombination tuyere for use in a forge furnace.
- SEE OR SEARCH CLASS:  
 454, Ventilation, subclasses 49+ for a hood or offtake means for ventilating a forge furnace.
- 196 STRAW BURNER AND FEEDER:**  
 This subclass is indented under the class definition. Apparatus specially adapted for burning straw and the feeding means thereof.
- SEE OR SEARCH CLASS:  
 126, Stoves and Furnaces, subclasses 222 through 225 for burning refuse in a domestic stove or furnace.
- 197 External structure detachable from firebox:**  
 This subclass is indented under subclass 196. External structure detachable from firebox: Apparatus having fireboxes located exteriorly of the main furnace structure and capable of being readily separated or detached therefrom.
- 198 LOCOMOTIVE:**  
 This subclass is indented under the class definition. Apparatus specially adapted for use with mechanical structure movable upon a railway track and propelled by a steam engine.
- SEE OR SEARCH CLASS:  
 105, Railway Rolling Stock, subclasses 37+ for steam locomotive, per se.  
 122, Liquid Heaters and Vaporizers, subclass 434 for boiler water preheater combined with locomotive tender water tank.
- 199 Having noncombustible fluid feed means:**  
 This subclass is indented under subclass 198. Apparatus provided with means to inject air, steam, or water into a combustion chamber.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
297, for other types of combustion apparatus with fluid feed means.
- 200 And noncombustible fluid treatment means:**  
This subclass is indented under subclass 199. And noncombustible fluid treatment means: Apparatus provided with means for modifying the physical properties of the fluid prior to its injection into the combustion chamber.
- (1) Note. Physical properties include temperature, pressure, and volume of the fluid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
301+, for other furnace structure provided with noncombustible fluid treatment means.  
342+, for process of treatment.
- 201 Preheater:**  
This subclass is indented under subclass 200. Apparatus wherein the modifying means is provided to increase the temperature of the fluid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
302+, for other types of solid fuel combustion apparatus having a preheater.
- 202 Undergrate feed:**  
This subclass is indented under subclass 199. Apparatus provided with means for feeding the fluid below the combustion reaction.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
312, for other combustion apparatus provided with undergrate fluid feed means.
- 203 WITH EXHAUST GAS TREATMENT MEANS:**  
This subclass is indented under the class definition. Apparatus provided with means for conditioning combustion products subsequent to their production and prior to their venting to the atmosphere to render them less objectionable to the environment.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
345, for process of exhaust gas treatment.
- SEE OR SEARCH CLASS:  
266, Metallurgical Apparatus, subclasses 144+ for metallurgical treating apparatus provided with means for treating the exhaust fumes produced during the metallurgical treatment.  
432, Heating, subclasses 66, 67+, and 72 for a heating means of general utility provided with means for treating or handling exhaust gases.
- 204 Recirculation means:**  
This subclass is indented under subclass 203. Apparatus wherein the conditioning means returns all or part of the products of combustion to a combustion chamber.
- SEE OR SEARCH CLASS:  
126, Stoves and Furnaces, subclass 79 for a heating stove provided with means for returning the combustion products to the combustion chamber.  
266, Metallurgical Apparatus, subclass 156 for metallurgical treating apparatus provided with exhaust gas recycling means.  
431, Combustion, subclasses 115+ for fluid fuel burners provided with exhaust gas recirculation means.
- 205 Air supply means:**  
This subclass is indented under subclass 204. Apparatus provided with means for introducing air into the combustion products being returned to the combustion chamber.
- 206 Including pump:**  
This subclass is indented under subclass 205. Apparatus provided with means for impelling the returned combustion products into the combustion chamber.
- 207 Eductor:**  
This subclass is indented under subclass 206. Apparatus wherein the impelling means is a moving stream of fluid which mixes with and draws the returning combustion products into the combustion chamber.

- 208 Furnace having multiple firebox:**  
This subclass is indented under subclass 203. Apparatus having a plurality of combustion chambers and further provided with means for passing combustion products from one combustion chamber to another.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
295+, for other types of multiple firebox combustion apparatus.
- SEE OR SEARCH CLASS:  
122, Liquid Heaters and Vaporizers, subclasses 57 and 60 provided with multipart water fireboxes provided with means for passing combustion products from one part to the other.
- 209 By undergate means:**  
This subclass is indented under subclass 208. Apparatus provided with means for passing combustion products beneath a combustion reaction.
- 210 Afterburning means:**  
This subclass is indented under subclass 203. Apparatus wherein the treating means includes means to effect combustion of unburned components in the gaseous products of combustion.
- SEE OR SEARCH CLASS:  
431, Combustion, appropriate subclass for fluid fueled burners.
- 211 Means directing main flame or combustion products for afterburning:**  
This subclass is indented under subclass 210. Apparatus wherein means is associated with the main burner to direct a portion of the flame into an afterburning zone spaced from the main combustion zone or to redirect the gaseous products of combustion through the flame of the main burner.
- 212 Liquid or gaseous fueled:**  
This subclass is indented under subclass 210. Apparatus wherein an auxiliary fluid fueled burner is used to assist in effecting combustion of unburned components in the gaseous products of combustion.
- 213 Swirl inducing:**  
This subclass is indented under subclass 212. Apparatus wherein the fluid fueled burner is arranged to induce a turbulent or whirling motion to the products of combustion to promote burning of the unburned components.
- 214 Including means to add air:**  
This subclass is indented under subclass 210. Apparatus including means to supply air to the afterburner zone to effect combustion of the unburned components of the gaseous products of combustion.
- 215 Means contacting exhaust gas with liquid:**  
This subclass is indented under subclass 203. Means contacting exhaust gas with liquid: Apparatus including means to commingle or otherwise encounter the gaseous products of combustion with a liquid medium to remove impurities from the gaseous products.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
119+, for devices for preventing live sparks from passing out of the stack or chimney. The devices include screens, baffles, steam, or water sprays located in smokebox or stack.
- SEE OR SEARCH CLASS:  
261, Gas and Liquid Contact Apparatus, appropriate subclass for apparatus of general utility for contacting a gas with a liquid.  
266, Metallurgical Apparatus, subclasses 146+ for metallurgical apparatus provided with means for contacting an exhaust gas with a liquid.
- 216 Means separating particles from exhaust gas:**  
This subclass is indented under subclass 203. Apparatus including means to remove particulate matter suspended in the gaseous products of combustion.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
119+, for devices for preventing live spark from passing out of the stack or chimney of furnaces. The devices include



screens, baffles, steam, or water sprays located in smokebox or stack.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, for apparatus for gas separation, per se.

**217 Outlet screen:**

This subclass is indented under subclass 216. Apparatus wherein the chimney or flue has a foraminous member for preventing discharge of solid particles to the environment.

SEE OR SEARCH THIS CLASS, SUBCLASS:

119+, for means preventing live sparks from passing out of the stack or chimney.

**218 WITH FUEL TREATMENT MEANS:**

This subclass is indented under the class definition. Apparatus provided with means to enhance the combustible properties of the solid fuel to be burned or refuse to be incinerated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

342+, for process of treatment.

**219 Preliminary refuse treatment means:**

This subclass is indented under subclass 218. Apparatus provided with means for conditioning the refuse to be incinerated prior to burning.

**220 Sorter:**

This subclass is indented under subclass 219. Apparatus provided with means for separating the waste material on the basis of some physical characteristic.

- (1) Note. Some of the physical characteristics upon which the material is separated are size, magnetic properties, removal of liquid.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, appropriate subclasses for sorting or separating solid materials, per se, and subclass 11 for sorting or separating solid materials combined with heat treatment.

210, Liquid Purification or Separation, appropriate subclass for separation from a liquid of any character of material.

**221 Dewatering:**

This subclass is indented under subclass 220. Apparatus having means for removing liquid from the refuse.

- (1) Note. The devices of this subclass are provided with means which effect the physical separation of solids and water, as for example, centrifuges, strainers, skimming devices, etc. Those devices which merely heat a watery mass to evaporate the water contained therein will not be found in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

224+, for devices which drive water from a wet mass by the application of heat thereto.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, appropriate subclasses for liquid purifiers and separators.

**222 Comminutor:**

This subclass is indented under subclass 219. Apparatus provided with means for breaking up or reducing in size the waste material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

106, for fuel feeders having blowers combined with pulverizers.

SEE OR SEARCH CLASS:

241, Solid Material Comminution or Disintegration, appropriate subclass for comminuting or disintegrating apparatus, per se, or combined with heating means where no chemical change to the material heated occurs.

**223 Compactor:**

This subclass is indented under subclass 219. Apparatus provided with means for condensing or densifying the waste material.

- SEE OR SEARCH CLASS:  
100, Presses, appropriate subclasses for press structure, per se, and subclasses 92+ for press combined with heating means for drying without producing incineration.
- 224 Dryer:**  
This subclass is indented under subclass 219. Apparatus provided with means for driving off moisture from the waste material by heating the material prior to delivery to an incineration zone.
- SEE OR SEARCH CLASS:  
34, Drying and Gas or Vapor Contact With Solids, appropriate subclass for methods and apparatus not provided for elsewhere for removing excess or unwanted moisture from solid materials. Further, see the search note in the class definitions of Class 34 for a statement of the line between Class 34 and Class 110.
- 266, Metallurgical Apparatus, subclass 175 for means to preheat or to dry a charge prior to its entry into a metallurgical furnace.
- 225 Furnace with multiple hearth:**  
This subclass is indented under subclass 224. Apparatus provided with plural drying means wherein the refuse is moved progressively from one drying zone to another.
- 226 Rotary drum type:**  
This subclass is indented under subclass 224. Apparatus wherein the means to drive off the moisture includes a barrel-like receptacle which is mounted to revolve about its longitudinal axis while the material is being dried.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
246, for incinerating apparatus employing rotary drum-type structure.
- SEE OR SEARCH CLASS:  
34, Drying and Gas or Vapor Contact With Solids, subclasses 130+ for rotary drum-type driers.
- 266, Metallurgical Apparatus, subclass 173 for rotary drum preheating or drying apparatus.
- 227 Having means to effect or facilitate refuse movement:**  
This subclass is indented under subclass 224. Apparatus having means to either cause or to aid in the passage of the material being treated from a drying zone to a combustion zone.
- 228 Mechanical conveying means:**  
This subclass is indented under subclass 227. Apparatus wherein the means to cause or to aid in the passage of the material includes a power-driven conveyor.
- SEE OR SEARCH CLASS:  
198, Conveyors: Power-Driven, subclasses 618+ for a conveyor of general utility.
- 414, Material or Article Handling, subclasses 147+ for an apparatus for charging a chamber used for a heating function other than incineration.
- 229 Means for liberating gas from solid fuel:**  
This subclass is indented under subclass 218. Apparatus wherein the means produces a combustible fluid from the solid fuel.
- SEE OR SEARCH CLASS:  
48, Gas: Heating and Illuminating, subclasses 61+ for a gas producer, per se, in which the produced or liberated gas is not burned during its production, and subclass 113 for a gas generator of the furnace retort type.
- 60, Power Plants, subclass 39.12 for a combustion products generator provided with means to produce a combustible gas which is subsequently delivered to and burned in the generator.
- 122, Liquid Heaters and Vaporizers, subclass 5 for the combination of boiler structure intimately related with a gas producer.
- 230 Coking means:**  
This subclass is indented under subclass 229. Apparatus provided with means to separate or eliminate the combustible fluid from the solid

fuel such that the distilled fuel is mainly consumed within the combustion chamber.

SEE OR SEARCH CLASS:

122, Liquid Heaters and Vaporizers, subclass 66 for a boiler combined with a water cooled coking chamber.

**231 Undergrate:**

This subclass is indented under subclass 230. Apparatus provided with means to pass the separated fluid under the fuel supporting means and through a combustion reaction.

**232 Means for pulverizing solid fuel:**

This subclass is indented under subclass 218. Apparatus wherein the means is capable of comminuting or disintegrating solid lump fuel into powdered fuel for use in a powdered fuel burner.

SEE OR SEARCH THIS CLASS, SUBCLASS:

222, for a comminutor for disintegrating waste material combined with an incinerator.

SEE OR SEARCH CLASS:

241, Solid Material Comminution or Disintegration, appropriate subclasses for comminuting or disintegrating apparatus, per se, or combined with heating means where no chemical change to the heated material occurs.

**233 COMBINED:**

This subclass is indented under the class definition. Apparatus including means in addition to the incinerating or burning apparatus for performing some additional nonincinerating or nonburning function or for perfecting the operation of the basic incinerating or burning apparatus not provided for in another class.

(1) Note. See headnote V, Relationship to Combination Classes, of these (Class 110) definitions for structure of another class combined with a Class 110, Furnaces.

SEE OR SEARCH CLASS:

15, Brushing, Scrubbing, and General Cleaning, subclass 4 for combined cleaning and incineration.

71, Chemistry: Fertilizers, subclasses 11+ for the making of fertilizer from refuse material.

100, Presses, subclasses 92+ for compacting combined with heating means for drying without incineration.

126, Stoves and Furnaces, subclasses 224 and 225 for refuse burners structurally related to cooking or heating stoves.

266, Metallurgical Apparatus, appropriate subclass for the recovery of metals from refuse material. Where a number of diverse constituents are reclaimed; e.g., glass and lead, etc., classification is in this (110) class.

**234 With boiler:**

This subclass is indented under subclass 233. Apparatus wherein the addition apparatus is a liquid heater or vaporizer.

SEE OR SEARCH CLASS:

122, Liquid Heaters and Vaporizers, subclass 2 for significant boiler structure combined with an incinerator or solid fuel burning apparatus.

**235 REFUSE INCINERATOR:**

This subclass is indented under the class definition. Apparatus specially adapted for burning waste material.

(1) Note. Includes apparatus for the destruction by burning of unwanted materials which materials include solids, liquids, or mixtures thereof.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclass 224 for a domestic stove or furnace which uses garbage or refuse as fuel.

**236 Means for cleaning by combustion:**

This subclass is indented under subclass 235. Apparatus including means to effect the burning of the unwanted waste material from a salvageable item.

(1) Note. Examples of devices to be found herein are incinerators to burn the upholstery from car bodies, means to burn insulation from wires, etc.

- SEE OR SEARCH CLASS:  
134, Cleaning and Liquid Contact With Solids, subclasses 1+ and especially subclasses 19+ for methods of cleaning salvable objects by combustion.
- 237 For explosive or radioactive material:**  
This subclass is indented under subclass 235. Apparatus specially adapted to burn radioactive or explosive waste material.
- 238 For liquid refuse:**  
This subclass is indented under subclass 235. Apparatus specially adapted for the burning of liquid waste material.
- SEE OR SEARCH CLASS:  
431, Combustion, appropriate subclass for apparatus for burning fluid fuels.
- 239 For stump in situ:**  
This subclass is indented under subclass 235. Apparatus specially adapted for burning stumps of trees in their original place.
- (1) Note. Generally the apparatus is in the form of a hood enclosing the stump.
- SEE OR SEARCH CLASS:  
126, Stoves and Furnaces, subclass 271.3 for solid fuel furnaces for thawing frozen earth.
- 240 Vehicle mounted:**  
This subclass is indented under subclass 235. Apparatus wherein the incinerator is mounted on an ambulant structure.
- 241 Portable:**  
This subclass is indented under subclass 235. Apparatus wherein the incinerator is constructed to be readily transported from place to place.
- 242 Closed vessel:**  
This subclass is indented under subclass 235. Apparatus wherein the incinerator is a sealed container into which the refuse is placed and incinerated over the fire.
- (1) Note. The vessel may or may not have means for dumping its contents on the fire.
- SEE OR SEARCH CLASS:  
48, Gas: Heating and Illuminating, subclasses 119+ for retorts pertinent to that class.  
202, Distillation: Apparatus, subclasses 86+, 96+, 105+, and 217+ for distillation retorts.
- 243 Refuse suspended in or supported by a fluid medium:**  
This subclass is indented under subclass 235. Apparatus wherein the incinerator consists of means by which the material to be incinerated either floats on the surface of a body of liquid or is carried within and by a moving stream of gas during its incineration.
- 244 Suspended in a gaseous medium:**  
This subclass is indented under subclass 243. Apparatus wherein the incinerator consists of means by which the material to be incinerated is carried within and by a moving stream of gas during its incineration.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
261+, and 263+, for fine fuel burned in suspension.
- 245 Fluidized bed of noncombustible particles:**  
This subclass is indented under subclass 244. Apparatus wherein the incinerator consists of means by which a distinct, flowable stratum of nonburnable particulate matter is formed in the combustion zone by the action of gas passing upwardly through the stratum.
- SEE OR SEARCH CLASS:  
34, Drying and Gas or Vapor Contact With Solids, subclasses 576+ for fluid current conveying of treated material.  
432, Heating, subclass 215 for a residual work tumbling-type or work heating furnace utilizing a solid fluent heat carrier.
- 246 Rotary drum:**  
This subclass is indented under subclass 235. Apparatus wherein the incinerator is a barrel-like receptacle within which the refuse material is placed, which receptacle is mounted to revolve about its longitudinal axis during incineration.

- SEE OR SEARCH CLASS:  
432, Heating, subclasses 103+ for a residential work tumbling-type heating furnace.
- 247 Rotary grate movable about a vertical axis:**  
This subclass is indented under subclass 235. Rotary grate movable about a vertical axis: Apparatus wherein the incinerator has a grate that revolves about an axis which is generally normal to the horizon upon which grate the refuse is supported.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
275, for a rotary grate movable about a vertical axis for burning solid fuels other than refuse.
- SEE OR SEARCH CLASS:  
198, Conveyors: Power-Driven, subclass 803.16 for a power-driven rotary conveyor, per se.
- 248 Refuse supported above grate:**  
This subclass is indented under subclass 235. Apparatus wherein the incinerator has means to support the refuse over the grate in spaced relation thereto, which means allows for circulation of air through the refuse.
- 249 Reverberatory type:**  
This subclass is indented under subclass 235. Apparatus wherein the incinerator has means to shield the refuse over which the flames of the furnace pass to consume the refuse.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
224, for similar structure wherein the refuse is dried on a platform or shelf and then transferred to the incineration zone.
- 250 With electric heater:**  
This subclass is indented under subclass 235. Apparatus including electrical heating means to assist or perform incineration of the refuse.
- SEE OR SEARCH CLASS:  
4, Baths, Closets, Sinks, and Spittoons, subclass 111.5 for dry closets having electric heating means.
- 219, Electric Heating, appropriate subclass for electric heating structure.
- 251 Including air supply means extending vertically within refuse:**  
This subclass is indented under subclass 235. Apparatus having means extending upwardly within a mass of the refuse to supply air thereto.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
297+, for means feeding air to firebox of a solid fuel furnace.
- 252 With supplementary burner:**  
This subclass is indented under subclass 251. Apparatus including a burner for discharging hot gases or flames vertically into the mass of refuse.
- 253 With means shielding burner from refuse:**  
This subclass is indented under subclass 235. Apparatus including means to prevent refuse from clogging or effecting operation of the burner.
- 254 With air preheater:**  
This subclass is indented under subclass 235. Apparatus including means to raise the temperature of air being delivered to the combustion chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
201, for a locomotive-type furnace provided with a noncombustible fluid preheater.  
302, for a furnace for burning solid fuel other than refuse provided with a noncombustible fluid preheater.
- 255 With means for advancing or handling refuse or residue:**  
This subclass is indented under subclass 235. Apparatus including similar means for feeding, conveying, or agitating refuse to or within the combustion chamber or for discharging ash from the chamber, without particular heating or combustion chamber structure.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 101+, for subcombination solid fuel feeding means.  
 267+, for a furnace for burning solid fuel other than refuse provided with means to feed the fuel to the furnace.
- SEE OR SEARCH CLASS:  
 198, Conveyors: Power-Driven, appropriate subclasses for conveyor structures.  
 414, Material or Article Handling, subclasses 147+ for feeding, conveying, or agitating refuse to or within the combustion chamber or for discharging ash from the chamber. Without particular or combustion chamber structure.
- 256 Means for feeding through chimney:**  
 This subclass is indented under subclass 255. Apparatus having means to deliver the refuse through the chimney or offtake flue to the combustion chamber.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 116+, for chute feeding means for solid fuel furnace.
- SEE OR SEARCH CLASS:  
 193, Conveyors, Chutes, Skids, Guides, and Ways, appropriate subclass for chute feeding means.
- 257 Continuous advance:**  
 This subclass is indented under subclass 235. Apparatus having mechanical means to cause or aid in continuous movement of refuse through the furnace.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 267+, for progressive feed of solid fuel.
- 258 Refuse agitating:**  
 This subclass is indented under subclass 255. Apparatus having means within the combustion chamber to stir or shake the burning mass of refuse.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 247, for agitators combined with a rotary grate, vertical axis.
- 259 Residue handling; e.g., ash, etc.:**  
 This subclass is indented under subclass 255. Apparatus for receiving or removing the spent solid products of combustion from the incinerator.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 165+, for ash receiving and handling for a pulverized fuel furnace provided with residue handling means.  
 266, for a pulverized fuel furnace provided with residue handling means.
- 260 INCLUDING FLUID FUEL BURNER:**  
 This subclass is indented under the class definition. Apparatus provided with means for burning solid fuel and liquid or gaseous fuel.
- SEE OR SEARCH CLASS:  
 122, Liquid Heaters and Vaporizers, subclass 22 for a combined boiler with a solid and fluid fuel furnace, and subclass 211 for a sectional boiler combined with a solid and fluid fuel furnace.  
 126, Stoves and Furnaces, subclass 36 for a culinary heating stove, and subclass 116 for a combined coal and liquid or gaseous fueled hot air furnace.  
 266, Metallurgical Apparatus, subclasses 74+ for fluid fuel outting apparatus provided with means for feeding solid material for enhancing the cutting operation.  
 431, Combustion, subclasses 159+ for a fluid fuel burner provided in a combustion furnace.
- 261 Powdered solid fuel:**  
 This subclass is indented under subclass 260. Apparatus capable of burning pulverized solid fuel.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 104, for a subcombination blower-type fuel feeder.

- 233, for furnace structure combined with solid fuel pulverizing means.  
 263+, for a pulverized fuel furnace adapted to burn only solid pulverized fuel.  
 347, for process of pulverized fuel combustion.

## SEE OR SEARCH CLASS:

- 60, Power Plants, subclass 39.461 for a power plant using combustion products as a motive fluid adapted to use powdered fuel.  
 148, Metal Treatment, subclasses 9+ for fluid fuel metal cutting apparatus provided with means to feed adjuvant powder.  
 239, Fluid Sprinkling, Spraying, and Diffusing, especially subclasses 79+ and 336 for a fluid distributor, per se, which may include means to mix a plurality of fluents, one of which may be a fluent solid; see search note to Class 239 in the Class 431 class definition for the line between those classes.  
 241, Solid Material Comminution or Disintegration, appropriate subclass for comminuting or disintegrating apparatus, per se, or combined with heating means where no chemical change to the heated material occurs.  
 431, Combustion, subclass 173 for fluid fuel burner provided in a combustion furnace wherein the fuel is fed into a circular chamber substantially tangentially to the wall of the chamber.

**262 Alternate fuel:**

This subclass is indented under subclass 261. Apparatus wherein the apparatus is capable of burning either powdered solid fuel or fluid fuel.

## SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, subclass 22 for a boiler which can be alternately heated by solid or fluid fuel, and subclass 211 for a sectional boiler which can be alternately heated by solid or fluid fuel.

**263 UTILIZING POWDERED FUEL:**

This subclass is indented under the class definition. Apparatus provided with means for burning pulverized solid fuel which has been suspended in air such that the burning occurs as the fuel remains so suspended.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 104, for a subcombination blower-type fuel feeder.  
 232, for furnace structure combined with solid fuel pulverizing means.  
 261, for powdered fuel furnace structure provided with a fluid fuel burner.  
 347, for process of fluidized fuel combustion.

## SEE OR SEARCH CLASS:

- 60, Power Plants, subclass 39.461 for a power plant using combustion products as a motive fluid adapted to use powdered fuel.  
 241, Solid Material Comminution or Disintegration, appropriate subclass for comminuting or disintegrating apparatus, per se, or combined with heating means where no chemical change to the heated material occurs.  
 431, Combustion, subclass 173 for fluid fuel burner provided in a combustion furnace wherein the fuel is fed into a circular chamber substantially tangentially to the wall of the chamber.

**264 Having rotary flow means:**

This subclass is indented under subclass 263. Apparatus provided with vane or vanelike structure through which the pulverized fuel and air mixture is caused to flow into the combustion chamber thereby producing a rotary flow of the mixture.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 213, for an incinerator or solid fuel furnace provided with a liquid or gaseous fuel swirl inducing after-burner.

## SEE OR SEARCH CLASS:

- 431, Combustion, subclasses 173+ for fluid fuel circular combustion furnace

structure in which the fuel is fed tangentially into the furnace.

**265 Having secondary air mixing means:**

This subclass is indented under subclass 263. Apparatus provided with variable control means to intermingle the suspended pulverized fuel with air other than that used to suspend the fuel to thereby produce a desired air-fuel mixture.

**266 With residue handling means (e.g., ash, etc.):**

This subclass is indented under subclass 263. Apparatus further provided with means to remove or dispose of the solid or liquid waste produced by the combustion of the pulverized solid fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

165+, for subcombination ash receiving and handling devices.

259, for residue handling combined with incinerator structure.

342+, for process of treatment.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclass 242 for domestic stoves and furnaces provided with means for the removal and collection of ashes.

414, Material or Article Handling, subclasses 209+ for a discharging device of a chamber used for a heating function.

**267 INCLUDING MEANS TO FEED SOLID FUEL:**

This subclass is indented under the class definition. Apparatus provided with means for conveying lump combustible material to the combustion chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:

101+, for subcombination fuel feeder structure.

186+, for solid fuel feed means combined with control means responsive to a sensed condition.

255+, for refuse feed means combined with incinerator structure.

SEE OR SEARCH CLASS:

122, Liquid Heaters and Vaporizers, subclass 376 for boiler structure provided with means for feeding fuel along a water cooled grate.

266, Metallurgical Apparatus, subclasses 176+ for ore treating or metal extracting means provided with means for moving the material being treated through a heating zone.

414, Material or Article Handling, subclasses 147+ for a driven means for charging a chamber used for a heating function.

432, Heating, subclass 121 for a heating chamber provided with means for moving work therethrough, and subclasses 239+ for a feeding or conveying subcombination specialized for heating.

**268 Movable grate:**

This subclass is indented under subclass 267. Apparatus wherein the fuel conveying means in an ambulatory perforated plate or bar structure which also supports the fuel during the burning.

SEE OR SEARCH THIS CLASS, SUBCLASS:

328, for a grate element, per se.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 152+ for grate structure specialized for use with a domestic furnace, stove, or range.

266, Metallurgical Apparatus, subclasses 178+ for ore treating or metal extracting apparatus provided with a traveling grate.

**269 Endless chain:**

This subclass is indented under subclass 268. Apparatus wherein the movable grate is composed of an assemblage of link sections attached together to form a beltlike conveyor structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

329, for endless chain element, per se, or for an assemblage of endless chain



elements not claimed with other furnace structure.

SEE OR SEARCH CLASS:

- 198, Conveyors: Power-Driven, subclasses 804+ for endless conveyor structure, per se.  
414, Material or Article Handling, subclasses 157 and 196 for a merely named heating chamber structure combined with endless conveyor charging means.

**270 Including air supply means:**

This subclass is indented under subclass 269. Apparatus provided with means for introducing air to the endless chain grate to thereby promote and support the burning of the fuel on the grate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 348, for process of fluid feed.

**271 And chain seal:**

This subclass is indented under subclass 270. Apparatus further provided with means contiguous to and communicating with the chain grate to prevent the escape of supplied air or burning gases associated with the burning fuel.

SEE OR SEARCH CLASS:

- 266, Metallurgical Apparatus, subclass 179 for an ore treating or metal extracting apparatus provided with a traveling grate having seal means.  
432, Heating, subclass 242 for subcombination feeding or conveying structure provided with means to seal the opening by which the work is moved into the chamber, or subclass 244 for preventing leakage through the chamber wall.

**272 Between runs:**

This subclass is indented under subclass 209. Apparatus wherein the seal means is located either within the interior or contiguous to a longitudinal side of the endless grate.

**273 Inclined run:**

This subclass is indented under subclass 269. Apparatus provided with means to vertically dispose one end of the chain grate so that the

longitudinal axis of the grate is at an angle with the horizon.

**274 Mobile support:**

This subclass is indented under subclass 269. Apparatus wherein the grate rests upon an ambulatory structure capable of allowing the entire grate to be moved as an entity with respect to the remainder of the combustion apparatus.

**275 Rotary:**

This subclass is indented under subclass 268. Apparatus wherein the grate or grate element is movable about its longitudinal axis and further wherein the fuel is fed onto the top of the grate or grate element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 247, for a combination of a refuse incinerator provided with a vertical axis rotary grate.

SEE OR SEARCH CLASS:

- 198, Conveyors: Power-Driven, subclass 803.16 for a rotary conveyor, per se.

**276 About horizontal axis:**

This subclass is indented under subclass 275. Apparatus wherein the axis of the rotary grate is at a right angle to plumb line.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 246, for an incinerator provided with a rotary drum movable on a horizontal axis for processing refuse.

SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, subclass 181 for domestic furnace, stove, or range grate horizontally pivoted and capable of rotary motion.

**277 Conical type:**

This subclass is indented under subclass 275. Apparatus wherein the rotary grate is in the shape of a pyramid having a circular base.

- (1) Note. The grate may be either of an upright or an inverted cone shape.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
287+, for similar stationary inverted frusto-conical grate structure.
- 278 Oscillatory:**  
This subclass is indented under subclass 268. Apparatus wherein the grate or grate element is fixed at a fulcrum point and capable of moving alternately backward and forward thereby advancing the fuel along the grate.
- SEE OR SEARCH CLASS:  
126, Stoves and Furnaces, subclasses 170+ for grate structure for domestic stoves and furnaces capable of moving in a to-and-fro motion.
- 279 Manual actuation means:**  
This subclass is indented under subclass 278. Apparatus further provided with means for producing the oscillatory motion by human hand motion.
- 280 Multiple retort:**  
This subclass is indented under subclass 278. Apparatus provided with plurality of grate assemblages.
- 281 Reciprocatory:**  
This subclass is indented under subclass 268. Apparatus wherein the grate or grate elements are mounted for linear alternate back and forth motion.
- SEE OR SEARCH CLASS:  
126, Stoves and Furnaces, subclass 174 for a domestic furnace, stove, or range grate capable of a horizontal to-and-fro movement.  
198, Conveyors: Power-Driven, subclasses 750+ for a reciprocating conveying surface, per se.
- 282 Including power feed:**  
This subclass is indented under subclass 281. Apparatus further provided with fuel supply means driven by mechanical device for feeding the fuel from a supply hopper to the reciprocating moving grate.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
286+, for a stationary grate provided with conveyor means.  
289, particularly for a push ram-type feed conveyor.
- SEE OR SEARCH CLASS:  
198, Conveyors: Power-Driven, subclass 657 for power-driven conveyors, per se, of similar structure.  
266, Metallurgical Apparatus, subclass 183 for ore treating or metal extracting means provided with power-driven conveying means.  
414, Material or Article Handling, subclasses 187+ for a merely named heating chamber provided with a hopper and a power-driven conveyor charging means.
- 283 UNDERFEED:**  
This subclass is indented under subclass 282. Apparatus wherein the fuel supply means lies in a plane below the topmost point of the grate structure.
- 284 Power feed perpendicular to grate:**  
This subclass is indented under subclass 283. Apparatus wherein the power feed means is at a right angle to the axis of the reciprocating motion of the grate.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
289, for a pusher ram feed means perpendicular to a static grate.
- 285 Raking bar type:**  
This subclass is indented under subclass 268. Apparatus wherein the movable grate is composed of relatively long evenly shaped pieces of metal interposed with similar stationary metal pieces such that the movable grate produces a raking action to advance the fuel.
- 286 Power driven:**  
This subclass is indented under subclass 267. Apparatus wherein the fuel conveying means is a machine propelled by mechanical energy.
- (1) Note. The term mechanical energy is to be distinguished from hand labor as

being produced from a variety of electrical or mechanical motors or engines.

SEE OR SEARCH CLASS:

- 198, Conveyors: Power-Driven, subclass 657 for power-driven conveyors, per se, of similar structure.
- 266, Metallurgical Apparatus, subclass 183 for ore treating or metal extracting means provided with power-driven conveying means.
- 414, Material or Article Handling, subclasses 147+ for a merely named heating chamber provided with a power-driven conveyor charging means.

**287 Having circular grate:**

This subclass is indented under subclass 286. Apparatus provided with a fuel supporting means which is round in structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 277, for similar inverted frustoconical rotary grate structure with or without forced air means.

**288 And forced air supply:**

This subclass is indented under subclass 287. Apparatus further provided with air fan impeller means for feeding air to the circular grate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 348, for process of fluid feed.

**289 Pusher ram:**

This subclass is indented under subclass 286. Apparatus wherein the fuel supply means includes a fuel engaging means and means to cause the engaging means to move alternately to and fro along a straight line from a fuel engaging point to a fuel releasing point.

SEE OR SEARCH CLASS:

- 414, Material or Article Handling, subclass 198 for a merely named heating chamber provided with a reciprocating pusher type charging means.

**290 Parallel to grate:**

This subclass is indented under subclass 289. Apparatus provided with a fuel supporting means composed of an assemblage of elements

the longitudinal axis of which is parallel to the axis of the straight line movement of the fuel supply means.

- (1) Note. The assemblage of grate elements comprises what is generally known in the solid fuel furnace art as a fuel retort.

**291 Inclined step grate:**

This subclass is indented under subclass 290. Apparatus wherein the grate assemblage is composed such that the elements overlap one another in a descending configuration thereby producing a steplike structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 328, for a grate element, per se.

**292 Separate feed:**

This subclass is indented under subclass 267. Apparatus provided with means to supply the fuel in discrete separate quantities.

SEE OR SEARCH CLASS:

- 414, Material or Article Handling, subclasses 147+ for a merely named heating chamber provided with discrete quantity charging means.

**293 Supply hopper; e.g., magazine, etc.:**

This subclass is indented under subclass 267. Apparatus wherein the feed means is of the chute type such that the fuel is fed to the combustion chamber by its own weight.

SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, subclass 30 for a boiler provided with a fuel magazine.
- 126, Stoves and Furnaces, subclasses 7, 10, 11, 68, 73, and 74 for stoves having magazine fuel feed.

**294 Cage grate:**

This subclass is indented under subclass 293. Apparatus wherein the lower part of the magazine has perforations or bars on opposite sides such that air may enter one side of the burning fuel and flames may pass out of the other.

- SEE OR SEARCH CLASS:  
122, Liquid Heaters and Vaporizers, subclass 373 for boilers with water cage grates.
- 295 HAVING MULTIPLE FIREBOX:**  
This subclass is indented under the class definition. Apparatus provided with more than one combustion chamber.
- SEE OR SEARCH CLASS:  
122, Liquid Heaters and Vaporizers, subclasses 57 and 60 for similar structure in fire tube boilers.
- 296 Including fluid supply means:**  
This subclass is indented under subclass 295. Apparatus provided with means to supply air, steam, or water to a combustion chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
188+, for a furnace provided with noncombustible fluid feed means provided with control means responsive to a sensed condition.  
348, for process of fluid feed.
- 297 INCLUDING NONCOMBUSTIBLE FLUID SUPPLY MEANS:**  
This subclass is indented under the class definition. Apparatus provided with means to inject a noncombustible gas or liquid into a combustion chamber to thereby promote or support the combustion reaction.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
348, for process of fluid feed.
- SEE OR SEARCH CLASS:  
122, Liquid Heaters and Vaporizers, subclass 70 for boiler structure provided with an air feeding conduit.  
126, Stoves and Furnaces, subclass 78 for a heating stove provided with a steam feeding device.  
266, Metallurgical Apparatus, subclasses 186+ for ore treating or metal extracting apparatus provided with means for feeding fluids.
- 298 Hollow grate:**  
This subclass is indented under subclass 297. Apparatus wherein the fluid supply means is composed of a mechanical structure provided with an internal closed cavity for allowing the fluid to pass therethrough such that mechanical structure is additionally used to support the fuel during combustion.
- SEE OR SEARCH CLASS:  
122, Liquid Heaters and Vaporizers, subclass 232 for a sectional boiler provided with a water grate; and subclasses 371+ for a boiler with a water grate.  
126, Stoves and Furnaces, subclasses 152+ for a grate for a furnace, stove, or range.
- 299 Having flow controller:**  
This subclass is indented under subclass 298. Apparatus provided with means to directly modify the direction, velocity, or pressure of the fluid through the hollow grate.
- SEE OR SEARCH CLASS:  
266, Metallurgical Apparatus, subclass 187 for an ore treating or metal extracting apparatus provided with flow regulated fluid feed means.
- 300 For forced air supply:**  
This subclass is indented under subclass 299. Apparatus wherein the flow control means is an impeller fan.
- 301 Having treatment means:**  
This subclass is indented under subclass 297. Apparatus provided with means to modify the physical properties of the fluid passing into the combustion chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
200, for a locomotive-type furnace provided with noncombustible fluid treatment means.  
342+, for process of treatment.

- 302 Preheater:**  
This subclass is indented under subclass 301. Apparatus wherein the modifying means increases the temperature of the fluid prior to entering the combustion chamber.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
201, for a locomotive-type furnace provided with a preheater.
- SEE OR SEARCH CLASS:  
126, Stoves and Furnaces, subclass 15 for a culinary heating apparatus provided with a preheater, subclass 58 for a heating stove provided with a preheater, and subclass 112 for a hot air furnace provided with a preheater.  
266, Metallurgical Apparatus, subclasses 138+ for a metallurgical apparatus provided with means to preheat a gas or vapor supplied to the apparatus.  
432, Heating, subclasses 78+ for a heating apparatus provided with means to heat incoming air.
- 303 And furnace gas mixer:**  
This subclass is indented under subclass 302. Apparatus further provided with means to intermingle the incoming fluid with gases rising from the combustion of the fuel.
- 304 Remote from combustion chamber:**  
This subclass is indented under subclass 302. Apparatus wherein the preheater is located such that it receives its heat from the combustion chamber exhaust gases, but the preheater is external to the combustion chamber.
- SEE OR SEARCH CLASS:  
432, Heating, subclasses 179+ for a heated work chamber provided with exhaust preheater means.
- 305 Bridgewall:**  
This subclass is indented under subclass 302. Apparatus further provided with a hollow barrier structure located at the rear of the fire grate attached to the preheater such that the heated fluid enters the combustion reaction from barrier structure.
- 306 Water or steam:**  
This subclass is indented under subclass 302. Apparatus wherein the fluid being injected into the combustion chamber is water in either its liquid or gaseous state.
- 307 Below grate:**  
This subclass is indented under subclass 306. Apparatus wherein the water or steam is fed below the fuel supporting means.
- 308 Internal to or attachable to wall:**  
This subclass is indented under subclass 302. Apparatus wherein the preheater means is located on the interior of or is contiguous to a sidewall of the combustion chamber.
- 309 And flow modifying means:**  
This subclass is indented under subclass 301. Apparatus further provided with means to modify the course of the fluid through the combustion chamber.
- 310 Deflector:**  
This subclass is indented under subclass 309. Apparatus wherein the flow modifying means is in the form of a plate or sheet for diverting the fluid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
322+, for deflector element, per se.
- 311 Grate mounted:**  
This subclass is indented under subclass 310. Apparatus wherein the deflector is attached to or substantially contiguous to the fuel supporting means.
- 312 Below grate:**  
This subclass is indented under subclass 311. Apparatus wherein the deflector is located below the grate.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
202, for noncombustible fluid feed means in a locomotive wherein the fluid is fed below the grate.

- 313 Feed nozzle:**  
This subclass is indented under subclass 309. Apparatus wherein the flow modifying means is a terminal shaping outlet.
- SEE OR SEARCH CLASS:  
239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclass for fluid spraying or diffusing nozzle, per se.
- 314 Supplying through hollow bridgewall:**  
This subclass is indented under subclass 297. Apparatus provided with a vertical barrier structure at the rear of the firebox having a substantially closed cavity through which the fluid may pass into the combustion chamber.
- 315 DOWNDRAFT:**  
This subclass is indented under the class definition. Apparatus provided with a grate and further having means to cause the incoming air to flow down through the fuel and grate.
- SEE OR SEARCH CLASS:  
126, Stoves and Furnaces, subclass 76 for a downdraft domestic heating stove.
- 316 Grateless:**  
This subclass is indented under subclass 315. Apparatus wherein the fuel support means is the solid unperforated bottom of the combustion chamber.
- 317 INCLUDING FIREBOX:**  
This subclass is indented under the class definition. Apparatus relating to combustion chamber construction.
- 318 Having arch:**  
This subclass is indented under subclass 317. Apparatus provided with structure specifically provided to reflect heat or combustion products in a desired direction or to a desired area.
- 319 And flame shaper:**  
This subclass is indented under subclass 318. Apparatus provided with means having a series of relatively small openings designed to contour and direct the combustion flames onto the structure desired to be heated.
- (1) Note. The flame shaper is generally located at the rear of the combustion chamber and usually designed to heat the water boiler tubes of a boiler heating system.
- 320 Adjustable dimension firebox:**  
This subclass is indented under subclass 318. Apparatus provided with means to vary the size of the combustion chamber either by a vertically movable grate, a movable bridgewall, or a movable dead plate which can vary the effective area of the grate surface.
- 321 Door arch:**  
This subclass is indented under subclass 318. Apparatus wherein the arch extends from the front of the combustion chamber over the combustion reaction.
- 322 BAFFLE OR HEAT RETAINER STRUCTURE:**  
This subclass is indented under the class definition. Structure relating to construction specially designed or provided for to either reflect or retard heat.
- (1) Note. The baffle or heat retainer is generally provided for use with boiler water tubes.
- SEE OR SEARCH CLASS:  
122, Liquid Heaters and Vaporizers, subclass 503 for boiler structure combined with furnace having a water-cooled baffle for receiving the impact of burning fuel.  
432, Heating, subclass 249 for heat shielding means for protecting the work or work area.
- 323 Refractory type:**  
This subclass is indented under subclass 322. Structure wherein the baffle or retainer is composed of a ceramic or ceramic-like material which is resistant to high temperatures and large quantities of heat.
- 324 Having concavity for engaging pipe exterior:**  
This subclass is indented under subclass 323. Structure wherein the refractory structure is provided with a negatively curved area adapted to mate with the external surface of a boiler tube.

**325 And structure to bridge pipes:**

This subclass is indented under subclass 324. Structure wherein the refractory structure is further provided with a second concavity such that refractory structure simultaneously engages two separate boiler water tubes.

**326 Metallic type:**

This subclass is indented under subclass 322. Structure wherein the baffle or retainer is composed of metal.

**327 SOLID FUEL FEED STRUCTURE:**

This subclass is indented under the class definition. Structure relating to a component of an apparatus, device, or mechanism used to supply either fluid or solid fuel to a combustion chamber of the class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

186+, for furnace feed means provided with control means responsive to a sensed condition.

267, for feed means combined with furnace structure.

**328 Movable grate:**

This subclass is indented under subclass 327. Structure relating to a solid fuel feed component which additionally supports the fuel during burning.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 155+ for movable grate structures for a domestic furnace, stove, or range.

**329 Endless chain:**

This subclass is indented under subclass 328. Structure relating to endless conveyor component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

269+, for an endless belt feed grate combined with furnace structure.

**330 Having sprocket drive:**

This subclass is indented under subclass 329. Structure provided with a wheel structure provided with projections on its periphery such

that the projections engage chain links to thereby impel the chain.

**331 ARCH OR ROOF STRUCTURE:**

This subclass is indented under the class definition. Structure relating to combustion chamber ceiling construction provided to reflect and direct combustion gases and heat back to the burning fuel to thereby further promote the burning action.

**332 Planar surface area:**

This subclass is indented under subclass 331. Structure wherein the roof has a flat horizontal contour.

**333 Inclined:**

This subclass is indented under subclass 332. Structure further provided with a section having a plane surface area which is at an angle with the horizon.

SEE OR SEARCH CLASS:

52, Static Structures (e.g., Buildings), subclasses 90.1+ for a flat roof construction of general application.

**334 And convex surface area:**

This subclass is indented under subclass 333. Structure further provided with an outwardly curved contoured area.

(1) Note. The convex surface is usually known as a nose arch.

**335 Concave surface area:**

This subclass is indented under subclass 331. Structure wherein the arch has an inwardly curved contour.

SEE OR SEARCH CLASS:

52, Static Structures (e.g., Buildings), subclasses 86+, 245, and 639+ for curved roof construction of general application.

**336 WALL STRUCTURE:**

This subclass is indented under the class definition. Structure relating to vertical barrier construction of a combustion chamber of the class.

## SEE OR SEARCH CLASS:

122, Liquid Heaters and Vaporizers, subclass 6 for a boiler provided with a water cooled furnace wall.

**337 Bridgewall:**

This subclass is indented under subclass 336. Structure relating to wall structure for use at the rear of the fire grate generally provided to turn the burning flame upwards and to the structure to be heated.

(1) Note. The structure to be heated is usually a boiler water tube.

**338 BRICK ELEMENT:**

This subclass is indented under the class definition. Structure relating to a monolithic structure specially adapted for use as a basic building element in a furnace wall, ceiling, baffle, or arch.

(1) Note. The brick element is generally composed of refractory material resistant to extreme temperatures for sustained periods of time.

## SEE OR SEARCH CLASS:

52, Static Structures (e.g., Buildings), subclasses 578+ for a module, per se, of general utility adapted to engage a similar module and provided with an intermediate distinct connecting means between connected modules, and subclasses 596+ for a module, per se, of general utility having an interrelating feature for engagement with a similar module.

165, Heat Exchange, subclasses 9.1+ for checker brick structure adapted to be assembled to form heat exchange open-work structure.

202, Distillation: Apparatus, subclass 267 for elemental materials of construction of structure of that class.

**339 Having hanger:**

This subclass is indented under subclass 338. Structure provided with distinct attached means to allow the brick element to be suspended from a separate support structure.

(1) Note. The brick element of this subclass is generally used to form a suspended arch or ceiling wherein the hanger consists generally of some type of metal bracket.

**340 And metal casing:**

This subclass is indented under subclass 339. Structure further provided with a metallic sheathing enclosing substantially all of the brick element.

(1) Note. The metallic casing acts as a seal between adjacent brick when assembled.

**341 PROCESS:**

This subclass is indented under the class definition. Method drawn to an operation peculiar to an apparatus of the class.

## SEE OR SEARCH CLASS:

266, Metallurgical Apparatus, subclasses 44+ for a process of operating a metallurgical apparatus.

431, Combustion, subclasses 2+ for a process of operating a fluid fuel burner.

432, Heating, subclasses 1+ for a process of operating a heating apparatus.

**342 Treating fuel constituent or combustion product:**

This subclass is indented under subclass 341. Process wherein the fuel, refuse, or a combustion product is subjected to a distinctive agent, action, device, or apparatus in order to bring about a desired result.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

200+, for a locomotive-type furnace provided with means to treat a noncombustible fluid.

218+, for furnace structure combined with means to treat fuel prior to combustion.

301+, for furnace structure provided with means to treat a noncombustible fluid.

**343 To prevent corrosion of furnace:**

This subclass is indented under subclass 342. Process wherein the desired result is the hindrance of the decay of the apparatus.



## SEE OR SEARCH CLASS:

431, Combustion, subclass 3 for a process of clearing or preventing the accumulation of undesired matter from a fluid fuel burner.

432, Heating, subclass 2 for a process of clearing or preventing the accumulation of undesired matter from a heating apparatus.

**344 Combustion product:**

This subclass is indented under subclass 342. Process for treating the material produced during the combustion reaction.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

259, for refuse incinerator structure provided with ash handling means.

266, for powdered fuel furnace provided with ash handling means.

**345 Exhaust gas; e.g., pollution control, etc.:**

This subclass is indented under subclass 344. Exhaust gas; e.g., pollution control, etc.: Process wherein the materials to be treated are the gaseous fumes normally expended to the atmosphere.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

203+, for furnace structure provided with exhaust gas treatment means.

**346 Incinerating refuse:**

This subclass is indented under subclass 341. Subject matter including processes for the combustion of refuse material and the operation of incinerating apparatus.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

235+, for refuse incinerator structure.

**347 Burning pulverized fuel:**

This subclass is indented under subclass 341. Process relating to the combustion of solid powdered fuel suspended in a fluid.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

232, for furnace structure combined with means for pulverizing solid fuel.

261+, for furnace structure for burning pulverized fuel and fluid fuel.

263+, for furnace structure for burning pulverized fuel.

**348 Supplying fluid:**

This subclass is indented under subclass 341. Process relating to the injecting of gases or liquids into the combustion apparatus.

## SEE OR SEARCH CLASS:

266, Metallurgical Apparatus, subclass 47 for a method of operating tuyere fluid feed means in metallurgical apparatus.

**349 MISCELLANEOUS:**

This subclass is indented under the class definition. Inventions specially adapted for use with an apparatus of the class but not provided for elsewhere.

END