

**CLASS 62, REFRIGERATION****SECTION I - CLASS DEFINITION**

This class includes (1) processes and apparatus peculiar to removing heat from a substance, usually by a change of phase of a coolant or refrigerant, as by evaporation, melting or sublimation, (2) the resultant product of part (1), e.g., ice, liquefied or solidified gases, and (3) processes and apparatus peculiar to handling the latter as a stored product, not elsewhere provided for.

**SECTION II - REFERENCES TO OTHER CLASSES****SEE OR SEARCH CLASS:**

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| <p>23, Chemistry: Physical Processes, subclasses 295+ for processes crystallizing inorganic compounds or non-metal elements not including a refrigeration step, and when there is an intent to make a single-crystal, see Class 117 whether or not including a refrigeration step.</p> <p>34, Drying and Gas or Vapor Contact With Solids, for processes and apparatus for drying by operations other than refrigeration, combined with cooling by refrigeration, particularly subclasses 62+, 284+, 302+, and 391+ and also for processes and apparatus for cooling only by gas or vapor contact involving no characteristics of refrigeration; see particularly subclasses 428+ and the Notes thereunder.</p> <p>52, Static Structures (e.g., Buildings), appropriate subclasses for the structure, per se, of an enclosure which may be defined as forming a refrigerated space, particularly subclasses 380+, 404.1+ and 479+.</p> <p>95, Gas Separation: Processes, for processes involving steps resulting in separation of a gas from a fluid mixture comprising (i) a gas and solid or liquid particles entrained therein, (ii) a liquid and gas entrained therein, or (iii) a plurality of gases wherein the steps are of a physical or material handling nature, involve contacting of materials, or exchange properties through electrical or nonreactive chemical treatment. Class 95 takes gas separation of the type noted above including cooling of the sorbent or cooling of the fluid mixture, but not including evaporative cooling after sorption of the type noted in (c) below. Class 95 takes the cold wall-hot wall thermal diffusion type of separation, regardless of any refrigeration claimed. Class 95 also takes expansion</p> | <p>96, Gas Separation: Apparatus, for gas separation apparatus corresponding to the processes of Class 95. The line for apparatus between Class 96 and Class 62 is the same as the line above for processes between Class 95 and Class 62.</p> <p>99, Foods and Beverages: Apparatus, subclasses 455, 470 and 517 for apparatus including cooling means.</p> <p>100, Presses, subclasses 92+ for a press with means to cool the material compacted by the press, especially subclasses 310, 312, and 314 for a conveyor-type press having means to cool the article or press.</p> <p>109, Safes, Bank Protection, or a Related Device, subclass 63.5 for a closure with means to render the closure lock ineffective, e.g., a refrigerator with safety features to prevent persons from being locked therein.</p> <p>117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, for processes and non-coating apparatus for growing therein-defined single-crystal of all types of materials, including inorganic or organic, including those having refrigeration steps or means.</p> <p>126, Stoves and Furnaces, subclass 273.5 for a domestic oven using a heat accumulator (e.g., fireless cooker, etc.) or subclass 375.1 for an open-top liquid heating vessel that may include a lid having a heat accumulator.</p> <p>137, Fluid Handling, appropriate subclass for processes and apparatus for fluid handling of general utility.</p> | <p>through an orifice of a liquid and gas entrained therein where the gas is evolved through the lowering of the pressure and the cooling effect which inherently results from such pressure reduction is <u>not</u> transferred through a wall to another material. If such heat transfer occurs, classification in Class 62 is proper. Class 62 takes (a) separation of a constituent from a plurality of gases by a significantly claimed refrigeration step or apparatus; (b) condensation of moisture from the atmosphere as a result of a refrigeration operation; (c) gas drying by sorption followed by contacting the dried gas with a liquid to produce cooling by evaporation; (d) a refrigerated enclosure combined with sorption means; (e) refrigeration producing processes and apparatus combined with steps or means for drying the refrigerant; and (f) extracting a constituent from a plurality of gases by liquefaction and separation (e.g., fractionation or distillation, etc.).</p> |
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- 138, Pipes and Tubular Conduits, subclasses 100 through 178, especially subclass 149 for insulation on pipe.
- 165, Heat Exchange, particularly subclasses 58+ for apparatus adapted for interchangeably, convertibly or alternately heating and cooling. See the reference to Class 62 in the definition of subclass 58 of Class 165.
- 166, Wells, subclass 57 for well apparatus including refrigeration means, subclasses 265+ for well processes in which fluid may be separated by refrigeration, and subclass 302 for well processes including cooling.
- 201, Distillation: Processes, Thermolytic, appropriate subclass for a process of thermolytic distillation of a solid carbonaceous material.
- 202, Distillation: Apparatus, appropriate subclass, for apparatus for distillation of general utility.
- 203, Distillation: Processes, Separatory, appropriate subclass for a process of separatory distillation of general utility and see Class 203 class definitions for the line between separatory distillation and this class.
- 210, Liquid Purification or Separation, appropriate subclass for processes and apparatus which may involve cooling. The following subclasses are particularly noted: subclass 773 for processes involving conversion of solids to liquids before separation, subclass 774 for processes involving heating or cooling and separation, subclass 149 for separating apparatus having means responsive to a thermal condition, and subclasses 175+ for a separator with a heater or heat exchanger.
- 215, Bottles and Jars, appropriate subclass for a bottle or jar of general utility.
- 217, Wooden Receptacles, appropriate subclass for a crate or shipping vessel of general utility.
- 220, Receptacles, appropriate subclass for a tank or receptacle having compartments made mostly of metal, or a tank or container having a mere jacket in which a cooling or heating fluid may be admitted when there is no directing means for circulating the fluid in the jacket.
- 221, Article Dispensing, appropriate subclass for mechanism having a specific article dispensing feature in combination with a feature too general for classification in Class 62.
- 222, Dispensing, appropriate subclass for a receptacle having a specific dispensing feature with a feature too general for classification in Class 62.
- 236, Automatic Temperature and Humidity Regulation, appropriate subclass for a control of general utility. A refrigerant controlling or expansion valve is of general utility unless features resulting in refrigeration production are included.
- 237, Heating Systems, appropriate subclass for a heating system which may use the heat rejecting portion of a refrigeration system with additional heating means.
- 241, Solid Material Comminution or Disintegration, appropriate subclass for processes and apparatus for comminuting solid refrigerants and also comminuting processes and apparatus provided with cooling means. See section 6 of the class definition of that class (241) for the line.
- 249, Static Molds, subclasses 69+ for ice cube trays including means to release ice cubes from a tray, and subclasses 129+ for ice cube trays, per se, for forming plural cubes.
- 252, Compositions, particularly subclasses 67+ for (1) admixtures of ingredients, or an old compound limited to use as a refrigerant, (2) processes of refrigeration comprising any known cycle and distinguished solely by the composition or compound therein, when apparatus structure is not included. The preceding are placed in Class 252 even though the freezing or boiling point or temperature of use is specific.
- 260, Chemistry of Carbon Compounds, including the related classes for processes of treating or modifying non-hydrocarbon organic compounds: by crystallization wherein the crystallization is not brought about by refrigeration; wherein crystallization, by any means including refrigeration, is combined with synthesis or modification of said compounds by chemical means; or wherein the separation of carbon compounds is accomplished exclusively by physical means other than refrigeration.
- 261, Gas and Liquid Contact Apparatus, appropriate subclass, for a gas and liquid contact device having no means specialized to cooling a material out of contact with the contacting fluids.
- 264, Plastic and Nonmetallic Article Shaping or Treating: Processes, for molding processes, per se, for materials within the class definition, noting particularly subclass 28 for processes including freezing or cooling to a temperature of zero °C.

- 299, Mining or In Situ Disintegration of Hard Material, appropriate subclass for a process or apparatus for recovering or working naturally occurring ice in situ and particularly subclasses 24+ for an ice working machine or cutter.
- 312, Supports: Cabinet Structure, particularly subclasses 31, 31.01, 36, 116, 213, 236, 253, and 400+ of that class (312) and see the Notes thereto, for cabinet structure including an insulated wall cabinet of general utility.
- 366, Agitating, appropriate subclasses for agitating process or apparatus of general utility; also, for agitating apparatus involving a cooling means where that means is only a container or a container with means for effecting agitation therein, and in either case there is no modification of either the container or the agitating means restricting the use of the apparatus to refrigeration.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 1+ for processes of preserving by operations other than refrigeration not provided for elsewhere; subclasses 245.1+ for non-coating crystallization apparatus not including chemical reaction means, not including refrigeration means, and not provided for elsewhere; and subclasses 129+ for non-coating crystallization apparatus including means for chemical reaction, which may or may not include refrigeration means, and not provided for elsewhere.
- 425, Plastic Article or Earthenware Shaping or Treating: Apparatus, appropriate subclasses for molding apparatus, per se, for merely shaping particulate ice (water or carbon dioxide) into a desired configuration; subclasses 117+ for a specific refrigeration apparatus and mold means to form a composite product from a fluent material and a preform. Class 62 provides for the combination of plastic material shaping or reshaping apparatus combined with refrigeration apparatus for the material shaped.
- 426, Food Edible Material: Processes, Compositions, and Products, appropriate subclasses for frozen food products and food working processes combined with freezing.
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses for a stock material product in the form of a single or plural layer web or sheet, and especially subclasses 304.4+ for a composite web or sheet including a porous or cellular layer.
- 454, Ventilation, for means and related processes for ventilation of an enclosure not specialized to refrigeration. The mere inclusion of a cooler for the air or means subjecting the air to air-liquid contact is not considered a means specialized to refrigeration.
- 585, Chemistry of Hydrocarbon Compounds, for processes including a step of refrigeration which treats or modifies only hydrocarbon compounds (claimed or disclosed). Such processes disclosing any non-Class 585 (i.e., non-hydrocarbon) organic compound are placed according to the class line with Class 260 and related classes. Especially see subclass 15 for treating or modifying a crystalline hydrocarbon hydrate and subclasses 812+ for a purification or separation process for recovery of a hydrocarbon.

## SUBCLASSES

**1 CONSUMABLE PRODUCTS PRODUCED BY COOLING:**

This subclass is indented under the class definition. A congealed or frozen article constituting the product produced by processes or apparatus which is intended to be used only once, e.g., a frozen or chilled unit or mixture of ice and liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

371, for a portable commodity container, i.e., a shipping or handling wrapper or container, or a refillable container for refrigerant using a product of refrigeration.

530, for a sealed, flexible, handled or attachable device containing a coolant usable to cool a substance, space or body.

SEE OR SEARCH CLASS:

252, Compositions, subclasses 67+, 70 and 71+ for a thermal compositions provided for, and see the reference to Class 252 in the class definition of this class (62).

426, Food or Edible Material: Processes, Compositions, and Products, subclasses 70+ for frozen food products.

**3.1 USING ELECTRICAL OR MAGNETIC EFFECT:**

This subclass is indented under the class definition. Process or apparatus in which cooling is produced by the influence of an electrical current or the field surrounding it upon a conductive or magnetic material.

**3.2 Thermoelectric; e.g., Peltier effect:**

This subclass is indented under subclass 3.1. Process or apparatus in which cooling is produced by either the conversion of heat into electricity or that of electricity into heat; e.g., the Peltier effect.

- (1) Note. The following classes and subclasses are noted as involving a thermocouple or a thermoelectric device: Class 136, Batteries: Thermoelectric and Photoelectric, subclasses 203+; Class 236, Automatic Temperature and Humidity Regulation, subclasses 69+; Class 310, Electrical Generator or Motor Structure subclass 306; Class 318, Electricity: Motive Power System, subclass 317; Class 322, Electricity: Single Generator Systems, subclass 2; Class 324, Electricity: Measuring and Testing, subclasses 451 and 452+; Class 361, Electricity: Electrical Systems and Devices, subclasses 161+; and Class 374, Thermal Measuring and Testing, subclasses 179+.

**SEE OR SEARCH CLASS:**

136, Batteries: Thermoelectric and Photoelectric, subclasses 203+ for Peltier type batter devices, per se. The battery elements are classified in Class 136 even though they are disclosed as used to produce hot and cold junctions by applying a current to them.

**3.3 Heat pump, selective heating and cooling:**

This subclass is indented under subclass 3.2. Process or apparatus wherein the thermoelectric unit moves thermal energy from one location to another, and can be used alternatively to either heat or cool an object.

- (1) Note. The change in function is usually accomplished by reversing the flow of electricity within the unit.

**3.4 Including dehumidifying and condensate handling:**

This subclass is indented under subclass 3.2. Process or apparatus wherein the thermoelectric unit is arranged in a system used to remove ambient humidity as condensate, and which includes means to manipulate the removed condensate.

**3.5 Made with flexible heat exchanger material; e.g., blanket, wearing apparel, etc.:**

This subclass is indented under subclass 3.2. Process of apparatus wherein the thermoelectric unit consists of pliant material (e.g., fabric) and can be used in an article of clothing, a blanket, etc.

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

259.3, for a structurally installed applicator for the effect of refrigeration.  
261, for a flexible heat exchanger adapted to be used with a specific article of furniture; e.g., a bed cover or canopy, etc.

**3.6 Interior of enclosure cooled; e.g., refrigerator:**

This subclass is indented under subclass 3.2. Process or apparatus wherein the thermoelectric unit is used to lower the temperature of a confined space.

- (1) Note. Room coolers are not included in this subclass.

**SEE OR SEARCH CLASS:**

165, Heat Exchange, subclasses 58+ for room coolers.

**3.61 Having vehicle feature; e.g., cooling cart, car, truck, boat, etc.:**

This subclass is indented under subclass 3.6. Process or apparatus wherein the cooled enclosure has some vehicular feature, such as wheels, casters, skids, pontoons, etc., adapting it for transporting people or cargo.

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

239+, for other types of refrigerators with vehicle features.

**3.62 Portable, having transporting feature; e.g., handle:**

This subclass is indented under subclass 3.6. Process or apparatus wherein the cooled enclosure is intended to be transported and includes means by which a person may carry or grip the unit or has means for attaching it to a person or vehicle; e.g., a picnic basket, lunch box, insulin cooler, bottle cooler, etc.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

457.1+, for other types of portable refrigeration apparatus.

**3.63 Icemaker:**

This subclass is indented under subclass 3.6. Process or apparatus wherein the enclosure is specifically adapted for converting water into its solid phase.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

340+, for other types of icemakers.

**3.64 Beverage dispenser:**

This subclass is indented under subclass .36. Process or apparatus wherein the enclosure is designed to hold a consumable liquid (water, beer, soda, etc.), and means is provided for discharging the liquid from the enclosure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

389+, for other types of cooled beverage dispensers.

**3.7 Including specific circuitry or heat exchanger material:**

This subclass is indented under subclass 3.2. Process or apparatus wherein significance is attributed to either electric circuitry associated with the cooling unit or to a material from which the cooling unit is constructed.

**4 CHEMICAL REACTION OR SOLIDS DISSOLVING:**

This subclass is indented under the class definition. Subject matter in which a refrigeration effect is produced by (1) a chemical reaction or (2) the dissolving of a solid in a liquid.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

76, for processes involving preliminary manufacturing of a refrigerant, e.g., forming a brine, cooling and utilizing it.

330, for apparatus for manufacturing a refrigerant.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 263.01+ for a chemical reaction heater and see the Notes thereto.

206, Special Receptacle or Package, subclasses 219+ for a combination package including a rupturable partition.

**5 VORTEX TUBE, E.G., RANQUE:**

This subclass is indented under the class definition. Subject matter in which a compressible fluid is caused to flow along a stationary curvilinear path under pressure, producing a refrigeration effect.

**6 GAS COMPRESSION, HEAT REGENERATION AND EXPANSION, E.G., STIRLING CYCLE:**

This subclass is indented under the class definition. Subject matter in which the refrigeration cycle comprises (1) confining a constant mass of a gas in a chamber whose volume varies from a maximum to a minimum, (2) compressing it, (3) cooling it, and (4) expanding it; the gas remaining as such throughout the cycle; the action of stages (2), and (3) being alternate with heat storage and return (regeneration) between these stages.

SEE OR SEARCH CLASS:

60, Power Plants, subclasses 516+ for a structurally similar heat operated motor.

**7 UTILIZING FUEL AS REFRIGERANT:**

This subclass is indented under the class definition. Subject matter in which the refrigerant is used as a refrigeration producer and consumed as a fuel.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

45.1+, for processes and apparatus for handling stored liquefied or solidified

gas, particularly subclasses 48.1+ for vapor dispensing from a liquefied gas dispenser.

#### 45.1 STORAGE OF SOLIDIFIED OR LIQUIFIED GAS (E.G., CRYOGEN):

This subclass is indented under the class definition. Process or apparatus for storing a product of refrigeration comprising a substance in solid or liquid phase, which substance boils at or below standard atmospheric temperature when under standard atmospheric pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 7, for liquified or solidified gas used as a fuel.
- 600+, for liquified or solidified gas product manufacturing.

SEE OR SEARCH CLASS:

- 48, Gas: Heating and Illuminating, appropriate subclass for a process, apparatus, or composition for the manufacture of gas for heating or illumination, and see the notes in the class definition of that class.
- 137, Fluid Handling, subclasses 317+ for means to tap a tank under pressure, and subclasses 334+ for heat exchange ancillary to a fluid handling system.
- 141, Fluent Material Handling, With Receiver or Receiver Coating Means, subclass 20 for a means of filling an aerosol, and subclasses 311+ for a filling means with a receiver or receiver coating means, particularly subclass 330 for a puncturing connecting means mounted on a receiver.
- 169, Fire Extinguishers, subclasses 5+ for a fluid system in fire extinguishing apparatus using liquified or solidified gas.
- 206, Special Receptacles and Packages, subclasses .6+ for a specialized receptacle for storing gas, and see the notes in that class.
- 220, Receptacles, subclasses 560.04+ for a receptacle for storing material under cryogenic conditions.

222, Dispensing, appropriate subclass for a liquid dispenser of general utility, particularly subclasses 3+ for gas dispensing apparatus not limited to liquified gas, and subclasses 173+ for a dispenser with a casing or support.

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 548+ and 589+ for spraying nozzles of general utility.

#### 46.1 With sorbing or mixing:

This subclass is indented under subclass 45.1. Process or apparatus in which the product of refrigeration is either (a) taken into and held by a sorptive material, (b) acted upon by a solvent, or (c) otherwise mixed with a diverse fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 114+, for refrigeration processes including sorption of a liquified gas-type refrigerant.

SEE OR SEARCH CLASS:

- 48, Gas: Heating and Illuminating, subclass 195 for means for charging heating and illuminating gas with an odorous substance.

#### 46.2 Mixing of substance with hydrogen:

This subclass is indented under subclass 46.1. Process or apparatus wherein the product of refrigeration is combined with hydrogen.

- (1) Note. The resulting compound is either a hydride or a hydrate.

SEE OR SEARCH CLASS:

- 34, Drying and Gas or Vapor Contact With Solids, subclass 402 for processes involving contact of a material with hydrogen under pressure.

#### 46.3 Sorbing into capillary material:

This subclass is indented under subclass 46.1. Process or apparatus wherein the product of refrigeration is absorbed into a porous material.

#### 47.1 With conservation of cryogen by reduction of vapor to liquid within storage receptacle:

This subclass is indented under subclass 45.1. Process or apparatus wherein vapor pressure within the receptacle is limited by reducing the

vapor to its liquid phase while in the receptacle.

- (1) Note. The result is that vaporization of the product of refrigeration is minimized.

SEE OR SEARCH THIS CLASS, SUBCLASS:

48.2, for a process or an apparatus wherein vapor is removed from the receptacle and subsequently returned to its liquid phase.

**48.1 With vapor discharged from storage receptacle:**

This subclass is indented under subclass 45.1. Process or apparatus wherein vapor within the receptacle is removed from the receptacle.

SEE OR SEARCH CLASS:

123, Internal Combustion Engines, subclasses 434+ for a charge forming device related to an internal combustion engine.

**48.2 And subsequently restored to receptacle as liquid:**

This subclass is indented under subclass 48.1. Process or apparatus wherein the removed vapor is condensed and then returned to the receptacle as a liquid.

**48.3 And subsequently used to cool receptacle:**

This subclass is indented under subclass 48.1. Process or apparatus wherein the removed vapor is used to cool either the receptacle's walls or an external component of the receptacle (e.g., a radiation shield, the receptacle's, foundation).

**48.4 Discharge caused by ignition of combustible gas:**

This subclass is indented under subclass 48.1. Process or apparatus wherein combustion of a gas results in vaporization and discharge of stored liquid.

**49.1 With measuring:**

This subclass is indented under subclass 45.1. Process or apparatus wherein a characteristic of the product of refrigeration is measured.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 290+ for liquid level testing, subclasses 700+ for fluid pressure testing, and subclasses 861+ for volume or flow rate measuring.

374, Thermal Measuring and Testing, subclasses 339+ for temperature measuring.

**49.2 Of liquid level:**

This subclass is indented under subclass 49.1. Process or apparatus wherein the height of the stored product within the receptacle is measured.

**50.1 Liquified gas transferred as liquid:**

This subclass is indented under subclass 45.1. Process or apparatus wherein the product of refrigeration is removed from the receptacle as a liquid.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 209+ for apparatus using gas pressure to discharge a liquid from a fluid system containing diverse fluids, and particularly subclass 210 for such apparatus with means to generate the gas pressure from the liquid.

**50.2 With vaporizing of liquified gas downstream of storage:**

This subclass is indented under subclass 50.1. Process or apparatus wherein the liquid becomes a vapor subsequent to removal from the receptacle.

- (1) Note. Potential energy is released when the liquid is converted to vapor.

**50.3 Energy converted to work (e.g., used to drive prime mover):**

This subclass is indented under subclass 50.2. Process or apparatus wherein the potential released by vaporization is transformed into applied power; e.g., used to drive a turbine or motor.

- 50.4 Operates valve which controls flow of liquid:**  
This subclass is indented under subclass 50.2. Process or apparatus wherein the potential adjusts a valve used to regulate the liquid being removed from the receptacle.
- 50.5 In phase separator:**  
This subclass is indented under subclass 50.2. Process or apparatus wherein the moved liquid enters a chamber which allows partial vaporization, from which the remaining liquid and the vapor are discharged separately.
- 50.6 Specific pump structure:**  
This subclass is indented under subclass 50.1. Process or apparatus wherein significance is attributed to a means for generating flow of the liquid; i.e., a pump.
- 50.7 Specific conduit, valve, or coupling structure:**  
This subclass is indented under subclass 50.1. Process or apparatus wherein significance is attributed to a component adapted to constrain or control flow of the liquid.
- 51.1 Including cryostat:**  
This subclass is indented under subclass 45.1. Process or apparatus wherein the cryogen is contained by a portable vessel and cools a device contained by the vessel (e.g., an infrared detector).
- 51.2 Joule-Thompson liquefier:**  
This subclass is indented under subclass 608. Subject matter wherein the liquefaction of helium is effected by passage from a high pressure to a low pressure through an adjustable orifice and the exiting liquid pre-cools the incoming gas by indirect heat exchange.
- 52.1 Spraying of cryogen:**  
This subclass is indented under subclass 45.1. Process or apparatus including discharge of the product of refrigeration as a stream of droplets, or means for producing such a stream (e.g., a nozzle).
- 53.1 Underground or underwater storage:**  
This subclass is indented under subclass 45.1. Process or apparatus wherein the product of refrigeration is stored in a subterranean or subaqueous receptacle (e.g., a tank, a void, etc.) adapted to hold a cryogen.
- 53.2 Storage in modified vehicle (e.g., ship, truck, etc.):**  
This subclass is indented under subclass 45.1. Process or apparatus wherein the product of refrigeration is stored in a conveyance adapted to carry a cryogen.
- 54.1 Cryogen stored in both phases (e.g., as slush or gel):**  
This subclass is indented under subclass 45.1. Process or apparatus wherein the product of refrigeration is stored as a mixture of substances having diverse phase characteristics; e.g., a slush, a slurry, a colloidal suspension, etc.
- (1) Note. The substances may have the same chemical composition, differing only in phase (e.g., both solid and liquid).
- 54.2 Controlled conversion of solidified gas to another phase:**  
This subclass is indented under subclass 45.1. Process or apparatus wherein a product of refrigeration in solid phase is transformed at a

## SEE OR SEARCH CLASS:

405, Hydraulic and Earth Engineering, subclasses 53+ for underground fluid storage for general applications; and subclasses 195.1+ for underwater fluid storage for general applications.

## SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, for colloid systems or agents for such systems or making or stabilizing such systems or agents, especially subclasses 9+ for continuous liquid phase (emulsions, slurries, suspensions), subclasses 98+ for continuous or semicontinuous solid phase (gels, pastes); in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.



regulated rate into either a liquid or gaseous phase.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 165+, for a refrigeration producer having automatic control using solidified gas.  
384+, for a cooler utilizing solidified gas.

SEE OR SEARCH CLASS:

- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 60 for holders for solid matter to be converted to gas by sublimation; e.g., moth balls or crystals.

### 54.3 Storing solidified gas:

This subclass is indented under subclass 45.1. Process or apparatus wherein the product of refrigeration is stored in solid phase.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 60, for a refrigeration process including packaging.  
371+, for a package cooled by solid refrigerant.  
529+, for a refrigerant or coolant storer or handler.

SEE OR SEARCH CLASS:

- 53, Package Making, subclass 440 for processes of package making with contents treated by cooling; and subclass 127 for package making apparatus with cooling means.

### 55.5 LOW PRESSURE COLD TRAP PROCESS AND APPARATUS:

This subclass is indented under the class definition. Processes and apparatus involving a condensing device which in use operates substantially below 0° C and substantially below atmospheric pressure to condense a material which exists as a gas in the feed line to the condensing device by condensing and retaining the material as a liquid or solid on a heat exchange surface which is kept sufficiently cold by means which is usually a liquefied or solidified gas or mixture thereof to cause the desired condensation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 8+, for processes and apparatus for manufacturing a liquefied or solidified gas mercantile product from a normally gaseous material.  
272, for refrigeration with means for preventing or handling atmospheric condensate.

SEE OR SEARCH CLASS:

- 34, Drying and Gas or Vapor Contact With Solids, subclasses 73+, 284+, 402, and 468, for processes and apparatus for drying which if operated at sufficiently low pressure may use a "cold trap".  
96, Gas Separation: Apparatus, for gas separation apparatus provided with heating or cooling means.  
137, Fluid Handling, subclasses 171+ for fluid separating traps or vents in a fluid distribution system of more general application.  
165, Heat Exchange, subclasses 110+ for a heat exchanger of more general application in which a body or stream of fluid of one density is in communication with a fluid of a second density, one of which is condensed.  
202, Distillation: Apparatus, subclasses 185+ for a still and a condenser.

### 56 PROCESSES:

This subclass is indented under the class definition. Processes of refrigeration.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 600+, for gas liquefying or solidifying processes.

### 57 Suspending in upwardly directed current:

This subclass is indented under subclass 56. Processes wherein particles are suspended by an upwardly directed fluid current.

SEE OR SEARCH CLASS:

- 34, Drying and Gas or Vapor Contact With Solids, subclass 359 for a gas or vapor contact with solids process with fluid current conveying or suspension of treated materials.

- 210, Liquid Purification or Separation, subclasses 616 and 661 for processes of liquid treatment utilizing a static suspended bed and see (1) Note for other classes having art involving fluidized bed solid and fluid contacting.
- 59 Accumulating holdover ice in situ:**  
This subclass is indented under subclass 56. Processes including making a solid refrigerating medium in situ by a refrigeration cycle, to be used to cool during high refrigeration demand or failure of the cycle.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
139, for automatic control of accumulation of ice on a freezing surface.  
434+, for apparatus using a fluid or an isolated nonliquid holdover.  
529+, for a refrigerant or coolant storer or handler, e.g., a container for a freezable material.
- 60 Packaging:**  
This subclass is indented under subclass 56. Processes including enclosing a refrigerated material in a closed or closable receptacle to form a completed transportable unit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
371+, for a refrigerated portable commodity container.  
530, for an envelope type container for a freezable material.
- SEE OR SEARCH CLASS:  
53, Package Making, particularly subclass 127 for packaging not specialized to refrigeration and see the reference to Class 62 in that subclass (127).  
141, Fluent Material Handling, With Receiver or Receiver Coating Means, subclass 82 for the subject matter of that class combined with cooling not specialized to refrigeration.  
426, Food or Edible Material: Processes, Compositions, and Products, subclass 393 for process involving the packaging and freezing food.
- 61 Utilizing motion of vehicle:**  
This subclass is indented under subclass 56. Processes including utilizing the motion of a carrier to effect the refrigeration process.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
133, for automatic control of related apparatus.  
241+, for related apparatus.
- 62 Treating an article:**  
This subclass is indented under subclass 56. Processes in which material to be cooled or refrigerated is an article comprising a physical entity identifiable as such before congelation and having a fixed boundary surface including particulate material, a removable container enclosing a liquid or a living thing.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
66+, for processes involving treating of a flowable material, e.g., congelation or ice making.
- SEE OR SEARCH CLASS:  
29, Metal Working, subclass 447 for process of assembly involving prestressing, e.g., chilling a part.  
34, Drying and Gas or Vapor Contact With Solids, subclass 428 for processes of cooling an article by gas contact not specialized to refrigeration.  
148, Metal Treatment, subclass 125 for processes involving refrigerating metal or metal articles in order to alter the internal characteristics or the properties of the metal.  
426, Food or Edible Material: Processes, Compositions, and Products, for processes of refrigerating and treating edible material.
- 63 Moving through cooling zone during cooling:**  
This subclass is indented under subclass 62. Processes wherein the article is moved through a cooling zone or past cooling means while the cooling is effective on the article.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 68+, for processes involving agitation of a flowable material undergoing conge-lation.
- 71+, for means removing an initially liquid product from a freezing surface.
- 378+, for related apparatus.

**64 By contacting with liquid:**

This subclass is indented under subclass 62. Processes in which the cooling is effected by contacting the article with a coolant liquid.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 56, for cooling by contact with a solidi-fied refrigerant even though there be incidental use of the ice melt.
- 373+, for related apparatus.

SEE OR SEARCH CLASS:

- 134, Cleaning and Liquid Contact With Solids, subclasses 1 through 42 for processes of contacting an article with a liquid not limited to cooling of the article.

**65 Diverse sequential temperatures, e.g., pre-cooling:**

This subclass is indented under subclass 62. Processes wherein a material is sequentially subjected to diverse temperatures.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 63, for processes wherein an article is moving during cooling.

**66 Congealing flowable material, e.g., ice mak-ing:**

This subclass is indented under subclass 56. Processes for congealing material initially in a flowable condition, e.g., ice cream or ice mak-ing or condensing fluid to solid.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 59, for holdover solid coolant accumulat-ing processes which hold-over is intended for use without removal.
- 60, for processes involving packaging.

- 62, for processes of cooling an article which is initially an identifiable fixed entity.

- 80+, for defrosting processes.
- 151+, for automatic control apparatus.
- 272+, for condensate handling.
- 340+, for shaped or modified congealed product producing apparatus.
- 532+, for fractionally solidifying and sepa-rating processes.
- 601+, for solidified gas producing processes and apparatus there provided for.

SEE OR SEARCH CLASS:

- 65, Glass Manufacturing, subclasses
  - 454+ for processes of manufacturing glass fibers or filaments from molten or flowable material, especially sub-class 482 for cooling of molten mate-rial at forming area; and subclasses 19+ for processes of otherwise utiliz-ing molten or plastic slag.
- 264, Plastic and Nonmetallic Article Shap-ing or Treating: Processes, subclass 5 for methods of forming solid particu-late matter directly from a molten or liquid mass, e.g., liquid comminuting.

**67 With filtering or gravitational separating:**

This subclass is indented under subclass 66. Processes including filtration or gravitational separation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 85, for other processes involving separat-ing of undesirables from a coolant or cooled material.
- 318+, for related apparatus.
- 532+, for fractional crystallization of at least one constituent of a mixture of con-stituents of different kinds.

SEE OR SEARCH CLASS:

- 210, Liquid Purification or Separation, subclasses 767+ for processes and subclasses 175+ for apparatus func-tioning for a more general purpose.

**68 Agitating:**

This subclass is indented under subclass 66. Processes including agitation of a confined body of material during freezing.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
74, for processes involving spraying or dripping into a space.  
342+, for related apparatus.
- SEE OR SEARCH CLASS:  
366, Agitating, appropriate subclass, for apparatus and related processes of agitation of general utility.
- 69 Introducing gas, e.g., air:**  
This subclass is indented under subclass 68. Processes wherein air or gas is introduced in a material being frozen.
- (1) Note. Processes of freezing and incorporating a gas into the material being frozen is proper for Class 62; however any additional food working step would cause the patent to be classified in Class 426.
- SEE OR SEARCH CLASS:  
261, Gas and Liquid Contact Apparatus, subclasses 83+ for such apparatus utilizing rotating means.
- 70 By injecting:**  
This subclass is indented under subclass 69. Processes wherein the gas is injected into the agitated material.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
304+, particularly 306, for means feeding gas into a pressurized receiver.  
307+, for a submerged gas inlet.
- 71 Removing product from congealing surface:**  
This subclass is indented under subclass 66. Processes including removal of frozen material from a mold or cooling surface.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
353+, for a heat absorber with a product remover.
- 72 Flexing supporting surface:**  
This subclass is indented under subclass 71. Processes wherein a frozen material is removed by flexing a supporting surface, e.g., endless belt.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
345, for apparatus utilizing a moving freezing surface.
- 73 By heating:**  
This subclass is indented under subclass 71. Processes including application of heat.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
349+, for congealing apparatus with thawing means.
- 74 Spraying or dripping:**  
This subclass is indented under subclass 66. Processes wherein a material is sprayed or dripped into a zone.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
64+, for processes involving contact of an article with a liquid.  
347, for related apparatus.
- SEE OR SEARCH CLASS:  
159, Concentrating Evaporators, subclasses 48.1+ for process of concentrating a liquid involving spraying by application of vacuum.  
264, Plastic and Nonmetallic Article Shaping of Treating: Processes, subclass 5 for processes of forming solid particulate matter directly from a molten or liquid mass, e.g., liquid comminuting.  
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 6+ for a means to manufacture particulate material directly from a molten material generally by comminuting the material in a means providing a zone below the freezing point of the material.

**75 Sequential stages, e.g., composite block making:**

This subclass is indented under subclass 66. Processes wherein a step of freezing or cooling is followed by another step of freezing, or a prefrozen material is added to another material which is then frozen into a composite solid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

65, for processes of treating an article involving use of diverse sequential temperatures.

**76 With preliminary refrigerant manufacturing:**

This subclass is indented under subclass 56. Processes which includes producing a refrigerant and introducing it into a refrigerating system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

4, for processes and apparatus utilizing the endothermic action of a chemical reaction or the dissolving of a solid.  
114, for processes employing diverse materials or a particular refrigerant in a refrigeration operation.  
330, for related apparatus.

SEE OR SEARCH CLASS:

252, Compositions, subclasses 67+, 70 and 71 for compositions and related processes of making them.

**77 Assembling, charging, or repairing of refrigeration producer:**

This subclass is indented under subclass 56. Processes which include assembling parts of a refrigeration apparatus, installing the refrigeration apparatus in its position of use, charging the apparatus with a fluid (usually refrigerant or lubricant) or repairing some part of the apparatus which has been damaged.

SEE OR SEARCH THIS CLASS, SUBCLASS:

292, for charging apparatus.  
298+, for assembly apparatus.

SEE OR SEARCH CLASS:

29, Metal Working, subclasses 890.03+ particularly subclass 890.035 for processes of mechanical manufacture of an element, and subclasses 428+ for processes of assembling elements of a refrigeration device.

137, Fluid Handling, subclasses 15.01 through 15.26 for a process of cleaning, repairing or assembling, subclasses 237-246.23 with a cleaner, lubrication added to fluid or liquid sealing at a valve interface, or subclasses 315.01-329.4 for a fluid handling system with repair, tapping, or assembly means.

228, Metal Fusion Bonding, subclasses 101+ for the process of assembling and fusion bonding of the elements of a refrigeration device.

**78 Deodorizing, antisepticing or providing special atmosphere:**

This subclass is indented under subclass 56. Processes which include deodorizing, antisepticing or germiciding the material which is subjected to refrigeration or providing a special atmosphere in a cooled space.

SEE OR SEARCH THIS CLASS, SUBCLASS:

56, for processes of cooling involving subjecting to a melting or subliming refrigerant.  
91+, for processes involving humidifying.  
93+, for dehumidifying air.  
121, for gas-liquid contacting processes.  
264, for apparatus including illuminating or radiant energy means, e.g., ultraviolet.  
388, for apparatus wherein a sublimed gas enters a cooled enclosure.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, subclasses 516+ for drying processes involving special atmosphere.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 1+ for subject matter of more general utility.

- 424, Drug, Bio-Affecting and Body Treating Compositions, appropriate subclass for an antiseptic composition and subclasses 76.1+ for a deodorizing composition.
- 79 Exchanging heat between plural systems, e.g., disparate:**  
This subclass is indented under subclass 56. Processes in which (1) heat is exchanged with a disparate (nonrefrigeration) system, or (2) refrigeration is produced by plural separate systems, there being a heat transfer relationship between the systems.
- (1) Note. Evaporation and condensation are considered to be refrigeration production.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 81+, for processes of defrosting utilizing a fluid which may include the use of heat to vaporize a heat transfer fluid which is condensed in the vicinity of the heat absorber.
- 96, and 99, for processes involving non-change of state by indirect transfer fluid operations.
- 175, for automatic control of related systems.
- 238, for refrigeration apparatus exchanging heat with disparate means.
- 332+, for diverse refrigeration systems.
- 335, for a refrigeration system with plural paired elements.
- 80 Defrosting or frost inhibiting:**  
This subclass is indented under subclass 56. Processes which include inhibiting deposition of, or removing frozen atmospheric condensate from, a heat absorbing surface of refrigeration apparatus.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 150+, for automatic control of related apparatus.
- 272+, for related apparatus.
- 81 By utilizing working fluid of refrigeration producer**  
This subclass is indented under subclass 80. Processes accomplished by utilizing a fluid used in the refrigeration process.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
277+, for related apparatus.
- 82 By utilizing fluid strange to system :**  
This subclass is indented under subclass 80. Processes wherein a fluid, which is unnecessary to the refrigeration process is utilized.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
282, for related apparatus.
- 83 Preventing slugging to compressor:**  
This subclass is indented under subclass 56. Processes in which a liquid is prevented from entering the suction inlet to the compressor.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 84, for other processes involving lubrication of a refrigeration system.
- 113, for processes involving transferring heat between diverse function portions of a refrigeration cycle for other purposes.
- 174, for automatic control of trapping and discharging refrigerant batches.
- 503, 509, 512, and 513, for refrigeration apparatus with features which may prevent slugging.
- 84 Lubricant handling:**  
This subclass is indented under subclass 56. Processes which involves handling a liquid lubricant within a circuit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 83, for processes of preventing slugging.
- 85, for processes involving separating impurities from refrigerant and see the Notes, thereto.
- 192+, for automatic control of refrigeration producer lubrication.
- 468+, for related apparatus.

- 85 Separating or preventing formation of undesirables:**  
This subclass is indented under subclass 56. Processes which include the separating or prevention of the formation of undesirables in a refrigerant, on the internal surface of a refrigerant container or from a material being cooled, e.g., internal freeze inhibition.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 77, for processes involving charging a refrigeration producing system which may also remove undesirable matter.
  - 78, for processes involving deodorizing, antisepticizing or providing a special atmosphere.
  - 80, for processes involving defrosting.
  - 83, for processes involving prevention of refrigerant slugging.
  - 84, for lubricant handling processes.
  - 93+, for processes involving gas dehumidification.
  - 317, for apparatus for clarifying or separating materials from an external cooled gas.
  - 468+, for a refrigeration producer and lubricant handler.
  - 474, for a refrigeration producer with a refrigerant treater.
- 86 Reducing pressure on compressed gas:**  
This subclass is indented under subclass 56. Processes in which a gas is expanded to such a degree that a discernible drop in the temperature thereof is produced thereby, the gas remaining as such during the cooling operation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 613+, 621+, 645+, and 649+, for processes and apparatus for liquefying or solidifying a gas.
  - 115, for processes involving compressing, condensing and evaporating a fluid.
  - 401+, for related apparatus.
- 87 Converting energy of expansion to mechanical movement:**  
This subclass is indented under subclass 86. Processes in which a portion of the energy of expansion is converted to usable mechanical movement.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 38+, for operation with an expansion engine.
  - 402+, for related apparatus.
- 88 With reheat of gas stream:**  
This subclass is indented under subclass 87. Processes in which the gas stream is reheated subsequent to expansion.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 90, for processes involving cooling and reheating of a gas.
- 89 Circulating external gas:**  
This subclass is indented under subclass 56. Processes in which a gas external of a refrigeration producer is caused to circulate.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 86+, for processes involving reducing pressure on a compressed gas.
  - 404+, for related apparatus.
- SEE OR SEARCH CLASS:
- 34, Drying and Gas or Vapor Contact With Solids, subclass 428 for a process of cooling solids by mere contact with a gas, and see notes in the definition of this subclass.
- 90 With reheating:**  
This subclass is indented under subclass 89. Processes in which the gas is heated following the cooling operation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 113, for processes of reheating cooled fluid of a refrigeration cycle by internal exchange.
  - 173, for an automatically controlled apparatus having a similar function.

- 272, particularly subclasses 275+, for a cooler with a condensate remover which may include air reheating.
- 428, for an air cooler with means directing air over a heat rejector which may include air cooling and reheating by a refrigeration producer.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclass 223 for a reheating means automatically controlled by a humidistat, subclass 263 for reheating means controlled by temperature, and subclass 65 for a heater and cooler serially arranged in a flow path.
- 91 With adding of moisture:**  
This subclass is indented under subclass 89. Processes in which moisture is added to the gas being cooled.
- 92 With removing of moisture:**  
This subclass is indented under subclass 91. Processes in which moisture is removed from the gas.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
80+, for processes of defrosting or frost inhibiting.  
85, for removal of undesirables other than moisture.
- 93 With removing of moisture:**  
This subclass is indented under subclass 89. Processes in which moisture is removed from the gas.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
92, for moisture removing processes combined with moisture addition.
- 94 By sorption:**  
This subclass is indented under subclass 93. Processes by passing the gas in contact with a sorbent.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
271, for related apparatus and see the Notes thereto.
- 95 Plural cooling, e.g., precooling by exhaust:**  
This subclass is indented under subclass 89. Processes in which gas is subjected to the cooling action of plural heat absorbing operations or of separate and distinct operations of a heat absorption.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
65, for plural temperature treatment of an article.  
75, for sequential treatment of a congealing flowable material.
- 96 Indirect cooling using closed circuit heat transfer fluid:**  
This subclass is indented under subclass 89. Processes in which heat from the circulating gas being cooled is transferred to a heat absorber by indirect heat exchange through an intermediate fluid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
406, for related apparatus.
- 97 Combining streams having diverse temperatures:**  
This subclass is indented under subclass 89. Processes in which two streams of gas having diverse temperatures are combined into a single stream.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
122, for other refrigeration processes involving combining of fluid having diverse temperature.
- 98 Fluid external of refrigeration producing cycle:**  
This subclass is indented under subclass 56. Processes in which refrigeration is used to absorb heat from a fluid (usually a liquid) which is isolated from the working fluid of a refrigeration cycle.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
89+, particularly subclass 96 for processes wherein the fluid cooled is air.



- 99 Indirect by using heat transfer fluid external of cycle:**  
This subclass is indented under subclass 98. Processes in which the heat removed from the external cooled fluid is transferred to a heat absorber by indirect heat exchange through an intermediate fluid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
396+, for a liquid in heat exchange with a coolant.  
430+, for related apparatus.
- 100 Vacuumizing an open outlet chamber:**  
This subclass is indented under subclass 56. Processes in which a subatmospheric pressure is created in a chamber by removing a gas or vapor from it.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
268+, for related apparatus and see the Notes thereto.
- SEE OR SEARCH CLASS:  
34, Drying and Gas or Vapor Contact With Solids, subclasses 402+ for related processes of drying solids.  
159, Concentrating Evaporators, subclasses 47.1+ for related processes of evaporating and concentrating liquids.
- 101 Evaporation induced by sorption:**  
This subclass is indented under subclass 56. Processes in which a liquid is evaporated to produce cooling and the vapor is sorbed by a sorbent.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
100, for vacuumizing an open outlet chamber which may include the use of a sorbent.  
141+, for automatic control of a sorbent system.  
476+, for a sorbent type refrigeration producer.
- 102 Using diverse refrigerants:**  
This subclass is indented under subclass 101. Processes in which plural refrigerants are evaporated in presence of each other.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
114, for other processes of refrigeration production utilizing plural refrigerants.
- 103 With modulated flow rate of fluid:**  
This subclass is indented under subclass 101. Processes in which a fluid is circulated at varying rates.
- 104 By varying heat input or output:**  
This subclass is indented under subclass 103. Processes in which fluid circulation is altered by varying the heat input or the heat rejected by the system.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
148, for automatic control of the heating means of a sorption system.  
183, for automatic control of a fluid for a heat rejecter.
- 105 Varying non-refrigerant fluid flow:**  
This subclass is indented under subclass 103. Processes in which the flow of a nonrefrigerant fluid, e.g., inert gas or a noncondensable gas is varied.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
104, for related processes in which the fluid flow may be modulated by varying the heat input or the heat rejection.  
490+, for a sorption system utilizing an inert gas.
- 106 Intermittent operating of generation and sorption cycle:**  
This subclass is indented under subclass 101. Processes in which generation of refrigerant vapor alternates with absorption.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
143+, for automatic control of such a unit.  
477+, for related apparatus.

- 107 With absorption liquid circulation aided by system generated pressure:**  
This subclass is indented under subclass 101. Processes wherein the sorption liquid is transferred between the generator and sorber due to pressures of fluids generated within the system.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
487+, for related apparatus.
- 108 With liquid refrigerant transfer to evaporator against gravity:**  
This subclass is indented under subclass 101. Processes including the transferral of liquid refrigerant to and through the evaporator against gravity.
- 109 Cooling by evaporation of refrigerant from sorption solution:**  
This subclass is indented under subclass 101. Processes wherein the cooling is effected by vaporization of refrigerant from a sorption solution.
- 110 With diffusion of refrigerant into inert gas:**  
This subclass is indented under subclass 101. Processes wherein an inert gas is admitted into or overlies a body of liquid refrigerant, the liquid refrigerant diffusing into the inert gas.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
490+, for related apparatus.
- 111 With forced circulation between evaporator and sorber:**  
This subclass is indented under subclass 110. Processes in which the fluid is caused to circulate between the evaporator and sorber due to the creation of conditions other than those which allow the fluid to circulate due to differences in density.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
109, for processes involving cooling by evaporation from a sorbent solution.
- 112 Utilizing particular refrigerant and/or sorbent materials:**  
This subclass is indented under subclass 101. Processes in which a specific refrigerant and/or sorbent is used.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
114, for more general processes utilizing diverse materials or particular refrigerants.  
502, for apparatus utilizing diverse refrigerants.
- 113 Transferring heat between diverse function portions of refrigeration cycle:**  
This subclass is indented under subclass 56. Processes in which one portion of a refrigeration system having a first function is in heat exchange relation with another portion having another function.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
513, for related apparatus.
- SEE OR SEARCH CLASS:  
203, Distillation: Processes, Separatory, subclasses 21+ for a separatory distillation process directed to recovering heat from a material in the system by indirect heat exchange with a second material. The source of heat may be a distillate or a residue and the transfer of heat may take place at any point in the system.
- 114 Employing diverse materials or particular material in refrigeration circuit:**  
This subclass is indented under subclass 56. Processes employing diverse refrigerants or a particular material as a refrigerant.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
85, for processes of preventing formation of undesirables.  
86+, for processes involving air as a refrigerant.  
112, for sorption type refrigeration processes utilizing particular refrigerant and/or sorbent materials.

- 490+, for sorbent type refrigeration apparatus including inert gas means.
- 502, for a compressor-condenser-evaporator apparatus using diverse fluids.
- SEE OR SEARCH CLASS:  
252, Compositions, subclasses 67+ for refrigerant compositions, per se.
- 115 Compressing, condensing and evaporating:**  
This subclass is indented under subclass 56. Processes which include compressing, condensing and evaporating a refrigerant.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
86, for processes involving pressure reduction on a fluid which is a gas at all stages of the process.  
498+, for related apparatus.
- 116 Utilizing motive energy of fluid to compress:**  
This subclass is indented under subclass 115. Processes in which the motive energy of a fluid is employed to compress the fluid in the refrigeration cycle.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
500, for jet powered apparatus.  
501, for a fluid energized compressor.
- 117 Dividing refrigerant flow, e.g., bypass parallel units:**  
This subclass is indented under subclass 115. Processes in which the refrigerant in at least one portion of its flow path is divided into two or more flow paths.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
196+, for automatic control of by-pass means.  
504, for a compressor-condenser-evaporator circuit with means to apportion flow to its evaporator.  
525, for an evaporator with a particular flow distributor to sections thereof.
- 118 Pumping fluid in closed circuit:**  
This subclass is indented under subclass 56. Processes wherein a fluid is pumped in a closed circuit, absorbing and rejecting heat.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
86+, in which pressure is reduced on a gas, the gas remaining as such during the cooling operation.  
89+, and 98+, for processes involving circulation of an external fluid.  
115+, for processes involving compressing, condensing and evaporating.  
430+, particularly subclass 435 for apparatus utilizing an intermediate heat transfer fluid.
- 119 Condensing and evaporating:**  
This subclass is indented under subclass 56. Processes comprising heat absorption in one area and heat dissipation in another area, and utilization of a fluid heat transfer medium moving between said area which medium changes state in each of said absorption and dissipation steps.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
51.1+, for apparatus comprising only a connected liquid receiver (condenser) and evaporator a cryostat.  
115+, for processes involving compression, condensation and evaporation.
- 120 Spaced cooling steps:**  
This subclass is indented under subclass 56. Processes in which the operations are physically or temporarily spaced.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
65, for diverse temperature treating of an article.  
95, for plural steps of cooling air.
- 121 Gas and liquid contact:**  
This subclass is indented under subclass 56. Processes in which cooling is effected by reasons of mutually contacting a gas and a liquid.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
304+, for related apparatus.

- 122 Combining fluids having diverse temperatures:**  
This subclass is indented under subclass 56. Processes in which streams of fluids having diverse temperatures are combined.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
97, for similar processes wherein the streams are air streams.
- 123 SEPARATOR FOR SOLIDIFIED CONSTITUENT OF LIQUID MIXTURE:**  
This subclass is indented under the class definition. Apparatus having means to separate a constituent of a liquid mixture by cooling it, e.g., congealing the constituent, and means to remove the congealed constituent from the liquid.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
317+, for means separating a constituent or portion from a fluid by filtration or gravitational separation.  
532+, for related processes.
- SEE OR SEARCH CLASS:  
117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, for processes and non-coating apparatus for growing therein-defined single-crystal of all types of materials, including inorganic or organic, including those having refrigeration steps or means.  
159, Concentrating Evaporators, subclass 45 for evaporating apparatus for graining and separating crystals.  
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 245.1+ for non-coating crystallization apparatus not including chemical reaction means, not including refrigeration means, and not provided for elsewhere, and subclasses 129+ for non-coating crystallization apparatus which include means for a chemical reaction, which may or may not include refrigeration means, and which are not provided for elsewhere.
- 124 With heater for liquid mixture container:**  
This subclass is indented under subclass 123. Apparatus including means for heating a liquid mixture container.
- 125 WITH INDICATOR OR TESTER:**  
This subclass is indented under the class definition. Apparatus provided with an indicator or testing means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
246+, for apparatus which merely displays a commodity within a cooled compartment.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 551+ for a fluid system of general application with an indicator or tester.  
340, Communications: Electrical, subclass 585 for electrical indicating systems automatically responsive to the thermal condition of refrigerated storage.
- 126 Operatively correlated with automatic control:**  
This subclass is indented under subclass 125. Apparatus in which there is operative correlation between indicating and automatic refrigeration control means.
- 127 Diverse function indicators or testers:**  
This subclass is indented under subclass 125. Apparatus comprising a plurality of different function indicating or testing means.
- SEE OR SEARCH CLASS:  
340, Communications: Electrical, subclasses 521+ for electrical automatic indicating systems responsive to plural diverse conditions.
- 128 Atmospheric condensation accumulation, e.g., frost:**  
This subclass is indented under subclass 125. Apparatus in which the presence of atmospheric condensate is indicated.

- SEE OR SEARCH CLASS:  
340, Communications: Electrical, subclass 580 for electrical automatic indicating systems responsive to ice formation.
- 129 Condition sensing:**  
This subclass is indented under subclass 125. Apparatus which automatically responds to a variable condition.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
125, for a gauge glass which enables movement of a refrigerant to be observed.
- SEE OR SEARCH CLASS:  
340, Communications: Electrical, subclasses 500+ for electrical automatic condition responsive indicating systems.
- 130 External cooled material:**  
This subclass is indented under subclass 129. Apparatus in which the condition is material being cooled.
- 131 Position or extent of motion of movable element :**  
This subclass is indented under subclass 125. Apparatus in which the position or extent of motion of a movable element is indicated.
- SEE OR SEARCH CLASS:  
340, Communications: Electrical, subclasses 686.1+ for electrical automatic indicating systems responsive to position.
- 132 AUTOMATIC CONTROL:**  
This subclass is indented under the class definition. Apparatus comprising means to sense an operating condition or change of operating condition and exert a control on cooling means or means handling material cooled or to be cooled.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
126, for an indicator or tester correlated with automatic control.  
231+, for a time or program actuator.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, appropriate subclass for automatic control of fluid handling of general application, particularly subclasses 59+ for freeze responsive safety means and subclasses 78+ for atmospheric condition change responsive control.
- 165, Heat Exchange, subclass 200 for automatic control of a heat exchanger not specialized by structure to refrigeration.
- 236, Automatic Temperature and Humidity Regulation, appropriate subclass for an automatic temperature regulation system.
- 133 Responsive to vehicle body motion or traction:**  
This subclass is indented under subclass 132. Apparatus responsive to any phase of motion of a vehicle.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
215, 226+ and 228, for refrigerator-compressor drive control or response even though the drive is a vehicle motor.
- 134 Electrical generator:**  
This subclass is indented under subclass 133. Apparatus including an electrical motor-generator.
- 135 By congealed removable product condition:**  
This subclass is indented under subclass 132. Apparatus comprising means responsive to a change of condition of a consumable product undergoing congelation.
- 136 By change of consistency, e.g., viscosity or overrun:**  
This subclass is indented under subclass 135. Apparatus in which the condition is a change of consistency.
- 137 By accumulation of product**  
This subclass is indented under subclass 135. Apparatus in which the sensing means responds to an accumulation of the congealed product.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
139+, for condition sensing control by other accumulation, e.g., frost on a freezing surface, i.e., apparatus not having mechanical means to remove the accumulation.
- 138 On heat absorber:**  
This subclass is indented under subclass 137. Apparatus wherein the accumulation is on a cooled surface.
- 139 By accumulation on freezing surface, e.g., ice:**  
This subclass is indented under subclass 132. Apparatus responsive to the accumulation of congealed material on a freezing surface.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
135, for a similar control related to means manufacturing and removing or working a congealed consumable product.
- 140 By frost, i.e., atmospheric condensate:**  
This subclass is indented under subclass 139. Apparatus in which the condition sensed is the accumulation of frozen atmospheric condensate.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
151+, for other automatic handling of frost.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclass 215 for photocell control with a specific art device there provided for.
- 141 Of closed system sorbent type:**  
This subclass is indented under subclass 132. Apparatus controlling a refrigeration producer utilizing a sorbent for the refrigerant.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
101+, for processes of refrigeration utilizing a sorbent.
- 142 Discontinuous operation of refrigerant or sorbent container unit:**  
This subclass is indented under subclass 141. Apparatus in which a refrigerant or sorbent containing element is caused to be intermittently and repeatedly subjected to generating-condensing pressure and absorbing-evaporating pressure.
- 143 Of intermittent generator-sorber unit;**  
This subclass is indented under subclass 142. Apparatus wherein the sorbent container serves at one time as a still and at another time as a sorber.
- 144 Plural unit sequence or alternation:**  
This subclass is indented under subclass 143. Apparatus comprising at least two sorbent containing units controlled for alternate or sequential generation or sorption.
- 145 Serially connected type:**  
This subclass is indented under subclass 144. Apparatus in which the units are serially interconnected for refrigerant or absorbent flow from one to another.
- 146 Of cooling fluid:**  
This subclass is indented under subclass 143. Apparatus wherein flow of cooling medium for a unit is controlled.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
481, for absorber-generator cooling structure, per se.
- 147 Including sorbent refrigerant flow:**  
This subclass is indented under subclass 146. Apparatus in which sorbent or refrigerant flow is also controlled.
- 148 Of heating means:**  
This subclass is indented under subclass 141. Apparatus including means to control the supply of heat to a sorbent regenerator.
- 149 Withdrawing or adding refrigerant from or to normally closed system:**  
This subclass is indented under subclass 132. Apparatus which controls or responds to means adding or withdrawing refrigerant to or from a

- closed circuit type refrigeration system, relative to a source external of the system.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
174, for means collecting and discharging refrigerant batches within the system.
- 150 Preventing, removing or handling atmospheric condensate:**  
This subclass is indented under subclass 132. Apparatus which is responsive to or controls means which prevents, removes or handles atmospheric condensate.
- 151 Defrosting:**  
This subclass is indented under subclass 150. Apparatus which relates to removal of frozen atmospheric condensate.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
140, for condition sensing control measuring frost accumulation.  
162, for a control which resumes its function after manual initiation, e.g., manual initiation of defrosting means then the sensing control causes the refrigeration producer to resume operation.  
234, for time or program actuated defrosting means.
- 152 Limited area, e.g., preferred zone:**  
This subclass is indented under subclass 151. Apparatus in which the defrosting control acts to defrost a limited area of the space cooled or one section of a cooling means in preference to another, e.g., defrosting controls for two zone refrigerators.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
197+, for an evaporation by-pass control which may be similar in operation.
- 153 By storage compartment closure actuated means:**  
This subclass is indented under subclass 151. Apparatus which responds to actuation of a storage compartment closure, e.g., a door.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
162, for means to manually initiate the operation of the sensing means.  
267, for interlocked diverse function elements, e.g., door and refrigeration producer.
- 154 By energy input actuated means:**  
This subclass is indented under subclass 151. Apparatus responsive to operation of the power input means of a refrigeration producer, e.g., motor or compressor.
- 155 Including time or program actuator:**  
This subclass is indented under subclass 151. Apparatus with a timing or programming device.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
234, for a time or program actuated system.
- 156 By temperature:**  
This subclass is indented under subclass 151. Apparatus including thermally responsive means.
- 157 Time or program actuator:**  
This subclass is indented under subclass 132. Apparatus with a time or program actuator.
- 158 Time delay of condition sensing or control operation:**  
This subclass is indented under subclass 157. Apparatus in which there is means delaying the normal operation of the automatic control.
- 159 Selective heating or cooling:**  
This subclass is indented under subclass 132. Apparatus controlling, or responsive to, means selectively heating or cooling.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
324+, for a reversible heat pump and see the Notes thereto.
- 160 Reversible cycle machine:**  
This subclass is indented under subclass 159. Apparatus comprising means to reverse flow through a refrigeration producing cycle so as to

- reverse the function of the heat absorbing or rejecting means of the cycle.
- 161 With correlated manual or external operator and condition sensing means, e.g., cutoff or reset:**  
This subclass is indented under subclass 132. Apparatus so related to (1) manually operated means, or (2) other means external of the refrigeration producer, as to modify the manner of operation of the automatic control.
- (1) Note. The term “manually actuated means” does not include starting or stopping means such as a line switch or means for adjusting a control point of a sensing means, e.g., adjustable thermostat.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
267, for interlocked diverse function elements, per se.
- 162 Manual initiate with sensor terminate:**  
This subclass is indented under subclass 161. Apparatus in which an operative control cycle is initiated manually and is terminated automatically.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
153, for means determining a number of door operations to control defrosting.
- 163 Selective:**  
This subclass is indented under subclass 161. Apparatus in which operation is under selective control, e.g., either by manual or automatic control.
- 164 Manual reset or sensor operates additional element:**  
This subclass is indented under subclass 161. Apparatus in which a manual operator resets a condition sensing means and also sets or resets another control element.
- 165 Solidified gas:**  
This subclass is indented under subclass 132. Apparatus controlling, or responsive to, means involving the use of a solidified gas (CO<sub>2</sub>).
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
384+, for a material or space cooler using a solidified gas.
- 166 Diverse control or response:**  
This subclass is indented under subclass 165. Apparatus having different control or response means.
- 167 Of heater, heat transmitter or secondary fluid:**  
This subclass is indented under subclass 165. Apparatus in which (1) a heater, or (2) means varying heat transmission, is controlled.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
383, for refrigeration means utilizing variable thermal means.
- 168 By temperature:**  
This subclass is indented under subclass 165. Apparatus which is temperature responsive, e.g., venting of the gas is thermostatically controlled.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
167, for thermostatic control of a heater, heat transmitter or secondary heat exchanging fluid.
- 169 Vacuumized chamber with open outlet:**  
This subclass is indented under subclass 132. Apparatus which controls, or is responsive to, means having a chamber containing a liquid, or a wetted solid, e.g., lettuce.
- (1) Note. The vapor may be condensed, heated and vaporized to supply the evacuating pump.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
100, for processes involving vacuumizing an open outlet chamber.  
191, for automatic control of a closed cycle refrigeration producer having a jet-type compressor.  
268+, for vacuumized open outlet chamber refrigeration apparatus.



**170 Evacuating means, e.g., jet pump:**

This subclass is indented under subclass 169. Apparatus in which the sensing means controls, or responds to, the operation of the evacuating means.

**171 Gas-liquid contact cooler, fluid flow:**

This subclass is indented under subclass 132. Apparatus controlling, or responding to, the flow of the gas or liquid of a gas-liquid contacting cooler.

SEE OR SEARCH THIS CLASS, SUBCLASS:

271, for an atmosphere and sorbent contacting cooler which may include a liquid sorbent.

304, for material cooling means, utilizing gas-liquid contact means.

SEE OR SEARCH CLASS:

261, Gas and Liquid Contact Apparatus, particularly subclasses 121+ for a gas-liquid contactor having no features for refrigeration.

**172 Air compressor, cooler and expander:**

This subclass is indented under subclass 132. Apparatus controlling or responding to the operation of an air compressor-cooler-expander type refrigerant producer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

401+, for an air-compressor-cooler expander machine.

**173 Of external fluid reheating:**

This subclass is indented under subclass 132. Apparatus in which the means controlled utilizes some or all of the heat of a heat rejecting portion of the same or another refrigeration producer for reheating an external fluid which has been cooled, e.g., air.

SEE OR SEARCH THIS CLASS, SUBCLASS:

90, for processes of air cooling and reheating.

159+, for control of a selective heating or cooling refrigeration producer.

428, for an air cooler with means for heating air over a heat rejector.

SEE OR SEARCH CLASS:

165, Heat Exchange, subclass 223 for a refrigeration producer having a reheating means, other than a heat rejection portion of a refrigeration producer, that is controlled by a humidistat; and subclass 263 for such reheat means controlled by temperature.

**174 Trapping and discharging refrigerant batches :**

This subclass is indented under subclass 132. Apparatus controlling, or responsive to, means trapping and retaining a quantity of liquefied refrigerant and which trapping means is actuated to intermittently discharge said refrigerant in batches.

SEE OR SEARCH THIS CLASS, SUBCLASS:

83, for processes of preventing refrigerant slugging.

84, for processes involving lubricant handling.

503, for a liquid trap in a refrigerant line.

509, for a condensed refrigerant receiver.

512, for a vapor-liquid separator and liquid recycle means.

**175 Diverse, cascade or compound refrigeration-producing system:**

This subclass is indented under subclass 132. Apparatus controlling, or responsive to (1) a refrigeration producing system having diverse refrigeration producing means, (2) a refrigeration producing system in which the same refrigerant flows through two pairs of elements in circuits which are interconnected for fluid flow between them, or (3) a refrigeration system having circuits isolating the fluid in one from the other and having at least two similar elements in each circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

332+, for an ice and mechanical system.

335, for refrigeration producing elements in cascade.

**176.1 Humidity sensor:**

This subclass is indented under subclass 132. Apparatus which senses moisture in the air to be refrigerated.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 29.02+ for an hygrometer.
- 236, Automatic Temperature and Humidity Regulation, subclass 44 for a humidity control of general utility.

**176.2 Having defrost control related to humidity:**

This subclass is indented under subclass 176.1. Apparatus in which the sensed humidity of the cooled space exerts at least a partial control of some phase of a defrosting operation.

- (1) Note. In a nominally time controlled defroster, the intervals of defrosting are directly proportional to the humidity level.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 151+, for automatic control of defrosting.

**176.3 Controlling variable compressor capacity:**

This subclass is indented under subclass 176.1. Apparatus in which the output of a compressor is varied in response to the sensed humidity, e.g., unloading variable speed, compressor staging, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 510, for plural compressors.

SEE OR SEARCH CLASS:

- 236, Automatic Temperature and Humidity Regulation, subclass 1 for automatic control of refrigeration systems by multistage controls.
- 307, Electrical Transmission or Interconnecting Systems, subclass 39 for condition responsive plural load circuits.

**176.4 Controlling gas-liquid contactor for air:**

This subclass is indented under subclass 176.1. Apparatus which there is an air-liquid contactor controlled at least in part by an air humidity sensor, e.g., evaporative type cooler.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 226 for control of a gas-liquid fluid control by humidity sensor.

**176.5 Control of air heater, e.g., reheat pump:**

This subclass is indented under subclass 176.1. Apparatus in which there is provided a means to regulate an air heater, e.g., reheat, to control the humidity in the ambient air.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 90, for methods involving reheating.
- 173, for automatic control of reheating.

**176.6 Plus air temperature sensor exerting a control:**

This subclass is indented under subclass 176.1. Apparatus in which an air temperature sensor acts in conjunction with the air humidity sensor to exert a control; the air temperature sensor could be alternative to or modifying the air humidity sensor.

SEE OR SEARCH CLASS:

- 236, Automatic Temperature and Humidity Regulation, subclass 44 for systems in which the temperature and humidity are controlled.

**177 Of external fluid or means:**

This subclass is indented under subclass 132. Apparatus controlling a fluid other than a refrigerant, a cooled product or a product to be cooled.

**178 Diverse control or response:**

This subclass is indented under subclass 177. Apparatus, (1) controlling a plurality of means, at least one handling a fluid or product, or (2) diverse function sensing means controlling an external fluid or means.

**179 Plural external fluids or means controlled:**

This subclass is indented under subclass 178. Apparatus in which the plurality of controlled means are external of the refrigeration producer.

- 180 External fluid and refrigeration producer:**  
This subclass is indented under subclass 178. Apparatus controlling fluid external of cooling means and a refrigeration producer or operative element thereof.
- 181 Condenser cooling fluid flow:**  
This subclass is indented under subclass 180. Apparatus controlling flow of a condenser cooling fluid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
183+, for other automatic control of or by cooling fluid for a heat rejector.
- 182 Sequential:**  
This subclass is indented under subclass 180. Apparatus in which the controls are arranged so that they operate in a determined sequence.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
181, for diverse control or response related to condenser cooling.
- 183 Cooling fluid for heat rejector, e.g., condenser:**  
This subclass is indented under subclass 177. Apparatus controlling the fluid which cools a heat rejective element of a refrigeration producer.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
181, for condenser cooling fluid control and refrigeration producer control or response and see the Notes thereto.
- 184 By refrigerant:**  
This subclass is indented under subclass 183. Apparatus responsive to a condition of a refrigerant within a refrigeration producer, e.g., temperature or pressure.
- 185 Indirect heat transfer liquid, e.g., brine:**  
This subclass is indented under subclass 177. Apparatus responsive to, or controlling, flow of an indirect heat transferring coolant, e.g., brine.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
430+, for a cooling system using an intermediate fluid or holdover.
- 186 Air controller or director:**  
This subclass is indented under subclass 177. Apparatus controlling, or responsive to, means forcing, directing or allowing flow of air.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
404+, for cooling means having a controller or director, per se.
- 187 Damper between storage compartments:**  
This subclass is indented under subclass 186. Apparatus in which the movement of an air circulation controlling damper between compartments is controlled.
- 188 By lever, e.g., float-controlled valve:**  
This subclass is indented under subclass 177. Apparatus controlled by fluid level, e.g., a valve is controlled by a float.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 386+, particularly subclasses 410+ for a float controlled valve.
- 189 By fluid flow, e.g., check valve:**  
This subclass is indented under subclass 177. Apparatus responsive to, or controlling, the flow of the external fluid, e.g., a check valve.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 511+ for a check valve.
- 190 Refrigeration producer:**  
This subclass is indented under subclass 132. Apparatus responsive to or controlling, a refrigeration producer.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
467+, for a refrigeration producer.

**191 Of or by jet-type compressor:**

This subclass is indented under subclass 190. Apparatus in which the sensing means controls or responds to a closed type refrigeration producer employing a jet type compressor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

170, for automatic control of means evacuating an open outlet chamber.

SEE OR SEARCH CLASS:

417, Pumps, subclasses 182+ for jet pump regulation.

**192 Lubrication:**

This subclass is indented under subclass 190. Apparatus controlling, or responsive to, a condition of a lubricating means or the lubricant.

**193 Of or by compressor:**

This subclass is indented under subclass 192. Apparatus in which the sensing means responds to or controls a refrigerant compressor.

**194 Lubricant aspirator in evaporator liquid level control chamber:**

This subclass is indented under subclass 192. Apparatus in which there is a liquid chamber enclosing a liquid level operated fluid flow controller, e.g., valve, which chamber includes a refrigerant vapor outlet means and also means to cause lubricant to be entrained with the vapor passing through said outlet.

SEE OR SEARCH THIS CLASS, SUBCLASS:

218+, for a similar float operated liquid control.

**195 Impurity removal:**

This subclass is indented under subclass 190. Apparatus controlling, or responsive to, means removing an undesired constituent, e.g., gas, from a refrigerant producer.

**196.1 Bypass, e.g., compressor unloading:**

This subclass is indented under subclass 190. Apparatus controlling or responsive to, means allowing flow around either a refrigerant condenser, evaporator, compressor or a part of either, e.g., compressor unloading, or directing

refrigerant flow to either of two or more evaporators or condensers arranged in parallel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

117, for processes involving dividing refrigerant flow.

174, for control of trapping and discharging refrigerant batches. These devices often trap liquid from the evaporator outlet and feed it to the receiver.

SEE OR SEARCH CLASS:

417, Pumps, subclasses 279+ for condition responsive control of the fluid handled by a pump or compressor.

**196.2 For plural compressor cylinders:**

This subclass is indented under subclass 196.1. Apparatus in which there is control of either a compressor unit or system comprising more than one compression chamber, e.g., multi-stage, multicylinder, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

510, for plural compressors.

SEE OR SEARCH CLASS:

236, Automatic Temperature and Humidity Regulation, subclass 1 for refrigeration systems controlled multistage control.

**196.3 Direct bypass of compressor:**

This subclass is indented under subclass 196.1. Apparatus in which the gas discharged from the compressor goes directly to the compressor suction, e.g., compressor unloading.

SEE OR SEARCH CLASS:

417, Pumps, subclasses 297+ for compressor unloading.

418, Rotary Expansible Chamber Devices, subclass 14 for rotary expansible chamber compressor unloading.

**196.4 Condenser bypass:**

This subclass is indented under subclass 196.1. Apparatus in which refrigerant is caused to bypass part or all of a condenser.

- (1) Note. The condenser may be part of a condenser system having plural condensers.
- 197 Of expansion zone:**  
This subclass is indented under subclass 196. Apparatus in which the refrigerant fluid bypasses a restrictor, evaporator or the suction line returning to a compressor.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
216+, for evaporation zone control or response, per se.
- 198 Of serially arranged evaporator:**  
This subclass is indented under subclass 197. Apparatus in which evaporators are arranged for serial flow and the refrigerant fluid bypasses at least one of them.
- 199 Through an evaporator, i.e., parallel:**  
This subclass is indented under subclass 197. Apparatus in which the bypass for refrigerant fluid around the evaporator is to another evaporator, i.e., the evaporators are in parallel.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
504, for means to apportion flow to evaporators.  
525+, for an evaporator with plural distinct zones or sections.
- 200 Individual flow controllers and sensors:**  
This subclass is indented under subclass 199. Apparatus in which the control means acts to cause flow through one or more of a plurality of evaporators in a selected order so that refrigerant is caused to flow to at least one evaporator in preference to another.
- 201 By external cooled liquid or holdover:**  
This subclass is indented under subclass 190. Apparatus responsive to a condition, usually temperature, of an external liquid, e.g., withdrawable or heat transfer, (brine) or of a holdover.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
430+, for secondary liquid and holdover combinations, per se.
- 202 Including external thermal source modifying sensor action:**  
This subclass is indented under subclass 190. Apparatus including thermal means not a part of the refrigeration producer or the means cooled by it so related to a sensor that it modifies its action.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
209+, for other plural sensors and single refrigeration producing elements with compensating or control features.  
214+, for a single sensor mounted or formed to respond to plural conditions, e.g., compensated sensors.
- 203 Plural refrigerating producing elements and plural sensors**  
This subclass is indented under subclass 190. Apparatus comprising a refrigeration producing system having plural operative elements and plural condition sensing means each responding to or controlling at least two of said elements.
- 204 Including expansion valve or variable restrictor:**  
This subclass is indented under subclass 203. Apparatus in which at least one of the operative elements is an expansion or variable restrictor controlling the flow of the refrigerant.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
216+, for control of or by an evaporation zone in which there is a single control or single valve controlled.
- 205 Plural variable restrictors in flow line:**  
This subclass is indented under subclass 204. Apparatus controlling a plurality of expansion valves or variable restrictors for a refrigerant.
- 206 High and low side:**  
This subclass is indented under subclass 205. Apparatus in which both the high (expansion valve) and low side, (back pressure) restrictor or valve are controlled.

- 207 Diverse function refrigeration elements controlled by single sensor:**  
This subclass is indented under subclass 190. Apparatus in which operative elements of a refrigeration producer having diverse functions are controlled by single sensing means.
- 208 Single refrigeration producer controlled by plural sensors**  
This subclass is indented under subclass 190. Apparatus having plural sensing means which coact to control a single operative element of a refrigeration producer.
- 209 Compensating or modifying:**  
This subclass is indented under subclass 208. Apparatus in which the plural sensing means act together to modify or compensate the action of one another.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
202, for external thermal source modifying sensor action.  
214+, for a single sensor mounted or formed to respond to plural conditions, e.g., a compensated sensor.
- 210 Expansion valve or variable restrictor:**  
This subclass is indented under subclass 209. Apparatus controlling a variable refrigerant flow valve or restrictor.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
222+, for an expansion valve or flow restrictor controlled by a single sensor.
- 211 External condition sensor:**  
This subclass is indented under subclass 210. Apparatus in which at least one of the sensing elements responds to a condition external of the refrigeration producer.
- 212 Plural sensors at low side**  
This subclass is indented under subclass 210. Apparatus in which the plural sensing elements each respond to a condition between expansion means and a suction source.
- 213 Alternative or selective sensors:**  
This subclass is indented under subclass 208. Apparatus in which any one of the plurality of sensing means can alternatively or selectively control the element controlled.
- 214 Single sensor mounted or formed to respond to plural conditions, e.g., compensators:**  
This subclass is indented under subclass 190. Apparatus in which a single sensing means is positioned or formed so as to be responsive to plural conditions.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
209+, for plural sensors modifying or compensating each other and controlling a single refrigeration producer.
- 215 Controlling compressor or its drive, e.g., torque or speed:**  
This subclass is indented under subclass 214. Apparatus in which the sensing means controls an element in the compressor or its drive, e.g., its torque or speed.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
228+, for other sensing control of a compressor or its drive.
- 216 Of or by evaporation zone:**  
This subclass is indented under subclass 190. Apparatus controlling or responding to the condition of an element between or at the outlet of a liquefied refrigerant source, e.g., condenser or receiver, and to the means withdrawing a vapor, e.g., compressor.
- 217 Back flow or pressure regulator:**  
This subclass is indented under subclass 216. Apparatus in which the fluid condition in the evaporator is regulated by a variable restrictor between the evaporator outlet and the inlet (suction side) of the compressor.
- 218 Valve or restrictor by liquid level:**  
This subclass is indented under subclass 216. Apparatus in which a valve or variable flow restrictor is controlled by refrigerant liquid level.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
194, for float means controlling an evaporator and means entraining lubricant in refrigerant vapors.
- 219 Low side float:**  
This subclass is indented under subclass 218. Apparatus wherein there is a float which responds to a liquid level in a chamber in which the pressure is that between expansion means and a source of suction (compressor).
- 220 Float chamber at suction line:**  
This subclass is indented under subclass 219. Apparatus in which the suction line opens directly into the float chamber.
- 221 Valve isolated from float chamber:**  
This subclass is indented under subclass 220. Apparatus in which the flow controlling valve is in a chamber separated by an isolating partition from the chamber containing the float.
- 222 Of expansion valve or variable restrictor:**  
This subclass is indented under subclass 216. Apparatus in which the device controlled is a valve or variable restrictor of an expansion device.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
194, 197+, 204+, and 218, for other sensing control of expansion means with a variable restrictor.  
528, for an evaporator with an adjustable flow controller.
- SEE OR SEARCH CLASS:  
236, Automatic Temperature and Humidity Regulation, appropriate subclass, particularly subclasses 67+ for a thermostatically controlled valve of more general application.
- 223 By external condition:**  
This subclass is indented under subclass 222. Apparatus responsive to a condition external of the refrigeration producing means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
177+, for means controlling an external fluid or means, particularly subclasses 180+ for such means combined with a refrigeration producer control.
- 224 By condition at low side:**  
This subclass is indented under subclass 222. Apparatus responsive to a condition on the low side, i.e., between expansion means and a source of suction.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
206, for high and low side response.  
212, for plural sensors on the low side.
- 225 At or beyond evaporator outlet, i.e., super-heat:**  
This subclass is indented under subclass 224. Apparatus in which the condition is the one prevailing at or beyond an evaporator outlet, i.e., the condition of the vapor after evaporation is complete.
- 226 Compressor or its drive controlled:**  
This subclass is indented under subclass 216. Apparatus in which the compressor or its drive is controlled.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
228+, for other control of a compressor or by sensing means.
- 227 By conducted evaporator temperature:**  
This subclass is indented under subclass 226. Apparatus in which a temperature sensing means is in heat conducting relationship to an evaporator.
- SEE OR SEARCH CLASS:  
374, Thermal Measuring and Testing, subclasses 141+, particularly subclass 147 for means mounting a temperature measuring device on a support.
- 228.1 Compressor or its drive controlled:**  
This subclass is indented under subclass 190. Apparatus relating to a compressor or its drive.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 172, for control of or by an air compressing type refrigeration producer.
- 187+, particularly subclass 180, for diverse control or response involving control of an external fluid or means.
- 191, for control of or by a jet type compressor.
- 193+, for control of or by lubricating means.
- 196+, for control of or by a by-pass, e.g., compressor unloading.
- 215, for a single sensor responsive to plural conditions and controlling a compressor.
- 236+, for control of a compressor of or by evaporation zone condition.

SEE OR SEARCH CLASS:

- 417, Pumps, subclasses 1+ for condition responsive control of a pump or compressor drive motor, subclasses 212+ for condition responsive control of a pump or compressor drive transmission or displacement; subclasses 274+ for condition responsive control of the volumetric capacity of a pump or compressor; and subclasses 279+ for condition responsive control of the fluid handled by a pump or compressor.

**228.2 For ice or ice cream maker:**

This subclass is indented under subclass 228.1. Apparatus in which the controlled compressor provides the refrigeration effect for a liquid under-going partial or full congelation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 135, for automatic control of the congealed product condition.

**228.3 By refrigerant pressure:**

This subclass is indented under subclass 228.1. Apparatus in which the compressor is controlled by a sensed condition of refrigerant pressure.

- (1) Note. The sensed condition here may merely control the compressor in an on-off manner.

SEE OR SEARCH CLASS:

- 417, Pumps, subclass 38 for control of a pump by a liquid pressure sensor.

**228.4 By variable speed motor or pulley type mechanism:**

This subclass is indented under subclass 228.1. Apparatus in which movement of the compressor working member is varied as a function of a sensed drive condition.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 215, for a compressor controlled by a single sensor responding to plural conditions.

**228.5 By variable compressor output (e.g., unloading, staging, etc.):**

This subclass is indented under subclass 228.1. Apparatus in which the output of a single compressor or the combined output of a plurality of compressors is varied as a function of a sensed compressor operating condition, e.g., compressor unloading, compressor staging.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 176.3, for control of plural compressors controlled by humidity.
- 510, for plural compressors.

SEE OR SEARCH CLASS:

- 236, Automatic Temperature and Humidity Regulation, subclass 1 for refrigeration system staging.

**229 By external cooled gas:**

This subclass is indented under subclass 228. Apparatus responsive to a condition of an external cooled ambient gas.

**230 By condition of power source:**

This subclass is indented under subclass 228. Apparatus responsive to a condition of the compressor power source or drive.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 133+, for a control responsive to vehicle motion or traction feature, the traction feature generally being the prime mover for the refrigeration producer.



**231 TIME OR PROGRAM ACTUATOR:**

This subclass is indented under the class definition. Apparatus whereby (1) the time in which or length of time taken to perform an operation is controlled, (2) there is either a fixed continuous sequential or fixed repetitive operation of means performing a treating operation, or (3) there is means terminating a single operation in a fixed position to restart an additional cycle, which cycle is more complex than a mere starting or stopping of a single device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

155+, and 157+, for automatic control combined with time or program control.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 624.11+ for fluid handling of a more general utility with a program or time actuator.  
 200, Electricity: Circuit Makers and Breakers, subclasses 19.01+ for a periodic switch, subclasses 33+ for a switch with an actuation retarder.  
 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 301+ for thermally actuated switches which are continuously driven or time controlled.

**232 Closed system sorbent type:**

This subclass is indented under subclass 231. Apparatus relating to operation of a closed sorption type refrigeration producer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

141+, for automatic control of a sorbent type refrigeration producer.

**233 Congelation product maker:**

This subclass is indented under subclass 231. Apparatus relating to operation of congelation apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:

135+, for control of a congelation product maker by product condition.  
 340+, for a congelation product maker, per se.

**234 Defrosting:**

This subclass is indented under subclass 231. Apparatus relating to a defrosting operation of a refrigeration producer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

140, and 151, for automatic control of defrosting.

**235 RINK:**

This subclass is indented under the class definition. Apparatus designed for ice skating purposes.

**235.1 UTILIZING SOLAR ENERGY:**

This subclass is indented under the class definition. Subject matter subjecting a material to the heat energy of the sun.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, subclass 93 for a solar-heated drier.  
 60, Power Plants, subclasses 641.1+ for a power plant operated by the sun.  
 126, Stoves and Furnaces, subclasses 569+ and 714 for a solar heater.

**236 WITH ALTERNATELY USABLE ENERGY SOURCES:**

This subclass is indented under the class definition. Apparatus having two energy sources actuating a refrigeration producer which sources are alternately usable.

SEE OR SEARCH THIS CLASS, SUBCLASS:

134, for means responsive to vehicle body motion or traction and including an electrical generator.  
 237, a separable ambulant cooled enclosure and a power source.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclasses 64+ for substitute or emergency source electrical transmission or interconnecting systems.

**237 SEPARABLE AMBULANT COOLED ENCLOSURE AND POWER OR COOLING SOURCE:**

This subclass is indented under the class definition. Apparatus comprising an ambulant enclosure, e.g., vehicle, which is cooled by connecting or placing it into juxtaposition with a cooling means or a power source for operating cooling means, e.g., for precooling of an enclosure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 65, for sequential stage processes.
- 236, for alternatively usable energy sources.
- 298+, for repair, assembly or disassembly means.
- 448+, for a cooled enclosure with a contained movable unit of a refrigeration producing assembly.

**238.1 DISPARATE APPARATUS UTILIZED AS HEAT SOURCE OR ABSORBER:**

This subclass is indented under the class definition. Apparatus in which (a) the heat of a disparate apparatus as an energy source for a refrigeration producer, or (b) the rejected heat of a refrigeration producer is used to heat a disparate apparatus.

- (1) Note. A disparate apparatus herein is a nonrefrigerating or cooling means having a function other than merely serving as an energy source for the refrigeration producer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 7, for apparatus and processes wherein a refrigerant is used as a fuel.
- 38+, for liquefied gas producing involving an expansion engine.
- 61, 133+ and 241+, for operation involving motion of a vehicle.
- 79, for related processes or for processes involving exchanging heat between plural systems.
- 87, and 401+, for operations involving expanding a gas through an engine.
- 235.1, for means utilizing solar energy.
- 259.1+, particularly subclass 260 for a refrigerating system installed in or acting to

cool a structure having a function other than merely enclosing a space or handling material.

- 277+, for means utilizing rejected heat to remove atmospheric condensate.
- 322, for disparate serially arranged product treating means.
- 323.1+, for another internal-combustion engine and refrigeration producing combination.
- 324.1+, for a reversible cycle machine.
- 501, for apparatus using an external fluid as a power source and as a heat exchanging fluid.
- 532+, and 123+, for processes and apparatus for solidifying a liquid fraction which may include using waste heat to thaw a frozen constituent.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclass 41.19 for an internal-combustion engine cooled by a refrigeration cycle.

**238.2 With vortex tube, thermoelectric, stirling or air cycle:**

This subclass is indented under subclass 238.1. Apparatus in which there is refrigeration produced by a vortex tube, thermoelectric cycle, Stirling cycle or an air cycle.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 5, for refrigeration devices comprising a vortex tube.
- 6, for refrigeration devices comprising a Stirling cycle.
- 86+, and 401+, for refrigeration system including an internal-combustion engine and not using a compressor.
- 235.1, for refrigeration devices comprising a thermoelectric cycle utilizing solar energy.
- 324.2, for a diverse reversible refrigeration system.

**238.3 With sorption:**

This subclass is indented under subclass 238.1. Apparatus wherein refrigeration is produced by utilizing a sorbent for a refrigeration fluid.

- (1) Note. The sorbent being usually a fluid but may be a solid.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 101+, for processes of sorption.
- 235.1, for refrigerant systems utilizing solar energy.
- 476+, for sorption apparatus.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclasses 62 and 63 for heating and cooling with sorption systems.

**238.4 With power vapor generator:**

This subclass is indented under subclass 238.1. Apparatus wherein the energy for driving the refrigeration system is derived at least in part by the making of vapor, e.g., Rankine cycle, jet pump.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 500, for jet pumps powered by refrigerant circuit fluid.
- 501, for an external fluid actuating a compressor and exchanging heat.

SEE OR SEARCH CLASS:

- 60, Power Plants, subclasses 643+ for motive fluid energized by external heating means.
- 417, Pumps, subclasses 76+ for details of jet pumps.

**238.5 With distillation, ice maker, or freeze separation:**

This subclass is indented under subclass 238.1. Apparatus comprising (a) separating a more volatile part from a less volatile part of a substance by heating, (b) congelation of a liquid product, or (c) separation of a constituent of a liquid mixture by congelation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 123+, and 532+, for freeze separation.
- 66+, and 340+, for ice making.

SEE OR SEARCH CLASS:

- 202, Distillation: Apparatus, appropriate subclasses for distillation apparatus.
- 203, Distillation: Processes, Separatory, appropriate subclasses for distillation processes.

**238.6 With vapor compression system:**

This subclass is indented under subclass 238.1. Apparatus in which either a heated disparate apparatus or a disparate heating device is associated with a reverse Carnot cycle refrigeration system.

- (1) Note. The evaporator is usually the receiver of the disparate heat and the condenser is usually the heat source for heating the disparate apparatus.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 235.1, for a solar energy heat source.
- 324.5, for a reversible refrigeration system either with disparate heating or with a disparate heat source.

SEE OR SEARCH CLASS:

- 237, Heating Systems, subclass 2 for heating systems using the rejected heat of a refrigeration system as a heat source.

**238.7 Reversible, i.e., heat pump:**

This subclass is indented under subclass 238.6. Apparatus in which parts of a refrigeration system may either (a) receive heat from, or (b) give heat to a separate device.

- (1) Note. Usually the evaporator is the receiver of the disparate heat and the condenser is the heat source for heating a disparate apparatus.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 235.1, for solar energy as a heat source.

SEE OR SEARCH CLASS:

- 237, Heating Systems, subclass 2 for heating systems using the rejected heat of a refrigeration system as a heat source.

**239 WITH VEHICLE FEATURE:**

This subclass is indented under the class definition. Apparatus having (1) means dependent on vehicle motion, (2) a defined vehicle traction feature, or (3) a defined vehicle body feature other than that merely forming the

- structure enclosing a space to be cooled or supporting a cooling means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 323, for an internal combustion engine in a refrigeration system.
- 378+, for a refrigerator with a conveyor or transporter for articles.
- 407+, and 440+, for structural relationships with enclosures of more general utility.
- 240 Ship:**  
This subclass is indented under subclass 239. Apparatus relating to a ship.
- 241 Utilizing motion of vehicle:**  
This subclass is indented under subclass 239. Apparatus utilizing vehicle motion.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 61, for related processes.
- 133+, for automatic control responsive to vehicle motion.
- SEE OR SEARCH CLASS:
- 417, Pumps, subclass 231 for a vehicle operated pump or compressor.
- 454, Ventilation, subclasses 69+ for a vehicle ventilating system.
- 242 Axle drive:**  
This subclass is indented under subclass 241. Apparatus relating to an axle of the vehicle.
- 243 Vehicle contained common power supply:**  
This subclass is indented under subclass 239. Apparatus in which there is a common power supply for the vehicle and a refrigeration apparatus.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 7, for processes and apparatus utilizing refrigerant as a fuel.
- 244 Occupant-type vehicle:**  
This subclass is indented under subclass 239. Apparatus having features peculiar to a passenger or features accommodating the vehicle operator, e.g., seats, instrument panels, dashboards, luggage compartments, etc.
- SEE OR SEARCH CLASS:  
454, Ventilation, subclasses 69+ for vehicle ventilation.
- 245 Melt control:**  
This subclass is indented under subclass 239. Apparatus having means to control the drip, splash, or disposal of the melt from a solid refrigerant.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 312+, 422+ and 459+, for other ice melt handling.
- 246 DISPLAY TYPE:**  
This subclass is indented under the class definition. Apparatus having structure forming a cooled compartment and including a feature, as a transparent panel, stepped shelves, or an air current across an opening which enhances the display of articles within the compartment.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 407+, for an enclosure with a gas circulating feature.
- 440+, for a cooled enclosure, particularly subclass 457, for a portable receptacle cooler, and subclass 458 for an open access cooled surface.
- 247 With means dispersing or evaporating liquid into atmosphere:**  
This subclass is indented under subclass 246. Apparatus having means to disperse or evaporate a liquid into the atmosphere of the display device.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 304+, for another gas-liquid contact material cooling structure.
- 248 Means removing or preventing condensate on transparent panel:**  
This subclass is indented under subclass 246. Apparatus having means to prevent or remove condensation of moisture in the ambient atmosphere on a transparent panel.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
272+, for condensation prevention or removal from another heat absorbing surface.
- SEE OR SEARCH CLASS:  
52, Static Structures (e.g., Buildings), subclasses 171.3+ for a transparent panel with treating means, e.g., a condensation preventer, and see notes.
- 249 With feature extraneous to cabinet or cooler:**  
This subclass is indented under subclass 246. Apparatus in which the refrigerated display structure is combined with a device or structure having other functions, e.g., mirror, counter, waste collector.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
264, for a refrigerator with illuminating or radiant energy means.
- 250 With material conveyer or transporter, e.g., for ice or goods:**  
This subclass is indented under subclass 246. Apparatus having means to move an article.
- 251 Stepped, e.g., shelves:**  
This subclass is indented under subclass 246. Apparatus having article support means or shelves arranged in superimposed offset relationship.
- 252 Plural storage compartments:**  
This subclass is indented under subclass 246. Apparatus having walls or partitions forming compartments for the cooling or storage or articles.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
417, for a plural compartment cooled enclosure having a gas controller.  
441+, for the structure of a plural compartment cooled enclosure.
- 253 Formed by hollow imperforate cooled partition:**  
This subclass is indented under subclass 252. Apparatus in which the walls are hollow, imperforate and cooled.
- 254 Including nondisplay storage compartment:**  
This subclass is indented under subclass 252. Apparatus comprising a nondisplay compartment for holding articles.
- 255 With air controlling or directing means:**  
This subclass is indented under subclass 246. Apparatus including means for forcing, directing or controlling the flow of air within or relative to a cooled display compartment.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
265+, for an enclosure access with air blocking means.  
407+, for an enclosure with cooled air or gas controlling or directing means.
- 256 Spaced elongated air inlet and outlet type, e.g., air curtain:**  
This subclass is indented under subclass 255. Apparatus having means forming an elongated air inlet and outlet both of which extend substantially the length of a cabinet dimension so that a curtain stream of air is formed.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
413+, for an enclosure having verging streams.
- SEE OR SEARCH CLASS:  
454, Ventilation, subclasses 188+ for an air curtain of more general application.
- 257 Bottom cooling means, e.g., cooled floor**  
This subclass is indented under subclass 246. Apparatus having cooling means cooling the floor of the display compartment.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
458, for an open access cooled surface.

**258 WITH MEANS FORMING NON-COOLED WORK SURFACE, E.G., COUNTER, TABLE, SIDEBOARD:**

This subclass is indented under the class definition. Apparatus having means forming a non-cooled work surface, e.g., table, side board, cutting block.

SEE OR SEARCH THIS CLASS, SUBCLASS:

458, for a cooled open access article supporting surface.

**259.1 STRUCTURAL INSTALLATION:**

This subclass is indented under the class definition. Apparatus with (a) means performing an operation external to the subject matter of this class, (b) a static construction installation, (c) a particular geographic feature, wherein there is included only so much structure foreign to Class 62 as to associate it with the apparatus of Class 62.

(1) Note. The following classes and subclasses are noted as including electrical devices and means for cooling them: Class 373, Industrial Electric Heating Furnaces, subclasses 76, 113, 158, and 165; Class 174, Electricity: Conductors and Insulators, subclasses 15.1+; Class 219, Electric Heating, subclasses 10.491+ and 120; Class 250, Radiant Energy, appropriate subclasses, especially subclass 238; Class 310, Electrical Generator or Motor Structure, subclasses 52+; Class 313, Electric Lamp and Discharge Devices, subclasses 11+ and 231.01; Class 314, Electric Lamp Discharge Devices: Consumable Electrodes, subclass 26; Class 315, Electric Lamp and Discharge Devices: Systems, subclasses 112+; Class 361, Electricity: Electrical Systems and Devices, appropriate subclasses, especially subclasses 676+ and 688; Class 336, Inductor Devices, subclasses 55+; and Class 338, Electrical Resistor, subclasses 53+.

SEE OR SEARCH THIS CLASS, SUBCLASS:

235, for skating rink.  
235.1, for a system utilizing solar energy.

238.1+, for disparate apparatus utilized as a heat source or absorber and see the notes thereto.

239, for cooling means with a vehicle body or traction feature.

258, for apparatus with a noncooled work surface.

440+, for refrigeration means having a relationship to a cooled enclosure.

SEE OR SEARCH CLASS:

5, Beds, subclass 284 for a heating and cooling device combined with bed structure.

137, Fluid Handling, subclasses 343+ for a fluid handling system of general application installed in extraneous structure.

165, Heat Exchange, subclasses 47+ for structural installation of a heat exchanger not specialized to refrigeration.

184, Lubrication, subclasses 104.1+ for a lubricator with heating or cooling means.

454, Ventilation, appropriate subclasses for ventilation of a building.

**259.2 With electrical component cooling:**

This subclass is indented under subclass 259.1. Apparatus in which an electrical apparatus is cooled by refrigeration means.

(1) Note. Cooling of a specific electrical means should be searched in the class where the means as such would be classified, e.g., Class 362, for illumination.

SEE OR SEARCH THIS CLASS, SUBCLASS:

418, for component cooling by utilizing a foraminous air distributor.

505, for motor cooling.

514, for Joule Thompson effect coolers.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclasses 152+ for cooling and/or fluid feeding.

361, Electricity: Electrical Systems and Devices, subclasses 688+ for cooling means for electronic systems and devices.

**259.3 With body applicator:**

This subclass is indented under subclass 259.1. Apparatus in which there is provided a refrigeration means for cooling a living body or part thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 293, for a hand-manipulable tool for applying cooling to a body, e.g., branding iron.
- 530, for an envelope type refrigerant cooler.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 46 for a flexible envelope body conforming heat exchanger.
- 607, Surgery: Light, Thermal, and Electrical Application, subclasses 96+ for thermal applicators; and dig. 27 for cryogenic devices applicable to the body or body part.

**259.4 With evaporative type cooler:**

This subclass is indented under subclass 259.1. Apparatus in which cooling of air or an object takes place by the evaporation of water into air in an open system, e.g., roof coolers.

- (1) Note. An open system is one which is not sealed from the atmosphere for operation at or substantially at atmospheric pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 121, for related processes.
- 304+, for material cooling means including a gas-liquid contactor.

SEE OR SEARCH CLASS:

- 261, Gas and Liquid Contact Apparatus, appropriate subclasses for gas-liquid contact apparatus.

**260 Geographic, e.g., subterranean feature:**

This subclass is indented under subclass 259. Apparatus in which a part is arranged relative to the earth, e.g., subterranean.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 324+, for a reversible heat pump organization.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 363+ for ground supported fluid handling means.
- 165, Heat Exchange, subclass 45 for a heat exchanger not specialized to refrigeration having a geographical feature.

**261 Article of furniture, e.g., bed cover or canopy:**

This subclass is indented under subclass 259. Apparatus in which the cooling means is structurally related to an article of furniture.

SEE OR SEARCH CLASS:

- 5, Beds, subclasses 284 and 423 for a bed or a mattress which may include heat exchange means.
- 454, Ventilation, subclass 197 for a window ventilated bed or couch.

**262 Window connected or mounted:**

This subclass is indented under subclass 259. Apparatus including mounting or connecting means related to a wall aperture, e.g., a window.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 297, for an external support for a refrigerator housing.
- 426+, for a cooler unit with gas forcing means.

SEE OR SEARCH CLASS:

- 248, Supports, subclasses 208+ for a window mounted or attached bracket, per se.
- 454, Ventilation, subclasses 201+ for a nominally recited window mounted air conditioner type air pump.

**263 Vertical partition or wall mounting feature:**

This subclass is indented under subclass 259. Apparatus mounting a cooling unit on a vertical wall or partition of a building which wall has functions other than merely forming the enclosure to be cooled.

- SEE OR SEARCH CLASS:  
312, Supports: Cabinet Structure, subclasses 242 and 245+ for a cabinet mounted in or on a vertical wall.
- 264 Including article conveyor or transporter WITH ILLUMINATING OR RADIANT ENERGY MEANS:**  
This subclass is indented under the class definition. Apparatus with means to illuminate it or subject it to a particular radiant energy means other than mere heating or cooling.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
249, for a display cabinet with features extraneous to the cabinet or cooler.
- SEE OR SEARCH CLASS:  
312, Supports: Cabinet Structure, subclass 223.5 for an illuminated cabinet of general utility.  
362, Illumination, subclasses 127+ for a light and furniture combination of general application.
- 265 COMPARTMENT ACCESS OR USE AND AIR BLOCKING:**  
This subclass is indented under the class definition. Apparatus including a cooled compartment with an access and means blocking air flow or means resulting in disabling of air blocking means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
255, for a display cabinet with air controlling or directing means.  
267, for interlocked diverse function elements.
- 266 Including article conveyor or transporter:**  
This subclass is indented under subclass 265. Apparatus with an article handling means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
378+, for an article conveyor or transporter in general.
- 267 INTERLOCKED DIVERSE FUNCTION ELEMENTS:**  
This subclass is indented under the class definition. Apparatus having diverse functions which are correlated for conjoint control in such a manner that the action of one means is prerequisite to the action of another in a desired sequence or the action of one precludes the action of another.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
231, for a timed or programmed actuator.
- SEE OR SEARCH CLASS:  
109, Safes, Bank Protection, or a Related Device, subclass 63.5 for an enclosure with means for rendering its closure lock ineffective, e.g., safety means allowing exit of a person with the enclosure.
- 268 VACUUMIZED CHAMBER WITH OPEN VAPOR OR GAS OUTLET:**  
This subclass is indented under the class definition. Apparatus in which a chamber is placed under a subatmospheric temperature by removing of vapor of a liquid within the chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
100, for related processes.  
123, for means separating a solidified constituent of a liquid mixture.  
169+, for similar apparatus with automatic control.
- SEE OR SEARCH CLASS:  
34, Drying and Gas or Vapor Contact With Solids, subclasses 75, 92, and 402+ for similar apparatus and related processes where the primary function is that of drying.  
159, Concentrating Evaporators, subclasses 22+ for a closed chamber type evaporator.  
417, Pumps, subclasses 151+ for jet type pump, per se.
- 269 Including sorbent agent:**  
This subclass is indented under subclass 268. Apparatus in which a hygroscopic agent is used to aid in creating the vacuum.



SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 94, for processes of circulating external gas with removal of gas.  
271, for atmosphere and sorbent contact.

**270 System, i.e., multiple treating or fluid handling means:**

This subclass is indented under subclass 268. Apparatus comprising elements having different functions in producing a vacuum with or without fluid handling.

**271 ATMOSPHERE AND SORBENT CONTACTING TYPE:**

This subclass is indented under the class definition. Apparatus supporting or handling a sorbent and means to cause contact of the atmosphere, the sorbent acting to remove a constituent, usually moisture, from the atmosphere therewith.

- (1) Note. If the sorbent is a liquid, means to regenerate is included.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 93+, for related processes.  
269, for a vacuumized chamber with asorbent.  
304+, for means contacting a liquid with atmosphere even though the liquid be a brine.  
317, for an external fluid clarifier.  
474, for a refrigerant purifier.

SEE OR SEARCH CLASS:

- 96, Gas Separation: Apparatus, subclasses 108+ for solid sorbent apparatus, per se, and subclasses 243+ for gas separation apparatus combined with gas and liquid contact means.

**272 WITH MEANS PREVENTING OR HANDLING ATMOSPHERIC CONDENSATE RELATIVE TO HEAT ABSORBER:**

This subclass is indented under the class definition. Apparatus having means to remove or prevent the deposition of moisture condensed from the atmosphere on the surface of a heat absorbing surface.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 92, and 93, for processes involving removal of moisture from a circulating gas.  
312+, for an ice melt-gas contactor.  
324+, for a reversible cycle heat pump.  
353+, for a heat absorbing member with means to remove a congealed product therefrom.  
401+, for an air compressing, cooling and expanding system which may remove condensate from the compressed, heated air.  
432, and 441+, for a refrigerator with plural compartments which may be insulated from each other in which the insulation may act to prevent condensation on a compartment wall.  
460+, for a device which removes ice melt together with atmospheric condensate deposited on the ice.

SEE OR SEARCH CLASS:

- 52, Static Structures (e.g., Buildings), subclasses 171.3+ for a transparent panel with treating means, e.g., a condensation preventer and see notes.

**273 Operating on insulation, e.g., vent to refrigerated compartment:**

This subclass is indented under subclass 272. Apparatus which operates to prevent condensation within, or to remove condensation from, the interior of an insulated wall or partition.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 385, for means directing sublimed refrigerant gas into insulation or a hollow wall.

**274 With means to add moisture to cooled space:**

This subclass is indented under subclass 272. Apparatus in which there is means supplying a cooled space with moisture from outside the space.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 91+, for processes of circulating an external gas.

- 171, for automatic control of a gas-liquid contact cooler.
- 176, for a humidity sensor.
- 275 By external heater:**  
This subclass is indented under subclass 272. Apparatus aided by heating means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
349+, for similar apparatus used to release a congealed product from a heating absorbing element.
- SEE OR SEARCH CLASS:  
219, Electric Heating, subclass 538 for electrical heaters, per se, some of which may be used for defrosting.
- 276 Heating principal heat absorber, e.g., evaporator:**  
This subclass is indented under subclass 275. Apparatus in which the heater is positioned so as to contact, or to be adjacent to, the surface of a principal heat absorber of the refrigeration apparatus, e.g., evaporator.
- 277 Means utilizing heat developed by refrigeration producer:**  
This subclass is indented under subclass 272. Apparatus which includes a portion of a refrigeration apparatus which develops heat.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
81, for related processes.  
238, for means utilizing rejected heat in a disparate apparatus.  
352, for similar structure designed to release a congealed product from a heat absorbing surface.
- 278 Bypassing or reversing internal fluid flow:**  
This subclass is indented under subclass 277. Apparatus in which means is provided for bypassing certain of the elements, or reversing flow of internal fluid through the refrigeration producing apparatus.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
159+, for automatic control of selective heating or cooling means.
- 196+, for automatic control of evaporator or condenser by-pass.
- 513, for heat exchange means between diverse function elements.
- 525, for serially arranged evaporators, one of which may be a re-evaporating coil.
- 279 Means conducting atmospheric condensate to heat rejecter:**  
This subclass is indented under subclass 277. Apparatus for conducting atmospheric condensate from the heat absorbing portion of a refrigeration producer to a position wherein it absorbs heat from a heat liberating portion.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
305, for a gas-liquid contactor utilized to cool a heat rejector of a refrigeration producer.
- 280 Pump or thrower for condensate:**  
This subclass is indented under subclass 279. Apparatus including a pump or means throwing the condensate, e.g., slingers.
- 281 With porous or foraminous atmospheric condensate receiver:**  
This subclass is indented under subclass 272. Apparatus comprising a member, e.g., a wick, positioned to receive atmospheric condensate and diffuse it into the atmosphere.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
315, and 316, for a porous wall or porous cover member gas-liquid contact material cooler.
- 282 Means contacting heat absorber with fluid strange to system:**  
This subclass is indented under subclass 272. Apparatus with means for applying a fluid, e.g., air or brine, to the surface of the heat absorber, so as to inhibit the formation of or remove condensate from said heat absorber.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
82, for related processes.

- 283 Moisture condensing means distinct from principal heat absorber:**  
This subclass is indented under subclass 272. Apparatus in which means separate and distinct from the principal heat absorber is so arranged that atmospheric condensate tends to collect upon said means in lieu of on the principal heat absorber.
- (1) Note. Such means may be the heat absorbing portion of a refrigeration producing apparatus wherein its primary function is to cause atmospheric condensation, the primary cooling function being left to other heat absorbing apparatus.
- 284 Wiper or scraper:**  
This subclass is indented under subclass 272. Apparatus in which there is a device so constructed that upon movement relative to the heat absorber of a refrigeration apparatus, atmospheric condensate upon the heat absorber is removed therefrom.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
303, for cleaning means for refrigeration apparatus.  
345+, 347 and 354, for means scraping a congealed product from a heat absorbing element.
- 285 Retainer or flow director for atmospheric condensate:**  
This subclass is indented under subclass 272. Apparatus in which means is provided for retaining all or part of the atmospheric condensate after removal thereof from the heat absorbing surface, or for directing flow of such condensate.
- 286 Adjustable position or selectively usable:**  
This subclass is indented under subclass 285. Apparatus adjustable with respect to other parts of the apparatus or positioned with respect to another retainer or flow director in such a manner that it may be removed from the apparatus, the other retainer or flow director then accommodating the atmospheric condensate.
- 287 Wetted inner surface type refrigerator:**  
This subclass is indented under subclass 285. Apparatus in which the flow directing means includes an inner surface of a wall defining the space being refrigerated.
- (1) Note. The atmospheric condensate is usually caused to flow along said wall in order that a portion thereof may evaporate within said space.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
312, for an ice holder and ice melt-gas contacting means.  
451, for a cooled wall type refrigerator cabinet.
- 288 With flow director directing condensate to retainer**  
This subclass is indented under subclass 285. Apparatus directing condensate into means accumulating the condensate.
- 289 Retainer exterior of refrigerated space:**  
This subclass is indented under subclass 288. Apparatus in which the accumulating means is located outside of the space being refrigerated.
- 290 Plural distinct flow directors acting in parallel:**  
This subclass is indented under subclass 285. Apparatus in which plural distinct flow directors for atmospheric condensate act in parallel.
- 291 Condensate retainer:**  
This subclass is indented under subclass 285. Apparatus in which means, e.g., pan or tray, is provided for accumulating at least some part of the atmospheric condensate after its removal from the heat absorbing surface.
- 292 WITH MEANS FOR CHARGING CLOSED REFRIGERATION PRODUCING SYSTEM:**  
This subclass is indented under the class definition. Apparatus with means for introducing a material, usually a refrigerating fluid, into a closed circuit from a source external of the circuit, means to provide the refrigerant, to replace a lost portion or to replace one component with another.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
77, for related processes.  
149, for automatically adding or withdrawing refrigerant relative to a closed system.
- SEE OR SEARCH CLASS:  
141, Fluent Material Handling, With Receiver or Receiver Coating Means, appropriate subclass for means for transferring a fluid to a receiver of general utility.
- 293 HAND MANIPULABLE TOO:**  
This subclass is indented under the class definition. Apparatus including a portable cooling device having means for manually manipulating it for contact with a material to be cooled.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
530, for an envelope type refrigerant or coolant handling device.
- SEE OR SEARCH CLASS:  
138, Pipes and Tubular Conduits, subclass 35 for portable pipe thawing apparatus, and subclasses 97+ for pipe repair means including freezing means.
- 294 CONTAINER CUTTER OR PUNCH-TYPE OPENING MEANS:**  
This subclass is indented under the class definition. Apparatus including a fluid reservoir having fluid liberating means of the cutter or punch type.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
4, for processes and apparatus involving cooling by chemical reaction or dissolving wherein a container may be punctured.  
293, for hand manipulable cooling tools.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 317+ for fluid handling of general application involving tapping a pipe, keg or tank.  
222, Dispensing, subclasses 80+ for a dispenser with a cutter or punch.
- 295 RESILIENTLY SUPPORTED POWER AND/OR HEAT REJECTING ELEMENT:**  
This subclass is indented under the class definition. Apparatus having resilient supporting means for a power input means and/or heat rejecting element of a refrigeration producing system.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
466, for a resilient support for an element inside of a cooled enclosure.
- SEE OR SEARCH CLASS:  
248, Supports, subclasses 560+ for a resilient support in general.  
417, Pumps, subclass 363 for a resiliently mounted motor driven pump.
- 296 MUFFLER OR SOUND DAMPENER:**  
This subclass is indented under the class definition. Apparatus including a device for attenuating sound.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
295, for a resiliently mounted power or heat rejector.
- SEE OR SEARCH CLASS:  
181, Acoustics, subclasses 212+ for a muffler or sound deadener, per se.  
417, Pumps, subclass 312 for a pump or compressor combined with a muffler acting on the fluid handled by the pump.
- 297 EXTERNAL SUPPORT FOR REFRIGERATOR HOUSING:**  
This subclass is indented under the class definition. Apparatus including a device external of and supporting a refrigerator housing.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
239+, for refrigerating means with vehicle body structure or traction feature.  
295, for a resiliently supported power or heat rejecting element.
- SEE OR SEARCH CLASS:  
248, Supports, subclasses 127+ for a stand support, per se.

- 312, Supports: Cabinet Structure, subclasses 249.1+ and 351.1+ for a cabinet with an external support.
- 298 WITH REPAIR, ASSEMBLY OR DISASSEMBLY MEANS:**  
This subclass is indented under the class definition. Apparatus including means for repairing, removing, replacing or aiding in assembling or removing an element of a refrigeration assembly other than the parts making up the refrigeration assembly which could be removed by merely disconnecting a part, e.g., pipe joints, including means to break loose and remove a product (ice) mold from its support.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
77, for related processes, and see the Notes thereto.  
326+, for convertible structure which may be disassembled for conversion to another structure or for storage of the disassembled structure.  
340+, for means for removing a product from product forming means.
- 299 Detachable valve and coupling:**  
This subclass is indented under subclass 298. Apparatus including a pipe coupling and valve means controlling flow through the coupling.
- 300 Means releasing mold from support:**  
This subclass is indented under subclass 298. Apparatus having means coacting between a mold and its support for releasing the mold from the support.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
349+, for a mold with a heater for removing the product from the mold.
- 301 With grid or cube release means:**  
This subclass is indented under subclass 300. Apparatus including means for releasing a grid or molded congealed product (ice) from a tray.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
359+, particularly subclasses 362 and 364, for ice trays with cube release means.
- 302 Sliding or rolling on guide means:**  
This subclass is indented under subclass 298. Apparatus including means on which the element to be removed slides or rolls.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
382, for a drawer, tray or track guided type of receptacle in cooling compartment.
- 303 WITH CLEANING MEANS FOR APPARATUS:**  
This subclass is indented under the class definition. Apparatus having means for cleaning or facilitating the cleaning of a part of a cooling apparatus.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
272+, for atmospheric condensate removal means, particularly subclass 284 for a wiper for atmospheric condensate.  
298+, for repair, assembly or disassembly means.  
317+, for a separating clarifier for nonrefrigerant fluids.  
322, for disparate serially arranged apparatus, and other means treating a product, e.g., cleaning and cooling a product.  
340+, for a cooler with congealed product removal means.  
474+, for a refrigerant producer having refrigerant purifying means.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 238+ for a fluid handling system combined with cleaning means.
- 304 MATERIAL COOLING MEANS INCLUDING GAS-LIQUID CONTACTOR:**  
This subclass is indented under the class definition. Apparatus including (1) means for directing, confining, supporting or handling a material to be cooled combined with means promoting contact of a liquid with, or evaporating the liquid into, an atmosphere (usually air), or (2) means for contacting or injecting a gas into a confined body of liquid combined with means for cooling the liquid and gas in contact.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 91+, and 121, for related processes.
- 171, for a gas-liquid contact cooler with automatic control.
- 247, for display type with gas and liquid contacting means.
- 271, for sorbent and atmosphere contacting type cooling apparatus.
- 274, 279 or 281, for atmospheric condensate removal which may involve gas and liquid contact.
- 476+, particularly subclass 490, for a sorbent type refrigeration producer which may use an inert gas contacting the refrigerant or sorber.
- 502, for a compressor-condenser-evaporator refrigeration producer utilizing diverse fluids.

SEE OR SEARCH CLASS:

- 261, Gas and Liquid Contact Apparatus, subclasses 127+ for a gas and liquid contactor and heat exchanger wherein all of the gas and liquid mingle.

**305 Cooling heat rejector of refrigeration producer:**

This subclass is indented under subclass 304. Apparatus dispersing or evaporating liquid into air to cool a heat rejecting part of the system.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 279+, where the liquid is atmospheric condensate.
- 314, through 316 for gas-liquid contacting means indirectly cooling a fluid confining means.
- 428+, for an air cooler with means for cooling a heat rejector, and see the Note thereto.

**306 Means feeding gas into pressurized receiver:**

This subclass is indented under subclass 304. Apparatus including means to feed a gas into a tank or flow line containing a liquid which is pressurized by the gas, e.g., carbonating means or means to displace liquid by a gas under pressure.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 154+ for a diverse fluid containing pressure system of a more general application.
- 261, Gas and Liquid Contact Apparatus, subclass 140 for a refrigerated contact device, and subclass 153 for a heated or cooled gas exposed body of liquid.

**307 Submerged gas inlet:**

This subclass is indented under subclass 304. Apparatus including a gas inlet submerged in a body of liquid.

SEE OR SEARCH CLASS:

- 261, Gas and Liquid Contact Apparatus, subclasses 121+ for such device wherein a gas is injected into a body of liquid but having no means for cooling the liquid container or features peculiar to the manufacture of a congealed product (ice), and subclass 153 for a heated or cooled container for a gas exposed liquid body.

**308 Drop tube type:**

This subclass is indented under subclass 307. Apparatus wherein the gas inlet is a pipe suspended through an open top of a receptacle containing the liquid.

**309 Gas recirculated relative to enclosure:**

This subclass is indented under subclass 304. Apparatus comprising means forcing or directing gas relative to the contactor and a related enclosure in such a manner that at least a portion of the gas is recirculated.

**310 Fluid recirculating means:**

This subclass is indented under subclass 304. Apparatus having means for recirculating a contacting fluid, usually the liquid.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 309, for an apparatus in which the gas is recirculated relative to the enclosure.

**311 Diverse treating means**

This subclass is indented under subclass 304. Apparatus with means for treating the material being cooled or for treating the contacting gas or liquid, usually a second cooling means.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
309, and 310, for a system in which the gas or liquid is recirculated relative to a cooled enclosure and treated by a gas-liquid contactor and heat exchanger (cooler).  
332+, for other diverse refrigeration producers.
- 312 Ice holder and ice melt-gas contactor:**  
This subclass is indented under subclass 311. Apparatus comprising an ice holder and means for dispersing ice melt or drip into contact with the atmosphere internally or externally of a cooled enclosure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
421+, for an air cooler including a foraminous wall ice container wherein there may be incidental contact of air with ice melt escaping through the foramina.
- 313 Elongated vertical passage for melt and air:**  
This subclass is indented under subclass 312. Apparatus in which there is means forming a flue extending in a substantially vertical direction through which both air and ice-melt pass while in contact with each other.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
420+, wherein such passages may be present but there is no means enhancing gas-melt contact.
- 314 With gas forcing or directing means:**  
This subclass is indented under subclass 304. Apparatus having gas forcing means for directing the gas in a desired flow path relative to the gas-liquid contacting means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
305, for similar structure forcing or directing gas over a heat rejector of a refrigeration producer.  
309, for similar structure including recirculation of the gas.
- 315 Porous wall liquid container or flow line:**  
This subclass is indented under subclass 304. Apparatus having a porous wall liquid confining container or flow line, e.g., ollas.
- SEE OR SEARCH CLASS:  
312, Supports: Cabinet Structure, subclasses 31+ for a container wherein the evaporated vapor contacts material within the container.
- 316 Porous cover member:**  
This subclass is indented under subclass 304. Apparatus comprising a porous cover member for an impervious wall of a container.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
315, for a porous wall liquid container or flow line.
- 317 WITH SEPARATOR-CLARIFIER FOR COOLED FLUID OR ICE-MELT:**  
This subclass is indented under the class definition. Apparatus having a filter or gravitational separator for fluid cooled by refrigeration means, e.g., a filter for brine, ice-melt, or cooled fluid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
123+, for means separating a constituent from a mixture of two or more substances by cooling.  
271, for means contacting atmosphere with sorbent means.  
304+, for a separation-clarifier and gas-liquid contact type cooling means.  
474+, for a purifier for refrigerant flowing in a refrigeration producer.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 544+ for fluid handling of general application with separating means.
- 318 For liquid :**  
This subclass is indented under subclass 317. Apparatus wherein the fluid is a liquid.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 67, for congelation processes involving filtering or gravitational separation.  
272+, for atmospheric condensate handling means.

SEE OR SEARCH CLASS:

- 210, Liquid Purification or Separation, appropriate subclass, for processes and apparatus for separating liquids of more general utility.

**319 Isolated from coolant:**

This subclass is indented under subclass 318. Apparatus in which the liquid is prevented from contacting the coolant or from contacting a material (e.g., ice melt) which has served as a coolant.

**320 WITH COMMUNOTOR OR CUTTER:**

This subclass is indented under the class definition. Apparatus including means dividing a solid congealed mass into a number of smaller solid pieces.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 340+, particularly subclasses 345+ and 353 for a congealed product maker with a product remover, which remover may incidentally cause disintegration of the removed product.

SEE OR SEARCH CLASS:

- 30, Cutlery, subclasses 136+ and 140 for hand manipulable means to form ice cubes from an ice block, and subclasses 164.5+ for an ice pick.  
33, Geometrical Instruments, subclasses 18.1+ for means to score a block of ice, especially subclass 45 for a machine with plural scrubbing means.  
83, Cutting, appropriate subclass, especially subclasses 879+ for scoring and 170 for a heated cutting tool and saws of general utility.  
219, Electric Heating, appropriate subclasses for an electric heater which may be used to sever ice blocks.  
241, Solid Material Comminution or Disintegration, appropriate subclass for a comminutor of more general applica-

tion and see the reference to Class 62 under SEARCH CLASS in section 5 of the class definition of Class 241.

**321 Including means utilizing product:**

This subclass is indented under subclass 320. Apparatus including means for utilizing the subdivided product, e.g., in an ice cream freezer or railway car.

SEE OR SEARCH CLASS:

- 241, Solid Material Comminution or Disintegration, appropriate subclass, particularly subclass 100 for a comminutor and receiver of general utility.

**322 DISPARATE SERIALY ARRANGED PRODUCT TREATING APPARATUS:**

This subclass is indented under the class definition. Apparatus in which in addition to cooling or refrigeration apparatus and means auxiliary to its operation, e.g., agitator, conveyor, or coolant circulator, there is other distinct apparatus for performing a nonrefrigeration treating operation on the product cooled or product to be cooled, e.g., crushing, wrapping, compressing, which cooling and other apparatus is arranged for sequential operation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 60, for cooling processes involving packaging.  
62, for article treating processes.  
123+, and 532+, for subject matter involving cooling and thawing a frozen constituent.  
317+, for separating-clarifying means for treating an internal fluid combined with cooling apparatus.

**323.1 WITH INTERNAL-COMBUSTION ENGINE:**

This subclass is indented under the class definition. Apparatus including an internal-combustion engine.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 7, for subject matter wherein a refrigerant is utilized as a fuel.  
239+, for vehicle feature combinations and see the notes.



## SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclass 41.19 for an internal-combustion engine cooled by a refrigeration cycle.

**323.2 With cooling apparatus other than gas compressor:**

This subclass is indented under subclass 323.1. Apparatus in which there is provided a refrigeration system having a working fluid cycle not requiring the use of a gas compressor.

- (1) Note. Included herein are sorption and thermoelectric systems, but not included are Stirling cycle, jet pump, and air cycle systems.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

101+, 238.3 and 476+, for sorption systems.  
235.1, for a thermoelectric cycle in which solar energy is used.  
324.2, for similar systems having a reversing mode or operation.

**323.3 With electric motor drive:**

This subclass is indented under subclass 323.1. Apparatus in which at least one refrigerant compressor is driven at least part of the time by an electrically energized motor.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

228.2, for automatic control of compressor drive motors.  
236, for alternate compressor drives.

## SEE OR SEARCH CLASS:

318, Electricity: Motive Power Systems, appropriate subclasses for specific motor controls.

**323.4 With clutch or variable speed transmission controlling compressor drive:**

This subclass is indented under subclass 323.1. Apparatus in which drive means to operate a refrigerant compressor comprises either (a) a drive engaging or disengaging means, or (b) a drive speed varying means.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

133, for automatic control responsive to vehicle body motion, e.g., the compressor is declutched at low engine speeds.  
228.2, for automatic speed control of a compressor drive.

## SEE OR SEARCH CLASS:

192, Clutches and Power-Stop Control, for clutch details.  
417, Pumps, appropriate subclasses for pumps of general utility, and especially subclass 364 for pumps driven by an internal combustion motor.

**324.1 REVERSIBLE, I.E., HEAT PUMP:**

This subclass is indented under the class definition. Apparatus in which there is means to reverse flow through a refrigeration cycle or parts thereof so as to reverse the functions of the heat absorbing or rejecting means, or there is means to change the flow direction of an external fluid (air) so that it may be selectively heated or cooled.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

80+, for processes of defrosting.  
154, for automatic control of defrosting.  
160, for reversible heat pump with automatic control.  
238.1+, for related combinations wherein the rejected heat may be utilized in a disparate apparatus, e.g., hot water producer.  
260, for a refrigerator including subterranean features.  
278, for reversible heat pump acting to remove atmosphere condensate, e.g., defrost.

## SEE OR SEARCH CLASS:

165, Heat Exchange, subclass 62 for combined heating and cooling by a modifiable refrigerating system.

**324.2 With cooling apparatus other than gas compressor:**

This subclass is indented under subclass 324.1. Apparatus in which there is provided a refrigeration system having a working fluid cycle not requiring the use of a gas compressor.

- (1) Note. Included herein are sorption and thermoelectric systems, but not included are Stirling cycle, jet pump, and air cycle systems.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 101+, 238.3 and 476+, for sorption systems.  
235.1, for a thermoelectric cycle in which solar energy is used.  
323.2, for similar systems associated with an internal-combustion engine.

**324.3 With product treatment:**

This subclass is indented under subclass 324.1. Apparatus in which a solid or liquid product is subjected to heating and/or cooling by a refrigeration system, e.g., drying, freeze separation, congelation, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 66+, and 340+, for congelation.  
123+, for apparatus of freeze separation.  
532+, for processes of freeze separation.

SEE OR SEARCH CLASS:

- 34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses.

**324.4 With refrigerant collection and intermittent discharge:**

This subclass is indented under subclass 324.1. Apparatus in which means is provided for temporarily capturing part of the refrigerating fluid and subsequently releasing of it at recurring intervals discrete portions back into the refrigeration system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 174, for automatic control of trapping and of discharging refrigerant batches.

**324.5 With atmospheric condensate removal or prevention:**

This subclass is indented under subclass 324.1. Apparatus in which there is provided structure to either eradicate or prohibit the deposition of moisture condensed from the atmosphere on a heat absorbing surface of a refrigeration system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 272+, for details of atmospheric condensate preventing or handling.

**324.6 With flow control or compressor details:**

This subclass is indented under subclass 324.1. Apparatus wherein significance is attributable to particular fluid regulation or compressor structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 511, for fluid restrictors.  
528, for adjustable controllers.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 625.43 for reversing valve details.  
417, Pumps, appropriate subclasses for compressor details.

**325 External fluid flow reversed:**

This subclass is indented under subclass 324. Apparatus in which the direction of flow of an external fluid can be reversed relative to the heat absorbing and rejecting means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 428, for a refrigeration producer means circulating gas over the heat rejector.

**326 CONVERTIBLE:**

This subclass is indented under the class definition. Apparatus including means whereby mode or condition of operation or use can be changed by shifting or rearranging all or some of the parts in a different relationship to each other or by addition or omission of a part.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 286, for an adjustable position or selectively usable retainer or a flow director for atmospheric condensate.
- 298+, for apparatus having means aiding in assembling, or disassembling.
- 324+, for a reversible cycle machine.

- 327 Storable or variable capacity ice bunker:**  
This subclass is indented under subclass 326. Apparatus in which the ice storage capacity of an ice bunker can be readily increased or decreased.

SEE OR SEARCH CLASS:

- 105, Railway Rolling Stock, subclass 369 for a freight car with a load support, subclass 375 for floor structure, or subclass 376 for removable partitions.

- 328 Bunker wall movable to chamber wall:**  
This subclass is indented under subclass 327. Apparatus in which an ice bunker wall is movable to a stored position against the end wall, side wall or ceiling of the cooled enclosure.

- 329 Movable partition within cooled compartment:**  
This subclass is indented under subclass 326. Apparatus in which a cooled enclosure is provided with a partition so mounted that it may be removed, relocated, or shifted to a nonplural compartment forming position.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 327, for a storable or variable capacity ice bunker.
- 465+, for a particular internal element support, e.g., and adjustable foraminous shelf.

- 330 WITH REFRIGERANT OR COOLANT MANUFACTURING MEANS:**  
This subclass is indented under the class definition. Apparatus including means to manufacture a refrigerant or coolant as a removable and disposable product and including means utilizing the manufactured disposable product as a refrigerant or coolant, e.g., brine and ice mixture making and space cooler.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 76, for related processes.
- 321, for an ice maker and comminutor and means utilizing the product.
- 340+, for ice making apparatus, per se.

SEE OR SEARCH CLASS:

- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 261+ for solution making apparatus, e.g., brine, etc.

- 331 COMBINED:**  
This subclass is indented under the class definition. Apparatus not provided for above comprising a device in addition to or combined with refrigerator structure, having a function other than refrigeration or serving to perfect such apparatus for its intended primary purpose.

SEE OR SEARCH CLASS:

- 2, Apparel, appropriate subclass for a heat covering with treatment means there provided for.
- 165, Heat Exchange, subclass 58 for a combined heating and cooling system. See the statement under Search Class 62 in the definition of subclass 58 of Class 165 for a statement of the line between Classes 62 and 165 as to this subject matter.

- 332 DIVERSE SYSTEMS, E.G., ICE AND MECHANICAL:**  
This subclass is indented under the class definition. Apparatus having (1) two or more change of material phase producing closed circuits each having a different manner of operation, e.g., a primary compressor-condenser-expander circuit combined with a secondary condenser-evaporator circuit; a still-condenser-expander circuit combined with a compressor-condenser-expander-circuit, (2) change of phase closed circuits cooling one treating zone combined with cooling means using a solid or liquid which by change of phase cools another treating zone, or (3) apparatus having confining means each supporting or confining refrigerants or coolants of different kinds, e.g., water, ice and solidified carbon dioxide.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 79, for processes involving exchange of heat between plural systems.
- 175, for automatic control of diverse, cascade or compound systems.
- 311+, for gas and liquid contact cooling means combined with other cooling means.
- 335, for a plural paired system and see the Notes thereto.

- 333 Primary and secondary dependent circuits:**  
This subclass is indented under subclass 332. Apparatus having a primary (energy source circuit) refrigeration producing means which includes a flow line for a phase changing refrigerant and a secondary refrigeration producing means confining a phase changing refrigerant, said secondary system including only heat rejecting and absorbing parts and/or a restrictor, said primary and secondary means being isolated from and having at least one part of each in heat exchanging relationship with another.

- 334 Secondary evaporator contacting inner liner, e.g., two zone cold wall:**  
This subclass is indented under subclass 333. Apparatus in which the evaporator of the secondary dependent circuit is in heat exchange relationship with the inner liner of a storage compartment, e.g., those which form a so-called two zone cold wall type.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 395, for an evaporator between insulation and a cooled liquid container.
- 438, for an intermediate fluid container forming a cooled storage compartment.
- 451, for a cooled compartment in which the coolant holding or guiding means is within a hollow wall.

- 335 PLURAL PAIRED DIFFERENT FUNCTION REFRIGERATION PRODUCING ELEMENTS, E.G., CASCADE:**  
This subclass is indented under the class definition. Apparatus in which there are multiples of two or more diverse function elements of a refrigeration producing system.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 79, for processes involving exchange of heat between plural systems.
- 144+, for duplicate automatically controlled intermittently and alternately operation sorption systems.
- 332+, for diverse refrigeration systems and see the Notes thereto.
- 337+, for a heat exchanger between a space cooler and an isolated material handler.
- 467+, particularly subclasses 504 or 513, for a refrigeration system which may include two or more similar function elements, e.g., plural evaporators.

**336 MATERIAL HANDLERS OF DIVERSE TYPES:**

This subclass is indented under the class definition. Apparatus in which there are material handlers of diverse types.

**337 COOLED ARTICLE STORAGE COMPARTMENT AND COOLED ISOLATED MATERIAL HANDLER:**

This subclass is indented under the class definition. Apparatus having means forming a first cooling compartment for material combined with a second cooling compartment for second material, said second compartment being isolated from said first compartment and having (1) means for treating the second material other than by cooling, or (2) means removing the second material from its compartment.

- (1) Note. The heating or moving means may be an agitator, a dispenser, blower, pump or conveyor.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 336, for material handling means of diverse types.

**338 Liquid container or flow line within cooled enclosure:**

This subclass is indented under subclass 337. Apparatus in which the material handling means is a liquid container or flow line within the article cooling compartment.

SEE OR SEARCH THIS CLASS, SUB-CLASS:  
389+, for a withdrawable liquid cooler.

SEE OR SEARCH CLASS:  
222, Dispensing, subclass 146 for a dispenser with heating or cooling means of general application, and subclasses 173+ for fluid dispensing means with a casing or support.

**339 Including inlet flow line connection:**

This subclass is indented under subclass 338. Apparatus in which the cooled liquid container has an inlet flow line connected to an external source, e.g., city water supply.

**340 MEANS PRODUCING SHAPED OR MODIFIED CONGEALED PRODUCT:**

This subclass is indented under the class definition. Apparatus comprising means to shape or retain the shape of material being congealed, congealing means with means to release material congealed thereon, or means to modify the consistency of material being congealed by the working thereof (e.g., whipping) during congealation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 66+, for related processes.
- 123+, for a separator for a solidified constituent of a liquid mixture.
- 135+, for product responsive means to produce a congealed product.
- 307, for means to inject a gas combined with an ice or ice cream maker.
- 317+, for a separator-clarifier combined with a congealed product maker.
- 320+, for a comminutor combined with a congealed product maker.
- 322, for a disparate treater serially arranged with product cooling means.
- 324+, for a reversible heat pump which may thaw a product mold.
- 373+, for liquid contacting a distinct removable receptacle, e.g., ice can.
- 440+, for means for cooling a mere container.

SEE OR SEARCH CLASS:

- 30, Cutlery, subclass 140 for hand manipulable cutting means to form ice cubes

from an ice block, and subclass 164.5 for an ice pick.

- 83, Cutting, appropriate subclasses for devices for cutting ice blocks through thicknesswise.
- 249, Static Molds, subclasses 69+ and 129+ for ice cube trays not combined with means to congeal the fluent material to form the ice cube.
- 299, Mining or In Situ Disintegration of Hard Material, subclasses 24+ for a device for working naturally occurring ice in situ, and including machines and cutters to form blocks of ice for recovery.
- 426, Food or Edible Material: Processes, Compositions, and Products, appropriate subclasses for frozen food products and processes of preparing same.

**341 With article press means:**

This subclass is indented under subclass 340. Apparatus including means compressing an article, e.g., food package, during the freezing thereof.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 60, for processes involving packaging.
- 75, for sequential stage congelation processes.

SEE OR SEARCH CLASS:

- 100, Presses, appropriate subclass for pressing processes and apparatus of general application.
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 80 for laminating processes involving a step of refrigeration or freezing and subclass 498 for laminating devices with article cooling means.
- 264, Plastic and Nonmetallic Article Shaping or Treating: Processes, for shaping or molding processes within the class definition which may include the mere compacting of ice. subclass 28 therein includes the step of cooling and/or freezing to a temperature of zero °C and subclasses 109+ pertains to forming of articles by uniting of discrete bulk assembled particles.

- Subclasses 237 and 348 include cooling steps.
- 425, Plastic Article or Earthenware Shaping or Treating: Apparatus, appropriate subclasses for molding apparatus, per se, for shaping particulate ice or solidified carbon dioxide.
- 342 With means for working congealing material, e.g., beater:**  
This subclass is indented under subclass 340. Apparatus including means to modify the consistency of a material being frozen, e.g., beater.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 8+, for a solidified gas producer or former.
- 66+, for related processes.
- 135+, for control means responsive to congelation product condition.
- 136, for change of consistency sensing.
- 307+, for freezing means combined with a submerged gas inlet.
- 337, for a freezer and agitator combined with a storage compartment.
- SEE OR SEARCH CLASS:
- 165, Heat Exchange, subclass 94 for a heat exchanger of general application having a scraper removing a product and subclass 109.1 for one having a stirrer or agitator.
- 366, Agitating, subclasses 69+ and 241+ for a beater type agitator.
- 343 Diverse blades:**  
This subclass is indented under subclass 342. Apparatus including blades having diverse structure, e.g., beater and scraper.
- 344 With product receiving and storing means:**  
This subclass is indented under subclass 340. Apparatus including product receiving and storing means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 67, for processes involving packaging.
- 379, for solid refrigerant handling.
- 529, for refrigerant handling or storing, per se.
- 345 Freezing surface mounted for movement during freezing:**  
This subclass is indented under subclass 340. Apparatus including means for movably supporting a freezing surface during freezing.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 341, for a press type moving freezing surface.
- SEE OR SEARCH CLASS:
- 15, Brushing, Scrubbing, and General Cleaning, subclass 256.5 for a moving surface scraper wiper or brush where the surface means is of general application.
- 165, Heat Exchange, subclasses 86+ for a movable heat exchange surface not specialized by structure to refrigeration.
- 346 Drum:**  
This subclass is indented under subclass 345. Apparatus wherein the freezing surface is a rotating drum.
- 347 With raw material projector, e.g., spray:**  
This subclass is indented under subclass 340. Apparatus including means to project, e.g., spray, raw material onto a freezing surface.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 74, for related processes.
- 268+, for a vacuumized chamber type cooler in which the material cooled may be sprayed.
- SEE OR SEARCH CLASS:
- 159, Concentrating Evaporators, subclasses 3+ for a spray type concentrating evaporator.
- 239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclasses for spraying means, per se.
- 425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 6+ particulate material maker comprising a liquid comminutor (e.g., spray, etc.) and means providing a congealing area.

- 348 With means to precool or recirculate raw material:**  
This subclass is indented under subclass 340. Apparatus including means to cool the raw material prior to feeding it to the congelation product producer or means to remove the material being treated and return it back to the congelation means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
75, for related processes.
- 349 Thawing means:**  
This subclass is indented under subclass 340. Apparatus including means to release the product by heating an adhering surface.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
73, for related processes.  
275+, for preventing atmospheric condensate by an external heater.  
277+, for preventing or removing atmospheric condensate by a refrigeration producer.
- SEE OR SEARCH CLASS:  
414, Material or Article Handling, subclass 421 for a rotary cradle for dumping an ice block from an ice can, the cradle usually being provided with means to heat the can for releasing the ice block therefrom.
- 350 Attached to hand-manipulable mold:**  
This subclass is indented under subclass 349. Apparatus attached to a hand manipulable mold, e.g., tray and grid ice cube former.
- 351 Electrical heater:**  
This subclass is indented under subclass 349. Apparatus including an electrical heating means.
- SEE OR SEARCH CLASS:  
219, Electric Heating, appropriate subclasses for an electrical heater of more general utility.
- 352 Means using refrigerant or coolant as heating fluid:**  
This subclass is indented under subclass 349. Apparatus including means utilizing a refrigerant as a heating means by-passing a condenser between the compressor and evaporator or comprising a heated coolant circuit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
277+, for similar structure utilized to prevent or remove atmospheric condensate from a heat absorbing surface.  
324, for a reversible cycle heat.
- 353 Heat absorber with product remover:**  
This subclass is indented under subclass 340. Apparatus including means absorbing heat from a surface with means for removing a congealed product from said surface.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
345+, for moving surface congealing means often provided with a product remover, and see the Notes thereto.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclass 94 for a heat exchanger of general application provided with a scraper.
- 354 Moving scraper:**  
This subclass is indented under subclass 353. Apparatus wherein the product is removed by blade means moving adjacent the freezing surface.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
284, for similar apparatus for preventing or removing atmospheric condensate from a heat absorbing member.
- 356 Mold with means to absorb heat, e.g., brine tank:**  
This subclass is indented under subclass 340. Apparatus provided with means for cooling the mold, e.g., an ice cream mold in a cold brine tank.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 300+, for assembly and disassembly means releasing a mold from its support.
- 307+, for a cooled tank with means to inject air.
- 440+, for a cooled enclosure of more general application.

**371 PORTABLE, COMMODITY-CONTAINING:**

This subclass is indented under the class definition. Apparatus which forms a unit and comprises a portable container completely enclosing a commodity and/or coolant, the arrangement being such that the commodity must be removed to place or remove the coolant or vice versa or the unit must be destroyed as such when opened.

- (1) Note. The commodity may be a coolant as in the case of packaged solidified carbon dioxide.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 1, for a product of refrigeration.
- 60, for processes including forming a package.
- 440+, particularly subclass 457, for a refrigerator forming an enclosure even though portable.

SEE OR SEARCH CLASS:

- 43, Fishing, Trapping, and Vermin Destroying, subclasses 56+ for a cooled minnow bucket.
- 217, Wooden Receptacles, especially subclasses 7+ and 36+ for a compartmented crate of general utility.
- 220, Receptacles, subclasses 592.01+ for a receptacle having means for maintaining its contents above or below ambient temperature.

**372 Mutually supported commodity and solid coolant:**

This subclass is indented under subclass 371. Apparatus in which the commodity is cooled by a solid coolant and the commodity and coolant or their containers serve to position each other.

**373 LIQUID CONTACTING DISCRETE COMMODITY:**

This subclass is indented under the class definition. Apparatus for directing, controlling or handling a liquid coolant so as to cause it to contact a discrete freely removable commodity the bottom of which merely rests on support means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 64, for related processes.
- 304+, for a material cooler having means promoting contact of liquid with the atmosphere.
- 430+, for an enclosure in which there is a tank provided with means circulating an intermediate fluid into contact with the exterior of the tank.

SEE OR SEARCH CLASS:

- 134, Cleaning and Liquid Contact With Solids, appropriate subclass, for apparatus contacting a liquid of general application. Class 62 takes cooling processes and apparatus specialized to refrigeration, e.g., particular refrigeration producing means or specific heat transfer structure.

**374 With article conveyer or transporter:**

This subclass is indented under subclass 373. Apparatus including means to transport or convey the article through a refrigeration zone.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 336, 337, 340+, 377, and 378+, for other article handling combinations.

SEE OR SEARCH CLASS:

- 134, Cleaning and Liquid Contact With Solids, appropriate subclass, particularly subclasses 61+ and 124+ for an article and liquid contact device with an article conveyor of more general application.

**375 With liquid recirculating means:**

This subclass is indented under subclass 374. Apparatus in which the liquid coolant is recirculated in a determined path.



- 376 With liquid recirculating means:**  
This subclass is indented under subclass 373. Apparatus in which the liquid coolant is recirculated in a determined path.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
310, for a gas-liquid contacting cooler with liquid recirculating means.  
375, for article conveying or transporting with liquid recirculating means.
- 377 ARTICLE HOLDER MOUNTED ON DOOR OR PIVOTED PARTITION:**  
This subclass is indented under the class definition. Apparatus including an article holder mounted on a pivoted closure or a partition.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
266, for similar structure wherein there is air blocking means.
- 378 ARTICLE MOVING MEANS:**  
This subclass is indented under the class definition. Apparatus provided with means for guiding a freely supported discrete article to be cooled or a solid coolant with respect to treating zone, e.g., conveyor, dispenser, rack, track, guideway, or chute.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
250, for a display cabinet with an article handler.  
266, for means providing access to a compartment and blocking air flow.  
298, for assembling and disassembling means.  
340+, for a congealed product maker which may include a product conveyor.  
374+, for a similar organization with liquid contacting the article.  
440+, for a refrigerated enclosure provided with an article support, e.g., shelf.
- SEE OR SEARCH CLASS:  
53, Package Making, subclass 388 for package seam coolers.  
187, Elevator, Industrial Lift Truck, or Stationary Lift for Vehicle, appropriate subclass for elevator structure.
- 198, Conveyors: Power-Driven, appropriate subclass for conveyor structure.  
214, Material or Article Handling, appropriate subclass, particularly subclass 16, for material handling of more general application.  
221, Article Dispensing, subclass 150 for article dispensing apparatus with cooling or heating, of more general application.  
312, Supports: Cabinet Structure, subclasses 294+ for a cabinet with a movable component, e.g., drawer, tray or pivoted shelf.
- 379 Solid refrigerant :**  
This subclass is indented under subclass 378. Apparatus in which the article guided or conveyed is a solidified refrigerant, e.g., CO<sub>2</sub> or water ice.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
529+, for a refrigerant cooler or container.
- 380 Continuous longitudinal-type conveyor:**  
This subclass is indented under subclass 378. Apparatus provided with a continuous conveyor, e.g., belt or chain.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
345+, for endless conveyor means associated with means producing a shaped congealed product.
- 381 Rotary about fixed axis, e.g., rotary shelf or scraper:**  
This subclass is indented under subclass 378. Apparatus mounted in such a manner that it is rotatable about a fixed axis.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
346, for a rotary drum material congealer.
- 382 Drawer, tray or track-guided type; horizontally movable:**  
This subclass is indented under subclass 378. Apparatus including a drawer, tray or other component movable in a horizontal direction.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
302, for repair or assembly means sliding or rolling on guide means.
- SEE OR SEARCH CLASS:  
312, Supports: Cabinet Structure, sub-classes 330.1+ for a cabinet with a horizontally movable component, e.g., drawer.
- 383 MOVABLE THERMAL MEANS VARYING HEAT TRANSMISSION:**  
This subclass is indented under the class definition. Apparatus including (1) a heat transmitting means, e.g., plate, (2) insulation means, or (3) heat absorbing means; which means are movable to vary the heat transmission between a cooling source and a cooled space, or (4) means to vary the flow of a fluid past a heat transmitting panel mounted in a contact with insulation means so as to vary heat transmission through the panel.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
283, for removable moisture condensing means distinct from a principal heat absorber.
- 384 COOLER UTILIZING SOLIDIFIED GAS:**  
This subclass is indented under the class definition. Apparatus specific to the use of solidified gas, e.g., CO<sub>2</sub>, for cooling an enclosed space or having means to use the cooling effect in the treatment of fluid or solid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
165+, for automatic control of means utilizing solidified gas.  
601+, for manufacturing of solidified gas.
- 385 Sublimed gas entering insulation or within hollow wall:**  
This subclass is indented under subclass 384. Apparatus including means for either (1) discharging sublimed CO<sub>2</sub> into insulation or (2) circulating said gas within a hollow wall structure which is sealed except for a sublimed gas inlet and outlet.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
273, for a similar arrangement serving to prevent condensation upon insulation.
- 386 Means cooling withdrawable liquid:**  
This subclass is indented under subclass 384. Apparatus including means for guiding in a path a liquid being cooled for external use, the liquid remaining as such during the cooling operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
98+, for related processes.  
389+, for an otherwise cooled withdrawable liquid cooler.
- 387 External as circulator or director:**  
This subclass is indented under subclass 384. Apparatus comprising means for regulating, directing, forcing or controlling the flow of an external gas in a predetermined flow path relative to a cooling means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
404+, for any otherwise cooled gas circulating or directing means.
- 388 Means dispersing sublimed gas into cooled enclosure:**  
This subclass is indented under subclass 384. Apparatus constructed and arranged to disperse into a storage enclosure sublimed gas from a solid gas compartment or holder.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
78, for processes including providing a special atmosphere for a refrigerator.
- 389 WITHDRAWABLE LIQUID, E.G., DISPENSER:**  
This subclass is indented under the class definition. Apparatus including means for guiding in a path a liquid being cooled for external use, the liquid remaining as such during the cooling operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
98+, for related processes.

- 177+, for automatic control of external fluid.  
 294, for a sealed container having a cutter or punch to release the container contents.  
 304+, particularly subclass 306 for a liquid dispenser with gas-liquid contact means.  
 318+, for a separating-clarifier for cooled withdrawable liquid.  
 336, for material handlers of diverse types.  
 337+, particularly subclass 338 for a liquid container or flow line within a storage enclosure.  
 373+, for a liquid contacting distinct article type of cooler.  
 386, for a withdrawable liquid cooler specific to use of solidified gas.  
 430, for a cooler which may use a flowing liquid as an intermediate heat exchanging medium.  
 457.1+, for a portable receptacle type cooler of general and specific utility.  
 530, for an envelope type container for a liquid which may be refrozen.

## SEE OR SEARCH CLASS:

- 222, Dispensing, appropriate subclass, particularly subclass 146 for dispensing means of more general application.

**390 With plural liquid outlets or sources, e.g., distributing system:**

This subclass is indented under subclass 389. Apparatus in which there are plural liquid outlets or sources, e.g., dispensing faucets or barrels.

## SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 561+ particularly subclasses 594+ and 602+, for a fluid distribution system of general application.  
 222, Dispensing, subclasses 129+ for plural source dispensers of general application.

**391 With withdrawn liquid receiver:**

This subclass is indented under subclass 389. Apparatus in which there is a receiver for withdrawn liquid, e.g., flows in heat exchange relationship with the incoming liquid or the waste liquid or the waste liquid is collected in an open container.

## SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 312+ for fluid handling of general utility with a drip or waste receiver.  
 222, Dispensing, subclasses 108+ for a dispenser with a drip or a waste receiver.

**392 With agitator for withdrawable liquid:**

This subclass is indented under subclass 389. Apparatus including an agitator for the liquid.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 342+, for means for working (agitating) congealing material.  
 434, and 435, for means agitating an intermediate heat exchanging liquid.

## SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 109.1 for a heat exchanger of general application with an agitator.  
 366, Agitating, subclasses 144+ for an agitating device with cooling means.

**393 With intermediate indirect heat transfer fluid container or conductor:**

This subclass is indented under subclass 389. Apparatus including (1) means confining the withdrawable liquid, (2) means confining a coolant, and (3) means confining a fluid which acts to transfer heat between means (1) and (2).

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 430+, for intermediate fluid heat exchanging combinations.

**394 Refrigerant evaporator surrounding or within a container:**

This subclass is indented under subclass 389. Apparatus in which a refrigerant evaporator is in heat exchange relationship with a liquid flow line, liquid container, or other liquid storage means.

**395 Between cooled liquid container and insulation:**

This subclass is indented under subclass 394. Apparatus in which the refrigerant evaporator is located between the cooled liquid container or flow line and insulation.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
451, for a coolant container-enclosure relationship.
- 396 In indirect heat exchanging relationship to coolant:**  
This subclass is indented under subclass 389. Apparatus in which the flow path is in indirect heat exchange relationship with a coolant, e.g., ice or liquid.
- 397 Barometric feed-type liquid container:**  
This subclass is indented under subclass 396. Apparatus in which the container for the liquid to be cooled is of the barometric feed type, i.e., a container in which atmospheric pressure is utilized for maintaining a liquid within the container against its hydrostatic head.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 453 for a barometric feed device of general application and see the Notes thereto.
- 398 Cooled liquid container supporting ice:**  
This subclass is indented under subclass 396. Apparatus in which means forming the flow path is arranged to support solid coolant material.
- 399 Helical or spiral coil:**  
This subclass is indented under subclass 396. Apparatus comprising a helical or spiral coil.
- 400 Ice holder and cooled liquid container concentrically nested:**  
This subclass is indented under subclass 396. Apparatus in which the flow path is in nested concentric relationship with an ice holder.
- 401 AIR COMPRESSOR, COOLER AND EXPANDER TYPE:**  
This subclass is indented under the class definition. Apparatus in which there are means for compressing, cooling, and expanding gas which remains throughout in a gaseous state.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
86+, for related processes.  
172, for automatic control of related apparatus.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclasses 121+ for a heat exchanging and air pump combination of general application.  
418, Rotary Expansible Chamber Devices, subclasses 83+ for rotary expansible chamber devices having heat exchange means.
- 402 Motor-type expander**  
This subclass is indented under subclass 401. Apparatus in which the expanding air actuates a motor to produce work.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
38+, for related liquefied gas product producing apparatus.
- SEE OR SEARCH CLASS:  
415, Rotary Kinetic Fluid Motors or Pumps, appropriate subclass for a turbine of general utility.
- 403 Reciprocating element-type motor, e.g., piston:**  
This subclass is indented under subclass 402. Apparatus in which the motor includes a reciprocating element, e.g., piston.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
6, for a "Stirling" cycle machine.
- 404 GAS CONTROLLER OR DIRECTOR:**  
This subclass is indented under the class definition. Apparatus comprising means for forcing or directing gas in a desired flow path relative to cooling means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
89+, for processes involving circulation of cooled gas.  
186+, for automatic control of air circulation.  
255+, for a cooled display device having air controlling or directing means.  
304+, particularly subclass 314 for a gas-liquid contact material cooler often involving air circulation.

- 336, for a cooled material handler of diverse types in which one of the materials may be air.
- 337, for a cooled article compartment and an isolated material (air) handler.
- 387, for a cooler peculiar to solidified gas (CO<sub>2</sub>) and having an external gas circulator or director.
- 405 Isolated gas compartment, e.g., cold air jacket:**  
This subclass is indented under subclass 404. Apparatus including a storage compartment in indirect heat transfer relationship with the cooled gas.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 246+, particularly subclass 253 for a hollow jacket display cabinet.
- 406, for indirect liquid or holdover means cooling a gas.
- 417, for a cabinet with air circulating means and plural cooled storage compartment separated by an imperforate wall.
- 406 Gas passage over or through indirect heat-transfer container or holdover:**  
This subclass is indented under subclass 404. Apparatus including an enclosure sealed off from both the primary cooling means and from the gas to be cooled, such enclosure containing a secondary heat transfer medium and in which there is structure directing the gas over or through the secondary means enclosing the heat transfer medium.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 393, for a withdrawable liquid with intermediate heat transfer.
- 407 Cooled gas directed relative to cooled enclosure:**  
This subclass is indented under subclass 404. Apparatus including means for directing the cooled gas relative to the interior of an enclosure to be cooled.
- SEE OR SEARCH CLASS:
- 165, Heat Exchange, subclasses 104.18 and 104.22+ for a heat exchanger with an impeller circulating an intermediate enclosed body of fluid.
- 454, Ventilation, appropriate subclasses for a ventilated enclosure of general application.
- 408 With adjustable gas flow controller:**  
This subclass is indented under subclass 407. Apparatus including adjustable means for varying the flow of gas.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 187, for automatic control of a damper between compartment.
- 265+, for compartment access closure means operating a gas flow controller.
- 409 For exterior port:**  
This subclass is indented under subclass 408. Apparatus controlling an opening to the exterior of the enclosure.
- SEE OR SEARCH CLASS:
- 454, Ventilation, particularly subclasses 322+ and 333+ for building ventilating of general application including an adjustable valve on an air inlet.
- 410 Exterior port, i.e., ventilating:**  
This subclass is indented under subclass 407. Apparatus including a port for the gas being cooled opening to the ambient atmosphere exteriorly of the enclosure.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 409, for similar structure with a variable flow controller for the gas.
- 411 With additional means causing flow, e.g., blower:**  
This subclass is indented under subclass 410. Apparatus including additional means for causing gas flow, e.g., blower, air scoop or heating means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 414, 419 and 426+, for other combinations including gas forcing means.

- SEE OR SEARCH CLASS:  
454, Ventilation, appropriate subclasses for a building having a ventilation air pump of general application.
- 412 Inlet and outlet ports:**  
This subclass is indented under subclass 410. Apparatus including an inlet and an outlet port for the atmosphere exteriorly of the cooled enclosure.
- SEE OR SEARCH CLASS:  
454, Ventilation, subclasses 237+ for building ventilation of general application including an inlet and outlet.
- 413 Means verging gas streams within storage space:**  
This subclass is indented under subclass 407. Apparatus including combining and dividing separate circulating gas streams at a common verging area.
- (1) Note. Many of these patents are for freight cars with air cooling ice bunkers at opposed ends.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
255+, for a display cabinet which may include means causing verging air flow.
- 414 Gas flow forcing means:**  
This subclass is indented under subclass 413. Apparatus including powered means causing flow of a gas.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
411, for similar structure with an exterior port.
- 415 Space cooler units in separate streams:**  
This subclass is indented under subclass 413. Apparatus including a cooler unit in each of a plurality of the separate gas streams.
- 416 Above storage space and adjacent opposed walls:**  
This subclass is indented under subclass 415. Apparatus placed above a storage space and adjacent opposed walls of a cooled enclosure.
- 417 With imperforate partition forming storage compartments:**  
This subclass is indented under subclass 407. Apparatus including a dividing wall or partition having substantial imperforate areas forming a plurality of cooled compartments.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
441+, for a cooled enclosure with plural compartments of more general utility.
- 418 Foraminous gas distributor flow connected to cooler unit:**  
This subclass is indented under subclass 407. Apparatus including passage means connecting the cooling means and a gas distributing or plenum chamber at least one wall of which is foraminous.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
421+, for an enclosure with gas circulating means and a foraminous ice container.
- SEE OR SEARCH CLASS:  
454, Ventilation, subclasses 296+ for an air distributor including a foraminous wall.
- 419 Gas forcing means:**  
This subclass is indented under subclass 407. Apparatus including a mechanical gas forcing means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
314+, for similar structure including a gas liquid contactor.  
411, for gas flow forcing means relative to a ventilating port.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclasses 121+ for a fan forcing air through a heat exchanger not specialized to refrigeration.
- 420 Directed relative to ice container:**  
This subclass is indented under subclass 407. Apparatus, wherein the gas is directed in heat exchange relationship with container means holding ice.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
327+, for an ice bunker wall movable to convert to an uncooled storage space, e.g., iced car to ordinary freight car.
- 421 Foraminous wall or bottom ice container:**  
This subclass is indented under subclass 420. Apparatus, wherein the ice holding means includes a foraminous wall or bottom.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
418, for a foraminous gas flow distributor connected by passage means to cooling means.
- 422 Melt collector over storage space:**  
This subclass is indented under subclass 421. Apparatus, including ice-melt collecting means over a dry storage chamber.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
459+, for a mere cooled enclosure involving ice melt collection, distribution or use.
- 423 Storage space along container side:**  
This subclass is indented under subclass 422. Apparatus, having a dry storage chamber in side by side relationship with the ice holding means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
415+, for similar structure having at least two spaced cooling units, e.g., ice bunkers.
- 424 Gas flow passage means under ice container:**  
This subclass is indented under subclass 420. Apparatus, including means forming a gas flow passage beneath the ice holding means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
421+, for a melt collector providing a gas flow passage beneath a foraminous wall container.
- 425 Gas flow through ice compartment contacting ice:**  
This subclass is indented under subclass 404. Apparatus, in which the gas passes in direct contact with the cooling means (ice) in its compartment.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
387, for means having features specific to the use of solidified gas.
- 426 Gas forcing means, e.g., cooler unit:**  
This subclass is indented under subclass 404. Apparatus, including gas forcing means structurally related to the cooling means for moving the air thereover, e.g., self-contained air circulating and cooling units.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
272+, particularly subclass 277 for a similar unit having atmospheric condensate handling means.  
314, for similar structure including a gas liquid contactor.  
411, for a blower related to a ventilation part of a cooled enclosure.  
414, for similar structure relative to verging streams and a cooled enclosure.  
419, for gas forcing means relative to a cooled enclosure.
- 427 Plural gas inlets, e.g., recirculated and fresh air:**  
This subclass is indented under subclass 426. Apparatus including an inlet for a stream of gas to be cooled and an inlet for adding an additional stream to the former stream, e.g., an air conditioning unit mixing a cooled stream of air with a stream of air from the cooled enclosure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
122, for related processes.
- SEE OR SEARCH CLASS:  
454, Ventilation, subclasses 237+ for a related ventilation device of general utility.

**428 Means directing gas over heat rejector:**

This subclass is indented under subclass 426. Apparatus wherein the gas is directed over a heat rejecting element of a refrigeration system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 90, for processes of circulating external gas with reheating.
- 173, for automatic control of external fluid reheating.
- 272+, for the handling of atmospheric condensate on a heat absorber.
- 305, for gas-liquid contact means cooling a heat rejecter.
- 427, for similar structure arranged for admitting fresh and recirculated air.
- 505, and 506, for a refrigeration producer with a heat rejecting element cooling feature.

**429 Unitarily driven plural blowers:**

This subclass is indented under subclass 428. Apparatus, including a plurality of blowers driven by common driving means.

**430 INTERMEDIATE FLUID CONTAINER TRANSFERRING HEAT TO HEAT ABSORBER OR HOLDOVER:**

This subclass is indented under the class definition. Apparatus including (1) a solid heat hold-over member or (2) means forming a compartment which contains a substance acting as an indirect heat transferring medium or reserve coolant, mounted on or forming part of a refrigeration producer or forming part of the structure of a cooled enclosure, e.g., storage compartment wall, and acting to transfer heat to a heat absorber.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 59, for processes of accumulating hold-over ice in situ.
- 99, for processes of cooling a fluid using indirect heat transfer fluid.
- 185, for automatic control of an intermediate heat transfer medium.
- 356, for mold means with an intermediate heat transfer medium.

393, for means for cooling withdrawable liquid including an intermediate heat transfer medium.

406, for an air cooler with an air passage over or through an indirect heat transfer container or holdover.

457.1, for a portable receptacle confining a coolant.

530, for an envelope confining a coolant.

**431 Side-by-side or superimposed cooled compartments:**

This subclass is indented under subclass 430. Apparatus including means forming a plurality of side-by-side or superimposed storage compartments.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 340+, for means having congealed product making features.
- 441+, for cooled enclosure with plural compartments.

**432 Different temperature arrangements:**

This subclass is indented under subclass 431. Apparatus, including features arranged to maintain different temperatures in the various storage compartments, e.g., by (1) varying the flow of indirect fluid surrounding the compartments, (2) varying the quantities of indirect fluid surrounding the compartments or, (3) a disparate arrangement of the primary coolant elements in the indirect fluid or holdover.

**433 With top access to each compartment, e.g., ice cream cans:**

This subclass is indented under subclass 431. Apparatus including a top access opening for each compartment.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 458, for an enclosure having an open access cooled surface.

**434 Flow line connected transfer fluid supply and heat exchanger:**

This subclass is indented under subclass 430. Apparatus including flow line connection to a heat exchanger in or forming the compartment to be cooled.



- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
435, for an enclosure wherein the indirect fluid surrounding a compartment is agitated.
- 435 With indirect fluid pump or agitator:**  
This subclass is indented under subclass 430. Apparatus including a pump or agitator means for the indirect fluid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
342+, for congealed product making and agitating.  
392+, for a withdrawable liquid cooler and agitator.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclasses 104.18 and 104.22+ for a heat exchanger of general application having an intermediate exchanger fluid circulated by a mechanical impeller.  
366, Agitating, appropriate subclass for an agitator of more general utility.
- 436 Connected distinct sections for indirect fluid:**  
This subclass is indented under subclass 430. Apparatus including distinct sections or casings which are connected to each other by a flow line for either the coolant or the indirect fluid.
- 437 Non-liquid heat accumulator:**  
This subclass is indented under subclass 430. Apparatus including a normally nonliquid heat accumulator.
- SEE OR SEARCH CLASS:  
126, Stoves and Furnaces, subclass 400 for a heat accumulator there provided for and see the Notes thereto.
- 438 Forming cooled storage compartment:**  
This subclass is indented under subclass 430. Apparatus including a shaped, cooled storage compartment formed by an intermediate heat transferring fluid container.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
516+, for a shaped evaporator, per se.
- 439 Unitary jacket surrounding coolant line:**  
This subclass is indented under subclass 430. Apparatus including a unitary coolant confining flow line and jacket means surrounding it.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
394+, for a withdrawable liquid cooler having an evaporator surrounding or within a container.
- 440 COOLED ENCLOSURE:**  
This subclass is indented under the class definition. Apparatus supported relative to means forming an enclosure.
- (1) Note. The cooled enclosure may be open to the atmosphere and include only means forming a boundary for a cooled surface.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
239+, for a vehicle feature.  
246+, for an enclosure with a display feature.  
259+, for a structural installation.  
265+, for a compartment access closure combined with air blocking means.  
272+, for an enclosure with means preventing or handling atmospheric condensate.  
297+, for a cooled enclosure with an external support.  
309, for gas-liquid contact material cooling means and means circulating gas relative to a cooled enclosure.  
371+, for a portable, commodity-containing receptacle.  
407+, for enclosures with means directing cooled gas relative to it.  
430+, for a cooled enclosure with indirect heat transfer or holder means.  
516+, for an evaporator which in itself forms a cooled enclosure.  
529+, for a refrigerant or coolant storer or handler, e.g., ice storing enclosure specialized to such use.

- SEE OR SEARCH CLASS:
- 52, Static Structures (e.g., Buildings), appropriate subclasses for the structure, per se, which may be defined as forming a refrigerated space, particularly subclasses 380+, 404.1+, 408+, and 479+.
- 220, Receptacles, subclasses 560.04+ and 592.01+ for a receptacle intended to form a cooled enclosure.
- 312, Supports: Cabinet Structure, appropriate subclasses, particularly subclasses 31+ for a cabinet with gas or vapor treatment, subclass 116 for a refrigerated show case, and subclass 236 for a cabinet with heat exchange means and see the Note thereto.
- 441 Plural cooled compartments:**  
This subclass is indented under subclass 440. Apparatus including means dividing the enclosure into plural compartments, each of which is cooled.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
252+, for plural display compartments.  
337+, for a cooled storage compartment and material handler.  
417, for plural compartments with a gas director.
- 442 Coolers in parallel for plural compartments:**  
This subclass is indented under subclass 441. Apparatus including a separate heat absorber or remover for each of the compartments, said heat absorbers operating in parallel.
- 443 Cooler integral with or forming dividing wall:**  
This subclass is indented under subclass 441. Apparatus having the heat absorbing or removing element either serving as a partition separating plural cooled compartments or secured to a partition in such a manner as to lie adjacent thereto and be a part thereof.
- 444 Exterior wall:**  
This subclass is indented under subclass 443. Apparatus in which the heat absorbing element or section forms an integral part of an exterior wall of the cooled enclosure.
- 445 With non-dividing cooler:**  
This subclass is indented under subclass 443. Apparatus including a distinct heat absorbing element or section spaced from the heat absorbing partition.
- 446 Forms plural sides of a storage compartment:**  
This subclass is indented under subclass 443. Apparatus in which the heat absorbing partition is so shaped as to form plural sides of a compartment, e.g., freezing and cooled compartments.
- 447 Insulating dividing wall:**  
This subclass is indented under subclass 441. Apparatus including a separating partition having insulating properties.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
329, for means including a movable shelf or partition constructed for converting the mode of operation or use.  
383, for an adjustable thermal member varying heat transmission, e.g., movable insulating means.
- 448 Movable unit of refrigeration producing assembly:**  
This subclass is indented under subclass 440. Apparatus in which a refrigeration producer or part thereof is movable relative to the cooled enclosure.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
237, for an ambulant cooled enclosure and separable power or cooling source.  
298+, for apparatus having means for repairing, assembling or disassembling it.  
465+, for particular supporting means with an enclosure, e.g., resilient support for shelf.
- 449 Unit includes movable wall section, e.g., door:**  
This subclass is indented under subclass 448. Apparatus in which a portion of the enclosure wall moves with the movable refrigeration producing part.

- 450 Unit includes condenser fan:**  
This subclass is indented under subclass 449. Apparatus in which the movable part has a fan for forced circulation of air over the condenser of the refrigeration producer.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
506+, for a compressor-condenser-evaporator refrigeration producer with means causing cooling fluid contact with a rejector and see the Notes thereto.
- 451 Flowing coolant container covered by insulation means or within hollow wall of enclosure:**  
This subclass is indented under subclass 440. Apparatus in which the heat absorbing element is covered by insulating material or contained within a hollow wall forming at least part of a cooled enclosure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
395, for a withdrawable liquid cooler including an evaporator between it and insulation.  
405, for a jacketed enclosure with means for circulating a gas through it.
- 452 With heat rejecting element enclosure or cooling feature:**  
This subclass is indented under subclass 440. Apparatus including features rejecting or aiding in the rejection of heat from at least one element of a flowing refrigerant type refrigeration producer and/or means forming an enclosure for such elements.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
506, for compressor-condenser-evaporator refrigeration producer with means causing cooling fluid contact with a heat rejector and see the Notes thereto.
- 453 Heat rejector contacting enclosure wall:**  
This subclass is indented under subclass 452. Apparatus in which the heat rejecting element contacts and is supported in heat conducting relationship with a wall forming the exterior of the enclosure.
- 454 With ventilation means therefor:**  
This subclass is indented under subclass 452. Apparatus including means to circulate air over the rejecting element or vent air from the heat rejecting element enclosure.
- 455 Forced circulation:**  
This subclass is indented under subclass 454. Apparatus including means to force air over the heat rejecting element.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
305, for similar structure including a gas liquid contactor.
- 456 Vertical flue venting bottom compartment:**  
This subclass is indented under subclass 454. Apparatus in which the heat rejecting element enclosure is a compartment below the cooled enclosure and there is a distinct vertical flue communicating with and extending upwardly therefrom.
- 457.1 Portable receptacle:**  
This subclass is indented under subclass 440. Apparatus, including means associated with (e.g., supported by, supporting, or surrounding), or integral with, a transportable container (e.g., a bottle, a carrier, etc.), which means has feature peculiar to refrigeration or cooling the container's contents; e.g., a sealed nonrefillable coolant containing compartment, ice melt handling means, ice support means, means supported by ice, or a particular refrigerant, etc.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
293, for a hand manipulable tool which may include a coolant container with means for manipulating it for use as a cooling means.  
297, for a refrigerator with external support means.  
371+, for a portable commodity containing type package or another type of container.  
389+, particularly subclasses 397 and 400 for a withdrawable liquid type cooler which may include a cooled liquid supplying container.  
530, for a portable envelope type coolant container.

## SEE OR SEARCH CLASS:

215, Bottles and Jars, appropriate subclass, for glass or ceramic portable receptacles, particularly subclasses 12.1+ for a spaced wall and jacket receptacle even if the space is merely a coolant compartment.

220, Receptacles, subclasses 592.01+ for a receptacle having means for maintaining its contents above or below ambient temperature which may include spaced walls for merely receiving a coolant in a space between them.

**457.2 With holdover material:**

This subclass is indented under subclass 457.1. Apparatus including a substance acting as an indirect heat transferring medium or reserve coolant, wherein the substance is carried by (mounted on or forming part of the structure of) the container (e.g., a storage compartment wall) and adapted to transfer heat to a heat absorber.

(1) Note. "Blue ice", gel, and saline solutions are types of materials used as hold-over materials.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

371+, for a portable commodity containing type refrigerator, particularly subclass 372 for such apparatus including means to support both the commodity and a solid refrigerant.

430+, for a refrigerator having an intermediate fluid container adapted to transfer heat to the holdover material.

529+, for a portable refrigerant container, particularly subclass 530 for an envelope type container.

**457.3 Drinking container:**

This subclass is indented under subclass 457.2. Apparatus including a beverage receptacle adapted for contact with a user's mouth; e.g., a mug, etc.

**457.4 For beverage receptacle:**

This subclass is indented under subclass 457.2. Apparatus adapted to cool a beverage container; e.g., a can of beer or soda, etc.

**457.5 For multiple receptacles:**

This subclass is indented under subclass 457.4. Apparatus adapted to cool a unitary plurality of beverage containers; e.g., a six pack cooler.

**457.6 Cooled serving dish:**

This subclass is indented under subclass 457.1. Apparatus adapted for use as a container or platter for serving edible products which are normally served cold, e.g., butter, raw shrimp, etc.

**457.7 Picnic/lunch box type cooler:**

This subclass is indented under subclass 457.1. Apparatus wherein the container is adapted to carry edibles (e.g., an assortment of foods and drinks) and maintain them in a cold state.

(1) Note. Picnic coolers and lunch boxes with cooling means are intended for this subclass.

**457.8 Wine server/cooler:**

This subclass is indented under subclass 457.1. Apparatus adapted to either accommodate a container of wine (e.g., a bottle or a carafe) or itself hold the wine.

**457.9 Cooled by means other than ice (e.g., mechanical, electrical, absorption, cryogenic, etc.):**

This subclass is indented under subclass 457.1. Apparatus including a refrigerating system independent of frozen water for cooling the container.

**458 Access surface open to atmosphere:**

This subclass is indented under subclass 440. Apparatus including an open access surface and cooling means therefor.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

235, for a rink.

246+, particularly subclasses 256 and 257 for an open access display cabinet.

258, for a noncooled work surface.

373+, for cooling apparatus contacting an article with a liquid.

515+, for an evaporator, per se, which may serve to support an article.

- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclasses 168+ for a plate type heat exchanger of general application.
- 459 Ice support, e.g., container:**  
This subclass is indented under subclass 440. Apparatus including means for supporting ice.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
132, for automatic control of ice melting or ice melt handling.  
241+, for means retarding sloshing of ice melt due to vehicle motion.  
285+, for an atmospheric condensate retainer or director.  
312+, for ice holder and ice drip-gas contactor.  
318+, for an ice-melt purifier.  
321, for means utilizing and comminuting ice.  
371, for a portable commodity containing type which commonly utilizes ice.  
379, for means handling a solid refrigerant as an article.  
384+, for a cooler utilizing a solidified gas.  
398, 399 and 400, for a withdrawable liquid cooler utilizing ice.  
420+, for means for directing gas flow relative to an ice compartment.  
425, for gas flow in contact with ice.  
529, for ice holding or supporting means, per se.
- 460 Flowing ice melt heat exchanger within cooled enclosure:**  
This subclass is indented under subclass 459. Apparatus including means to direct ice melt-age or drip in heat exchanging relationship with the space within the enclosure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
312+, for refrigeration in which the ice melt-age contacts gas.
- 461 Lateral ice melt distributor :**  
This subclass is indented under subclass 460. Apparatus including means distributing the ice melt laterally of the ice holding chamber.
- 462 Valve or trap within ice melt flow line:**  
This subclass is indented under subclass 459. Apparatus including a valve or a trap in a flow line for the ice melt.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 147+ for liquid valves or liquid trap seals of general application.
- 463 Partially surrounding storage compartment:**  
This subclass is indented under subclass 459. Apparatus including a container at least partially surrounding the cooled enclosure.
- 464 Top access to ice compartment:**  
This subclass is indented under subclass 459. Apparatus including an ice support located within an enclosure with means providing access to said support for loading or unloading the ice through the top or roof of the enclosure.
- 465 With particular internal element support:**  
This subclass is indented under subclass 440. Apparatus including a particular support means for an element within the cooled enclosure or means having a particular cooperative supporting relationship between the enclosure and an element within it.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
326+, for means supporting an element to change the size or function of a compartment.  
382, for a cooled compartment with defined means for supporting a drawer, tray or other track guided means.
- 466 Resilient:**  
This subclass is indented under subclass 465. Apparatus including resilient means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
295, for a resiliently supported power element.

**467 REFRIGERATION PRODUCER:**

This subclass is indented under the class definition. Apparatus comprising means to cause a cooling effect by producing a change in the condition of a material, e.g., change of phase of a material or applying and releasing a stress on a material.

- (1) Note. The change of condition must be that due to causes other than mere heat exchange or transfer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 332+, for a diverse system.  
335, for plural paired element refrigeration producing systems.

**468 With lubricant handling means:**

This subclass is indented under subclass 467. Apparatus including means handling a lubricant.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 84, for related processes.  
192+, for automatic control of lubrication.

SEE OR SEARCH CLASS:

- 184, Lubrication, appropriate subclasses for lubrication in general.  
418, Rotary Expansible Chamber Devices, subclasses 83+, for rotary expansible chamber devices having nonworking fluid lubrication or seal means.

**469 Of unitary motor-compressor in casing:**

This subclass is indented under subclass 468. Apparatus comprising a compressor and its motor which form a unit located within a common refrigerant and lubricant containing casing.

SEE OR SEARCH CLASS:

- 417, Pumps, subclass 372, for interrelated or common lubricating means for a pump or compressor and the drive motor therefor, and subclass 902, for a hermetically sealed motor and pump or compressor unit.

**470 Lubricant separator:**

This subclass is indented under subclass 468. Apparatus including means for separating the lubricant from the refrigerant.

SEE OR SEARCH CLASS:

- 210, Liquid Purification or Separation, subclasses 167.02 through 167.09 for liquid purification or separation means in a structural installation with a closed circulating system for a lubrication system.

**471 At evaporator or evaporator-discharge line:**

This subclass is indented under subclass 470. Apparatus in which the lubricant separator is at the evaporator or in its suction line.

**472 With lubricant heating means:**

This subclass is indented under subclass 471. Apparatus including means heating separated lubricant.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 275, for a device in which the lubricant and refrigerant may be heated for defrosting purposes.

**473 At condenser or receiver:**

This subclass is indented under subclass 470. Apparatus, including a condenser or similar receiver having means to separate the lubricant from the liquid refrigerant therein.

**474 With refrigerant treater:**

This subclass is indented under subclass 467. Apparatus including means acting to keep the refrigerant in a normal operating condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 85, for related processes.  
195, for automatic control of or by impurity removing means.  
292, for means for charging a closed refrigeration producer.  
303, for means cleaning external parts of refrigeration apparatus.  
317+, for means for purifying an external fluid or ice melt.  
401+, for air compressing-cooling-expanding type refrigeration produce which

- may include means for purifying the air used as a refrigerant.
- 470+, for a lubricant separator.
- 476+, particularly subclasses 490+, 495+ and 497 for means for separating substances necessarily present in a sorbent type refrigeration producer.
- SEE OR SEARCH CLASS:
- 55, Gas Separation, appropriate subclasses, for gas or vapor purification in general.
- 96, Gas Separation: Apparatus, for gas separation apparatus, per se.
- 210, Liquid Purification or Separation, appropriate subclass for liquid purification in general.
- 475 Means for discharging impurity from system:**  
This subclass is indented under subclass 474. Apparatus including means for discharging an impurity from the refrigeration producer.
- 476 Sorbent type:**  
This subclass is indented under subclass 467. Apparatus including means utilizing a sorbent for a refrigerant fluid.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 101+, for related processes.
- 141+, for automatic control of a sorbent type refrigeration producer.
- 232, for a time or program actuated sorbent type refrigeration producer.
- 269, for a refrigerating system with an open gas or vapor outlet utilizing a hygroscopic agent.
- 271, for atmosphere and sorbent contact apparatus.
- SEE OR SEARCH CLASS:
- 122, Liquid Heaters and Vaporizers, appropriate subclass for a liquid vaporizer, per se, even though disclosed as a sorbent-generator.
- 477 Absorber-still, e.g., intermittent:**  
This subclass is indented under subclass 476. Apparatus in which the refrigeration producing unit acts alternately and intermittently, as a sorber and as a still (generator).
- 478 Evaporator-condenser unit:**  
This subclass is indented under subclass 477. Apparatus connected to another unit acting alternately as a condenser and then as an evaporator.
- (1) Note. This type of unit is commonly known as "icy-balls".
- 479 With means returning sorbent from evaporator:**  
This subclass is indented under subclass 477. Apparatus including means returning a sorbent liquid from the evaporator back to the sorber-generator.
- 480 With solid sorbent:**  
This subclass is indented under subclass 477. Apparatus including means utilizing a solid sorbent.
- 481 With sorber-generator cooling means:**  
This subclass is indented under subclass 477. Apparatus including means acting to cool the sorber-generator during sorption.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 146, for automatic control of cooling fluid.
- 482 Internal liquid flow to external cooler:**  
This subclass is indented under subclass 481. Apparatus including a cooled liquid flow line connected to the sorber-generator unit.
- 483 Pump means forcing gas or vapor relative to sorber:**  
This subclass is indented under subclass 476. Apparatus including pump means forcing a gas or vapor to or from the sorption unit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 51.1+, for a refrigerator using a liquid condenser and expander only, e.g., wherein the condenser and vaporizer are the same unit or wherein the atmosphere serves as a heating medium.

- 484 Vapor-liquid contact in reabsorber forming liquid refrigerant:**  
This subclass is indented under subclass 476. Apparatus comprising a generator, a sorbent liquid container commonly termed a reabsorber and an evaporator connected by flow lines in a closed cycle relationship so that vapor driven off by the generator contacts the liquid in the reabsorber to form a mixture rich in refrigerant which liquid mixture flows to the evaporator.
- 485 Means causing cooling fluid contact with sorber and/or condenser:**  
This subclass is indented under subclass 476. Apparatus including means causing contact of a cooling fluid with the sorber and/or a condenser.
- 486 Means cooling liquid refrigerant flow line to evaporator:**  
This subclass is indented under subclass 476. Apparatus including means cooling the liquid refrigerant flow line to an evaporator.
- 487 Internally generated pressure or capillary means moving sorption liquor:**  
This subclass is indented under subclass 476. Apparatus including means by which the internally generated pressures of the system or internal capillary means causes or aids in the circulation of absorption fluid between a generator and sorber.
- 488 Transfer vessel, e.g., liquid trap:**  
This subclass is indented under subclass 487. Apparatus including a closed vessel which accumulates sorption liquor, which vessel acts to intermittently return sorption liquor to the generator.
- 489 Means tempering flow line between sorber and generator:**  
This subclass is indented under subclass 476. Apparatus including features to heat or cool a flow line directly connecting the sorber and generator.
- 490 Inert gas:**  
This subclass is indented under subclass 476. Apparatus including means whereby a refrigerant is contacted with a gas which is chemically inert to the refrigerant or sorbent.
- (1) Note. This system operates under a uniform total pressure with the pressure in the evaporator being the sum of the partial pressures of the inert gas and the pressure of the refrigerant vapor, i.e., it operates according to Dalton's law of partial pressures and is commonly operated by heating means for household refrigerator use.
- 491 Gas-liquid contactor within inert gas circuit:**  
This subclass is indented under subclass 490. Apparatus including a gas-liquid contacting structure within a flow confining element of that part of the circuit utilizing the inert gas.
- 492 In evaporator:**  
This subclass is indented under subclass 491. Apparatus in which the gas-liquid contacting structure is within the evaporator.
- 493 Means cooling inert gas flow line from sorber to evaporator:**  
This subclass is indented under subclass 490. Apparatus in which there is means to cool the flow line for inert gas connecting the sorber to the evaporator.
- 494 Particular gas-liquid contact in sorber:**  
This subclass is indented under subclass 476. Apparatus including structure within the sorber having particular gas-liquid contact features.
- 495 Sorbent vapor separator between generator and condenser:**  
This subclass is indented under subclass 476. Apparatus including means located between the generator and condenser acting to remove the sorbent vapor from the refrigerant-vapor mixture.
- (1) Note. Such means is termed "rectifier".
- 496 Submerged gas-liquid contact means:**  
This subclass is indented under subclass 495. Apparatus in which the sorbent vapor separator includes means holding a body of liquid which is contacted by the vapor and enters below the upper face of the body of liquid.



- 497 With means to enhance separations in generator:**  
This subclass is indented under subclass 476. Apparatus, including means within the generator enhancing the separation of the refrigerant and sorbent.
- 498 Compressor-condenser-evaporator circuit:**  
This subclass is indented under subclass 467. Apparatus, including means arranged in a closed circuit to compress, condense and evaporate a fluid.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
115+, for related processes.  
401, for an air compressor-cooler-expander type refrigeration producer.
- SEE OR SEARCH CLASS:  
417, Pumps, appropriate subclasses, and see especially subclass 902 for gas pumps, per se.  
418, Rotary Expansible Chamber Devices, appropriate subclasses, for rotary expansible chamber compressors, per se.
- 499 Unitarily movable connected units:**  
This subclass is indented under subclass 498. Apparatus having a plurality of refrigeration producing units connected to move in fixed relationship to each other.
- 500 Jet powered by circuit fluid:**  
This subclass is indented under subclass 498. Apparatus in which the compressor is jet type powered by a fluid of a circuit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
191, for a similar system with automatic control.  
268+, for an open outlet vacuumized chamber in which the pump may be a jet pump.
- SEE OR SEARCH CLASS:  
417, Pumps, subclasses 151+ for jet type pumps, per se.
- 501 External fluid actuates compressor and exchanges heat:**  
This subclass is indented under subclass 498. Apparatus in which a fluid external of the circuit is utilized as a motive fluid for the compressor which fluid passes in heat exchange relationship with a portion of the circuit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
238, for means using heat of disparate apparatus to operate a refrigerating system.
- 502 Diverse fluids:**  
This subclass is indented under subclass 498. Apparatus in which there are different kinds of fluids in the circuit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
114, for related processes.  
468+, where the auxiliary medium performs only a lubricating function.  
476+, particularly subclasses 490+ for a sorbent type refrigerant producer utilizing diverse fluids.  
500, for a jet powered system which may use one kind of fluid as a pumping medium and another as a refrigerant.
- SEE OR SEARCH CLASS:  
252, Compositions, subclasses 67+ for a refrigerant composition.
- 503 With liquid trap or disperser in suction line:**  
This subclass is indented under subclass 498. Apparatus including means for trapping or dispersing liquid refrigerant between the evaporator outlet and the compressor inlet.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
83, for processes of preventing slugging to the compressor.  
174, for automatic control of trapping and discharging refrigerant batches.  
471+, for similar structure wherein the liquid is a lubricant or lubricant mixed with a refrigerant.  
512, for a liquid-vapor separator and separated liquid recycle.

**504 Means to apportion refrigerant to evaporator:**

This subclass is indented under subclass 498. Apparatus including means to apportion the liquid refrigerant to distinct regions of an evaporator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 199+, for automatic control for by-passing an evaporator through another evaporator.
- 335, for plural paired different function refrigeration producing elements.
- 525, for plural distinct evaporators, per se, with particular flow distributors.

**505 Cooling motor and/or compressor by refrigerant:**

This subclass is indented under subclass 498. Apparatus including means using the refrigerant being circulated for cooling either the compressor or a motor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 513, for heat exchange between diverse function elements of a refrigeration producer.

SEE OR SEARCH CLASS:

- 417, Pumps, subclasses 366+ for a pump drive motor which is cooled by pump fluid.
- 418, Rotary Expansible Chamber Devices, subclasses 83+ for rotary expansible chamber devices having heat exchange means.

**506 External cooling fluid contacts heat rejector:**

This subclass is indented under subclass 498. Apparatus including means causing flow of a cooling fluid outside of the refrigeration producer to cool a heat rejecting portion of it.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 90, for processes of circulating and heating an external gas.
- 113, for processes involving circulating a cooled gas and reheating it.

- 146+, for automatic control of cooling fluid in a sorbent system.
- 173, for automatic control of reheating.
- 183+, for automatic control of cooling fluid for a heat rejecter.
- 238, for disparate apparatus utilized as a heat absorber or rejecter.
- 277+, particularly subclass 279 for means using rejected heat in handling or preventing atmospheric condensate.
- 305+, for gas-liquid contact means cooling a heat rejecter.
- 324+, for a reversible heat pump.
- 332+, for diverse systems, one of which may reject heat to another.
- 353, for means using rejected heat to thaw a congealed product mold.
- 391, for means receiving withdrawn cooled liquid which may direct it to a heat rejecter.
- 428, for gas forcing means and means directing a gas over a heat rejecter.
- 452+, for a cooled enclosure with an enclosure or feature for cooling a heat rejecter.
- 476+, for a sorbent type refrigerator producer.
- 501, for a compressor actuating means which also cools a heat rejecter.

**507 Air cooled:**

This subclass is indented under subclass 506. Apparatus including means utilizing the ambient atmosphere as a cooling means.

**508 Motor-compressor in common housing:**

This subclass is indented under subclass 507. Apparatus in which the compressor and its driving motor are located within a common refrigerant containing casing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 469, for similar structure in which the casing also contains lubricant.

**509 Condensed liquid receiver, e.g., surge tank:**

This subclass is indented under subclass 498. Apparatus including a receiver between the condenser and evaporator, e.g., surge tank.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 83, for processes of preventing slugging to a compressor.  
 117, for processes of compressing, condensing and evaporating involving division of the refrigerant flow in separate paths.  
 474, for a receiver of this type wherein the refrigerant is purified.  
 503, for a trap in the suction line, and see the Notes thereto.
- 510 Plural compressors or multiple effect compression:**  
 This subclass is indented under subclass 498. Apparatus comprising more than one compressor or a compressor that is equipped to simultaneously produce more than one suction pressure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 332+, for diverse systems.  
 335, for plural paired diverse function refrigeration producing systems.
- 511 Fixed restrictor:**  
 This subclass is indented under subclass 498. Apparatus including a fixed area flow restricting passage arrangement such as an orifice, porous plug or capillary tube.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 527+, for an evaporator with a flow controller or boiling expediter.
- SEE OR SEARCH CLASS:  
 138, Pipes and Tubular Conduits, subclasses 40+ for a flow restrictor of general application.
- 512 Distinct vapor liquid separator and separated liquid recycle:**  
 This subclass is indented under subclass 467. Apparatus including a distinct separator acting to separate, other than by evaporation, the refrigerant into gas and liquid fractions combined with means to return the separate liquid fraction to the evaporator.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 503, for a trap in the suction line, and see the Notes thereto.
- 513 Heat exchange between diverse function elements:**  
 This subclass is indented under subclass 467. Apparatus having means to interchange heat between diverse function elements of the refrigerator producer, e.g., exchanging heat between the evaporator and condenser or hot liquid flow line.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 277+, particularly subclasses 279+ for means utilizing heat developed by a refrigeration producer for preventing or removing atmospheric condensate.  
 476+, for a sorbent type refrigerant producing system often involving heat exchanging within the system.  
 501, for means using a fluid as source of power and as a heat exchanger.  
 505, for means involving a motor or compressor by refrigerant of the circuit.
- 515 Evaporator, e.g., heat exchanger:**  
 This subclass is indented under subclass 467. Apparatus including means specialized to expanding or evaporating a refrigerant.
- 516 Enclosure forming:**  
 This subclass is indented under subclass 515. Apparatus forming a cooled enclosure.
- (1) Note. The enclosure may be open to the atmosphere, e.g., U-shaped.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 440+, particularly subclass 451 for an evaporator mounted within a surrounding enclosure, or an insulated evaporator.
- 517 With closure:**  
 This subclass is indented under subclass 516. Apparatus wherein the enclosure is provided with means for closing an opening.

- 518 Surrounds inner container:**  
This subclass is indented under subclass 516. Apparatus in which the evaporator means surrounds distinct inner enclosure forming means.
- 519 Plural distinct sections or diverse zones:**  
This subclass is indented under subclass 516. Apparatus comprising (1) distinct section forming multiple compartments or each differing in some structural characteristic, (2) portions contacting a wall of a chamber and distinct sections extending outwardly from and spaced from the chamber wall, (3) having distinct heat exchanging surfaces, e.g., fins, having different structural or heat exchanging characteristics, or (4) distinct flow line connected evaporators.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
441+, for a cooled enclosure with plural compartments and see the Notes thereto.
- 520 Shelf is evaporator:**  
This subclass is indented under subclass 519. Apparatus wherein the distinct sections or zones are formed by a shelf which is itself an evaporator.
- 521 Shelf, shelf or receptacle support:**  
This subclass is indented under subclass 516. Apparatus having a shelf or a support for a receptacle or shelf.
- 522 Integral or attached shelf :**  
This subclass is indented under subclass 521. Apparatus in which the shelf is integral with or permanently attached to a wall of the evaporator.
- 523 Corrugated or embossed wall:**  
This subclass is indented under subclass 516. Apparatus in which a wall of the evaporator is corrugated or embossed.
- 524 Plural distinct sections:**  
This subclass is indented under subclass 515. Apparatus including distinct fluid distributing sections.
- 525 With particular flow distributor to sections:**  
This subclass is indented under subclass 524. Apparatus in which a particular flow distributor, other than a mere header, is provided to distribute refrigerant to the sections.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
504, for a compressor-condenser-evaporator circuit having means to apportion refrigerant to the evaporator.
- 526 Serially connected:**  
This subclass is indented under subclass 524. Apparatus in which at least two of the distinct sections are serially connected.
- 527 Flow controller or boiling expeditor:**  
This subclass is indented under subclass 515. Apparatus including means located within a refrigerant flow path, which (1) controls or changes the manner of flow of the refrigerant, or (2) expedites boiling of the refrigerant.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
511, for a fixed restrictor for a compressor-condenser-evaporator circuit.
- SEE OR SEARCH CLASS:  
138, Pipes and Tubular Conduits, subclasses 40+ for a restrictor, per se.  
251, Valves and Valve Actuation, appropriate subclass for a valve having general utility.
- 528 Adjustable controller:**  
This subclass is indented under subclass 527. Apparatus which is adjustable.
- 529 REFRIGERANT OR COOLANT, STORER OR HANDLER:**  
This subclass is indented under the class definition. Apparatus having means to handle and/or hold a refrigerant or coolant.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

45.1+, for processes and apparatus for handling liquefied or solidified gas as a product. See the Search Notes thereunder.

459+, for ice support means within an enclosure.

### 530 Envelope type:

This subclass is indented under subclass 529. Device including (1) a portable or hand manipulable flexible wall container, e.g., ice bag, (2) a sealed hand manipulable container, (3) a small portable container with attaching means, e.g., body member treater, or (4) a refillable container having a closure for filling or emptying, which device is filled with a material to be chilled and which is used to cool material external of it.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

1, for a refrigerated product.

293, for a hand manipulable tool.

371+, for a portable commodity containing receptacle, e.g., mercantile package.

430+, for refrigerator and a hold-over.

457, for a cooled portable receptacle cooler.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 204+ for structure specialized to warming the body.

165, Heat Exchange, subclass 46 for a heat exchanger of general application of the flexible bag or cover type.

383, Flexible Bags, subclass 901 for a bag for holding hot water or ice which is intended to be removed after use (e.g., standard ice bag). Class 62, provides for devices for containing a refrigerant or coolant which is intended to be reused without removing the heat exchange medium (e.g., a permanently sealed bag or a bag holding a medium intended to be re-frozen or re-chilled).

### 531 MISCELLANEOUS:

This subclass is indented under the class definition. Apparatus not elsewhere provided for.

### 532 Fractionally solidifying a constituent and separating the same:

This subclass is indented under subclass 56. Processes wherein a solution or mixture of constituents is cooled sufficiently to solidify a constituent which is then removed from the mixture.

(1) Note. The solid, liquid or gaseous state for purposes of this and the indented subclasses is determined at the point immediately before the refrigerant and solution or mixture are first brought into contact, i.e., before any change of state of the refrigerant.

(2) Note. The formation of a hydrate or clathrate is considered for purposes of this and the indented subclasses as direct contact refrigeration with classification dependent upon the state of the hydrate former upon addition and its state upon removal.

(3) Note. In the absence of a clear disclosure to the contrary the dissolution of CO<sub>2</sub> in a solution with subsequent evaporation from the solution is to be considered direct contact refrigeration with a gas.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

66+, particularly subclass 67 for separating a congealed fraction of a single liquid, e.g., ice from water.

123+, for apparatus for separating a solidified constituent by refrigeration.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclasses 295+ for processes crystallizing inorganic compounds or non-metal elements not including a refrigeration step, and when there is an intent to make a single-crystal, see Class 117 whether or not including a refrigeration step.

34, Drying and Gas or Vapor Contact With Solids, for processes for drying by operations other than refrigeration

- combined with cooling by refrigeration particularly subclasses 284+ for processes wherein a frozen mixture is dried by sublimating a constituent while the mixture remains frozen.
- 117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, for processes and noncoating apparatus for growing therein-defined single-crystal of all types of materials, including inorganic or organic, including those having refrigeration steps or means.
- 208, Mineral Oils: Processes and Products, subclasses 28+ for similar processes combined with additional treatment of a mineral oil or a constituent thereof.
- 210, Liquid Purification or Separation, for processes which may involve cooling including treatment of a liquid mixture for purification by destruction or conversion of a constituent or treatment of sewage and waste by a living organism or gravitational separation with preliminary conversion of a solid to at least partially to a liquid.
- 260, Chemistry of Carbon Compounds, including the related classes for processes of treating or modifying non-hydrocarbon organic compounds: by crystallization wherein the crystallization is not brought about by refrigeration; wherein crystallization, by any means including refrigeration, is combined with synthesis or modification of said compounds by chemical means; or wherein the separation of carbon compounds is accomplished exclusively by physical means other than refrigeration.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 245.1+ for non-coating crystallization apparatus not including chemical reaction means, not including refrigeration means, and not provided for elsewhere, and subclasses 129+ for non-coating crystallization apparatus which include means for a chemical reaction, which may or may not include refrigeration means, and which are not provided for elsewhere.
- 423, Chemistry of Inorganic Compounds, for processes involving hydrate formation as a step in the purification of Class 423 compounds.
- 426, Food or Edible Material: Processes, Compositions, and Products, for processes of refrigeration of food (1) combined with an additional food working operation or (2) wherein the refrigerating agent becomes a part of the food (e.g., sugar refrigerant also sweetens the food).
- 585, Chemistry of Hydrocarbon Compounds, for processes including a step of refrigeration which treats or modifies only hydrocarbon compounds (claimed or disclosed). Such processes disclosing any non-Class 585 (i.e., non-hydrocarbon) organic compound are placed according to the class line with Class 260 and related classes. Especially see subclass 15 for treating or modifying a crystalline hydrocarbon hydrate and subclasses 812+ for a purification or separation process for recovery of a hydrocarbon.
- 533 Including direct contact with added refrigerant:**  
This subclass is indented under subclass 532. Processes wherein a solution or mixture of constituents is cooled sufficiently to solidify a constituent which is then removed from the mixture wherein the cooling of the solution or mixture is accomplished by direct contact with an added solid, liquid or gaseous material which is at a lower temperature.
- (1) Note. Solid refrigerant is not intended to refer to cooling by a heat exchanger such as a regenerator but is intended to encompass a cooling process wherein a cooled solid such as shot is added to the solution or mixture to be cooled.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**
- 532, for refrigeration by indirect heat exchange with a refrigerant.
- 537, for refrigeration accomplished by evaporation of a portion of the feed mixture or solution.

- 543, for refrigeration accompanied by pulsation of the solution or mixture.
- 534 Liquid refrigerant converted to vapor phase during cooling:**  
This subclass is indented under subclass 533. Processes wherein a refrigerant liquid is converted in whole or part to the vapor state while cooling a solution or mixture in direct contact therewith.
- 535 Spent refrigerant vapor used in direct contact to melt solidified component or heat product liquid:**  
This subclass is indented under subclass 534. Processes wherein the liquid refrigerant which has vaporized in cooling the solution or mixture is brought into direct physical contact with solidified product or liquid product separated from the solution or mixture to melt the solid product or rewarm the liquid product.
- (1) Note. Typically the processes of this subclass utilize multiple similar vessels with the refrigerant vaporized in one and utilized after recompression to melt solid in a second vessel.
- 536 Refrigerant remains liquid during cooling:**  
This subclass is indented under subclass 533. Processes wherein the liquid refrigerant performs its cooling function without change of state.
- 537 Utilizing a constituent of the original mixture or solution as refrigerant:**  
This subclass is indented under subclass 532. Processes wherein a solution or mixture of constituents is cooled sufficiently to solidify a constituent which is then removed from the mixture wherein refrigeration of the mixture or solution is accomplished by vaporizing a component of the mixture or solution and without the addition of refrigerant to the mixture.
- (1) Note. Refrigeration herein is usually accomplished by creating reduced pressure over the mixture or solution and in absence of contrary disclosure a process wherein a vacuum is drawn over the body of mixture or solution is to be presumed to result in refrigeration of the type included in this subclass.
- 538 Solidifying or purifying in a pulsed column or using sonic vibration**  
This subclass is indented under subclass 532. Processes wherein a solution or mixture of constituents is cooled sufficiently to solidify a constituent which is then removed from the mixture wherein the zone in which solidification or purification of the solid occurs is subjected to a regular or rhythmical increase and decrease in pressure or to vibration in the sonic range.
- (1) Note. The pulsation of the processes of this subclass are typically produced by a reciprocating piston in a line to or from a vessel or in some cases forming all or part of a wall of a vessel.
- 539 With control of pulsed column process parameter:**  
This subclass is indented under subclass 538. Processes wherein control of some process variable of the pulsed column is effected responsive to measurement of that or another process variable.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
540, for control of processes of refrigeration of a mixture or solution to solidify a constituent in the absence of pulsation.
- 540 With measured parameter responsive control:**  
This subclass is indented under subclass 532. Processes wherein control of some processes variable is effected responsive to measurement of the same or another variable.
- (1) Note. Mere liquid level control is excluded from this subclass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
539, for a process in which the parameters of a pulsed column are controlled.
- 541 With separated constituent recycle:**  
This subclass is indented under subclass 532. Processes wherein a portion of the solidified constituent or the solution remaining when the solidified constituent has been removed is

recycled as a solid or slurry or liquid to a point upstream in the process from the point of removal.

**542 Using melted solid to wash solidified constituent:**

This subclass is indented under subclass 532. Processes wherein a portion of the solidified constituent is melted and utilized as a wash liquid to remove the solution or mixture which remains on the surface of the solidified component.

- (1) Note. This subclass is intended to include processes wherein the solid is moved to a region of higher temperature where it melts and flows back over the solid entering the region of higher temperature.

SEE OR SEARCH THIS CLASS, SUBCLASS:

538+, for processes wherein the solidified constituent is remelted and returned as a liquid through the solidified constituent and the washing action is facilitated by pulsations of the liquid-solid mass.

**543 With squeezing or compression of solidified component:**

This subclass is indented under subclass 532. Processes wherein the solidified constituent is subjected to increased pressure by physical means.

- (1) Note. The pressure applied is such as to remove occluded liquid or cause some minor surface melting to remove surface impurities from the solidified constituent.
- (2) Note. A process including centrifugation is excluded from this subclass unless the force exerted on the solid in the centrifuge is claimed as either a specific force exerted on the solid or specific RPM of the centrifuge.

SEE OR SEARCH CLASS:

100, Presses, particularly subclasses 104+ for pressing apparatus with means to drain expressed liquid.

**544 With stirring, agitating or scraping of the solidification zone:**

This subclass is indented under subclass 532. Processes wherein the zone in which solidification occurs is subjected to some action or designed in such a manner that the body of mixture or solution is turbulent or in such a way that the buildup of solid is prevented.

- (1) Note. A screw conveyor is presumed to act in a manner consonant with the definition of this subclass in the absence of specific disclosure to the contrary.

SEE OR SEARCH THIS CLASS, SUBCLASS:

123+, for apparatus for separating a solidified constituent by refrigeration.

SEE OR SEARCH CLASS:

259, Agitating, for particular agitation apparatus.

**545 With externally scraped drum or helix or screw:**

This subclass is indented under subclass 544. Processes wherein solidified component is removed from the external surface of a drum on which solidification occurs or the agitator or scraper is in the form of a helix or screw.

**600 CRYOGENIC TREATMENT OF GAS OR GAS MIXTURE:**

This subclass is indented under the class definition. Subject matter for manufacturing a solidified or liquified gas having a boiling point below 32° F. from a gas or gas mixture at atmospheric pressure as a mercantile product by change of physical state by manipulation of temperature or pressure, and which may include apparatus converting liquified gas to a solid even though the conversion of a gas to a liquid is not included.

- (1) Note. This may include apparatus converting liquified gas to a solid even though the conversion of a gas to a liquid is not included.

SEE OR SEARCH THIS CLASS, SUBCLASS:

55.5, for a cold trap for condensing undesirable gas or vapor in a vacuum line.



- SEE OR SEARCH CLASS:  
149, Explosive and Thermic Compositions or Charges, subclass 1 for compositions of that class containing liquified gaseous fuel or oxygen.
- 601 Solidification:**  
This subclass is indented under subclass 600. Subject matter wherein the gas or gas mixture is formed into a solid.
- 602 Carbon dioxide:**  
This subclass is indented under subclass 601. Subject matter wherein the gas being solidified is carbon dioxide(i.e. CO<sub>2</sub>).
- 603 Snow:**  
This subclass is indented under subclass 602. Subject matter wherein the carbon dioxide is formed into crystalline flakes.
- 604 Pressed block:**  
This subclass is indented under subclass 603. Subject matter wherein the crystalline flakes are shaped into a solid rectangle.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
340+, for means for producing a shaped or modified congealed product from a liquid or semisolid.
- SEE OR SEARCH CLASS:  
100, Presses, subclasses 16+ for a press type molding device of general application.
- 605 Extruded pellets:**  
This subclass is indented under subclass 603. Subject matter wherein the crystalline flakes are forced through small openings and formed into small solids.
- 606 Liquefaction:**  
This subclass is indented under subclass 600. wherein the gas or gas mixture is made liquid.
- 607 Hydrogen:**  
This subclass is indented under subclass 606. Subject matter wherein the gas being liquified is hydrogen.
- 608 Helium:**  
This subclass is indented under subclass 606. Subject matter wherein the gas being liquified is helium.
- 610 He<sub>3</sub>/He<sub>4</sub> dilution refrigerator(i.e.superfluid):**  
This subclass is indented under subclass 608. Subject matter wherein each isotope of helium(i.e.,He<sub>3</sub> or He<sub>4</sub>) is liquified and is heat exchanged by direct contact with each other resulting in a superfluid condition below the Lambda Point (l) which is 2.17° K.
- 611 Natural gas:**  
This subclass is indented under subclass 606. Subject matter wherein at least one of the constituents of the gas mixture is a hydrocarbon compound (hydrocarbon is separated from sulfur, CO<sub>2</sub>, etc.) or a hydrocarbon gas that is separated into its constituents(methane, butane, etc.).
- 612 Multicomponent cascade refrigeration:**  
This subclass is indented under subclass 611. Subject matter wherein the gas or gas mixture is liquified against a refrigeration cycle wherein the gas or gas mixture is a mixture having components that condense out at different temperatures.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
335, for multiple of two or more diverse function elements of a refrigeration producing system.
- 613 Compression, expansion, and condensation:**  
This subclass is indented under subclass 611. Subject matter wherein the gas or gas mixture is pressurized, depressurized, and then liquified.
- 614 Heat exchange with liquid cryogen:**  
This subclass is indented under subclass 611. Subject matter wherein the gas or gas mixture is directed into a heat exchange operation wherein it is liquified by condensation as a result of contact of the gas or gas mixture with an evaporating cryogen.

- 615 Air:**  
This subclass is indented under subclass 606. Subject matter wherein the gas mixture being liquified is air.
- 616 Heat exchange with liquid cryogen:**  
This subclass is indented under subclass 606. Subject matter wherein the gas or gas mixture is directed into a heat exchange operation wherein it liquified by condensation as a result of contact of the gas or gas mixture with an evaporating cryogen.
- 617 Separation of gas mixture:**  
This subclass is indented under subclass 600. Subject matter wherein a constituent of a gas mixture is extracted (e.g. by liquefaction or solidification).
- SEE OR SEARCH CLASS:  
95, Gas Separation: Processes, subclasses 39+, 149+, 257, and 290 for processes of gas separation in which a gas may be liquified, but not involving a refrigeration operation.  
96, Gas Separation: Apparatus, for gas separation apparatus provided with heating or cooling means.  
203, Distillation: Processes, Separatory, appropriate subclass for a separatory distillation process where the product produced by condensation is normally a liquid.  
423, Chemistry of Inorganic Compounds, subclasses 210+ for processes of purifying or separating components of normally gaseous mixtures involving a chemical reaction.
- 618 Natural gas:**  
This subclass is indented under subclass 617. Subject matter wherein at least one of the constituents of the gas mixture is a hydrocarbon compound (hydrocarbon is separated from sulfur, CO<sub>2</sub>, etc.) or a hydrocarbon gas that is separated into its constituents (methane, butane, etc.).
- 619 Compression, expansion, and condensation:**  
This subclass is indented under subclass 618. Subject matter wherein the gas mixture is pressurized and depressurized in order to separate
- out a constituent of the mixture and the constituent is liquified or solidified.
- 620 Distillation:**  
This subclass is indented under subclass 618. Subject matter wherein the gas mixture is directed to a mass transfer column and volatilized or evaporated and a constituent is extracted by condensation.
- 621 Flowline expansion engine:**  
This subclass is indented under subclass 620. Subject matter wherein the refrigeration circuit comprises a flow line having means to convert the energy of expansion into mechanical energy.
- SEE OR SEARCH CLASS:  
415, Rotary Kinetic Fluid Motors or Pumps, appropriate subclass for a turbine not specialized for refrigeration.
- 622 Downstream of column:**  
This subclass is indented under subclass 621. Subject matter wherein the expansion operation occurs downstream of the column.
- 623 External refrigeration circuit:**  
This subclass is indented under subclass 620. Subject matter wherein the gas or gas mixture or the products of separation are operated upon by an outside source of refrigeration.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
912, for external refrigeration systems not specific to hydrocarbon separation.
- 624 Membrane:**  
This subclass is indented under subclass 620. Subject matter wherein the gas or gas mixture or product of separation undergoes a further separation step using a gas permeable barrier.
- SEE OR SEARCH CLASS:  
95, Gas Separation: Processes, subclasses 43+ for specific membrane structure.
- 625 Liquid contact:**  
This subclass is indented under subclass 620. Subject matter wherein the gas or gas mixture or product of separation undergoes a further separation step using a liquid wash.

- 626 Solid sorption:**  
This subclass is indented under subclass 620. Subject matter wherein a constituent is extracted by adsorption or absorption by a solid substance.
- SEE OR SEARCH CLASS:  
95, Gas Separation: Processes, subclasses 90+ for processes of gas separation by solid sorption, per se.
- 627 Dephlemation:**  
This subclass is indented under subclass 620. Subject matter wherein the gas or gas mixture undergoes an operation in which the distilland enters into indirect heat exchange with the distillate (i.e. a dephlemating heat exchanger).
- 628 Automatic control:**  
This subclass is indented under subclass 620. Subject matter wherein the separation operation changed in response to a sensed condition without the intervention by an operator.
- SEE OR SEARCH CLASS:  
700, Data Processing: Generic Control Systems or Specific Applications, subclass 270 for computerized control of distillation columns.
- 629 Solidification:**  
This subclass is indented under subclass 620. Subject matter wherein the gas or gas mixture or products of separation are separated by being formed into solids.
- 630 Plural columns:**  
This subclass is indented under subclass 620. Subject matter wherein a product of separation from a first distillation column undergoes a further separation in a second distillation column.
- 631 Recycle:**  
This subclass is indented under subclass 630. Subject matter wherein a product of separation from one of the columns is returned to the other column.
- 632 Liquid contact:**  
This subclass is indented under subclass 618. Subject matter wherein a constituent of the gas mixture is separated by direct contact with a treating liquid.
- 633 Dehydrating:**  
This subclass is indented under subclass 632. Subject matter wherein the treating liquid removes water from the gas or gas mixture.
- 634 Expansion:**  
This subclass is indented under subclass 632. Subject matter wherein the gas or gas mixture or a product of separation undergoes a volumetric increase.
- 635 Plural contact columns:**  
This subclass is indented under subclass 632. Subject matter wherein the products of separation from the liquid contact step undergo another separation with an additional liquid contacting the gas or gas mixture.
- 636 Sorption:**  
This subclass is indented under subclass 618. Subject matter wherein a constituent of the gas mixture is extracted by absorption or adsorption.
- SEE OR SEARCH CLASS:  
95, Gas Separation: Processes, subclasses 90+ for processes of gas separation by solid sorption, per se.
- 637 Solidification:**  
This subclass is indented under subclass 618. Subject matter wherein a constituent of a gas mixture is extracted by being formed into solids.
- 638 Regenerating heat exchanger:**  
This subclass is indented under subclass 637. Subject matter wherein a constituent is solidified on the surface of a heat exchanger and is later removed by reverse heat exchange operation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
641, for a process including flow reversing to a cold accumulator.  
909, for specific regenerator structure or materials for use in aregenerator.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclasses 4+ and 900 for regenerating heat exchangers, per se.

- 639 Helium:**  
This subclass is indented under subclass 617. Subject matter wherein one of the constituents being separated is helium.
- 640 Air:**  
This subclass is indented under subclass 617. Subject matter wherein the gas mixture is ambient air.
- 641 Regenerating heat exchanger:**  
This subclass is indented under subclass 640. Subject matter wherein a constituent is solidified on the surface of a heat exchanger and later removed by reverse heat exchange operation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
638, for a process including flow reversing to a cold accumulator.  
909, for specific regenerator structure or materials for use in a regenerator.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclasses 4+ and 900 for regenerating heat exchangers, per se.
- 642 Filtration:**  
This subclass is indented under subclass 640. Subject matter wherein the a constituent is extracted by passing through a porous medium.
- SEE OR SEARCH CLASS:  
55, Gas Separation, appropriate subclasses beginning with 434 for apparatus, for gas-solid separation by deflection or filtration of general application.  
95, Gas Separation: Processes, subclasses 273+ for processes of gas separation by filtering, per se.
- 643 Distillation:**  
This subclass is indented under subclass 640. Subject matter wherein the constituents of air are extracted by a combination of temperature and pressure control in a mass transfer column.
- 644 Upstream operation:**  
This subclass is indented under subclass 643. Subject matter wherein the feed air stream is operated on by some process prior to entering a distillation column.
- 645 Flowline expansion engine:**  
This subclass is indented under subclass 644. Subject matter wherein the refrigeration circuit comprises a flow line with a means to convert the energy of expansion into mechanical energy.
- SEE OR SEARCH CLASS:  
415, Rotary Kinetic Fluid Motors or Pumps, appropriate subclass for a turbine not specialized for refrigeration.
- 646 Spaced initial charging:**  
This subclass is indented under subclass 645. Subject matter wherein the feed stream is supplied in a plurality of separate streams and directed to vertically spaced points in the column.
- 647 Spaced initial charging:**  
This subclass is indented under subclass 644. Subject matter wherein the feed stream is supplied in a plurality of separate streams and directed to vertically spaced points in the column.
- 648 Downstream operation:**  
This subclass is indented under subclass 643. Subject matter wherein a separated constituent is acted upon by some process which enhances its characteristics after leaving the distillation column.
- 649 Flowline expansion engine:**  
This subclass is indented under subclass 648. Subject matter wherein the refrigeration circuit comprises a flow line with a means to convert the energy of expansion into mechanical energy.
- SEE OR SEARCH CLASS:  
415, Rotary Kinetic Fluid Motors or Pumps, appropriate subclass for a turbine not specialized for refrigeration.

- 650 High pressure nitrogen:**  
This subclass is indented under subclass 649. Subject matter wherein the extracted constituent is nitrogen from the high pressure section of the column.
- 651 Low pressure nitrogen:**  
This subclass is indented under subclass 649. Subject matter wherein the extracted constituent is nitrogen extracted from the low pressure section of the column.
- 652 Oxygen:**  
This subclass is indented under subclass 649. Subject matter wherein the extracted constituent is oxygen.
- 653 Flowline pump:**  
This subclass is indented under subclass 648. Subject matter wherein the separated constituent is operated on by a pressurizing device.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
50.6, for liquid handling of liquified gas for a specific pump designed to pump liquified gas.
- SEE OR SEARCH CLASS:  
417, Pumps, subclass 901 for cryogen pumps.
- 654 Liquid oxygen:**  
This subclass is indented under subclass 653. Subject matter wherein the extracted constituent is liquid oxygen.
- 655 Membrane:**  
This subclass is indented under subclass 643. Subject matter wherein the operation is the passage through a gas permeable barrier for further separation.
- SEE OR SEARCH CLASS:  
95, Gas Separation: Processes, subclasses 43+ for specific membrane structure.
- 656 Automatic control:**  
This subclass is indented under subclass 643. Subject matter wherein the operation is changed in response to a sensed condition without the intervention of an operator.
- SEE OR SEARCH CLASS:  
700, Data Processing: Generic Control Systems or Specific Applications, subclass 270 for computerized control of distillation columns.
- 657 Automatic control:**  
This subclass is indented under subclass 600. Subject matter wherein the operation is changed in response to a sensed condition without the intervention of an operator.
- CROSS-REFERENCE ART COLLECTIONS
- 900 Triple column:**  
Subject matter concerned with the separation of air in a distillation column wherein the column has three distillation stages (high, medium, and low pressure stages).
- 901 Single column:**  
Subject matter concerned with the separation of air in a distillation column wherein only one distillation stage is present.
- 902 Apparatus:**  
Subject matter concerned with specific details of cryogenic treatment of gas mixture apparatus not provided for below.
- 903 Heat exchange structure:**  
Subject matter under 902 with specific heat exchangers positioned within the distillation column (example: condenser/reboilers).
- 904 Coiled heat exchanger:**  
Subject matter under 903 with specific heat exchanger for gas separation wherein the heat exchanger is helical shaped.
- 905 Column:**  
Subject matter under 902 with specific details of a distillation column (example: riser tubes, tray positioning, etc.).
- (1) Note. See Class 196, subclass 100 and Class 202, subclass 158.
- 906 Packing:**  
Subject matter under 905 with specific details to the mass transfer means within the distillation column (e.g. structured or random packing; specific materials).

- 907 Insulation:**  
Subject matter under 905 with specific details for means to reduce heat transfer to or from the distillation column (e.g. specific materials, arrangement).
- 908 Filter or absorber:**  
Subject matter under 902 with specific details for means to remove or sorb impurities from the cryogenic treatment system (e.g. specific materials, placement) which can be liquid or solid.
- 909 Regeneration:**  
Subject matter under 902 with specific details to valve configuration or material used in the reversing heat exchangers as found in this class, subclasses 638 and 641.
- 910 Expander:**  
Subject matter under 902 with specific details to structure wherein the gas or gas mixture undergoes expansion in the cryogenic treatment system (e.g. Pelton wheels, Laval nozzles, vortex tubes, ejectors, or devices where separation occurs by centrifugal force).
- 911 Portable:**  
Subject matter under 902 with specific details of cryogenic separation or liquefaction devices which can be readily moved from place to place.
- 912 External refrigeration system:**  
Subject matter with specific details of systems to provide refrigeration to the distillation column which are separate therefrom.
- 913 Liquefied gas:**  
Subject matter under 912 wherein the external refrigeration system is a tank of liquefied gas (e.g. liquefied nitrogen, oxygen, argon, etc.).
- 914 Magnetic or electric field:**  
Subject matter with specific details to a cryogenic gas separation system wherein a magnetic or electric field is used.
- 915 Combustion:**  
Subject matter with details showing products of separation used in a system wherein burning occurs (e.g. oxygen from an air separation plant is directed to a blast furnace).
- 916 Explosion reduction:**  
Subject matter that adds an inert gas to the cryogenic distillation system which reduces the chances of uncontrollable burning (e.g. addition of nitrogen gas to methane).
- 917 Mercury:**  
Subject matter with gas mixtures having mercury as a constituent.
- 918 Halocarbon:**  
Subject matter specific to the separation of halocarbons into its constituent or the separation of one halocarbon from another.
- 919 Isotope:**  
Subject matter specific to the separation of one isotope from another (e.g. hydrogen from deuterium).
- (1) Note. Documents concerned with He<sub>3</sub>/He<sub>4</sub> dilution refrigerators should not be crossed here but crossed into this class, subclass 610.
- 920 Carbon monoxide:**  
Subject matter specific to the recovery of carbon monoxide from a gas mixture.
- 921 Chlorine:**  
Subject matter specific to the separation, purification, and liquefaction of chlorine and its compounds.
- 922 Sulfur:**  
Subject matter specific to the separation or purification of sulphur or its compounds.
- 923 Inert gas:**  
Subject matter specific to the separation of nonreactive gases not provided for below.
- 924 Argon:**  
Subject matter under 923 specific to the recovery of argon.
- 925 Xenon or krypton:**  
Subject matter under 923 specific to the recovery of xenon or krypton.

- 926 Gasoline:**  
Subject matter specific to the recovery of gasoline.
- 927 Natural gas from nitrogen:**  
Subject matter specific to the cryogenic separation of nitrogen from natural gas.
- 928 Recovery of carbon dioxide:**  
Subject matter specific to the recovery of carbon dioxide from a gas mixture not provided for below.
- 929 From natural gas:**  
Subject matter under 928 specific to the recovery of carbon dioxide from natural gas.
- 930 From nitrogen:**  
Subject matter under 928 specific to the recovery of carbon dioxide from nitrogen.
- 931 Recovery of hydrogen:**  
Subject matter specific to the recovery of hydrogen gas from a gas mixture not provided for below.
- 932 From natural gas:**  
Subject matter under 931 specific to the separation of hydrogen from natural gas.
- 933 From helium:**  
Subject matter under 931 specific to the separation of hydrogen from helium.
- 934 From nitrogen:**  
Subject matter under 931 specific to the separation of hydrogen from nitrogen, including the separation of ammonia and the separation of  $N_2/H_2$  wherein  $N_2$  is used as a liquid wash for  $H_2$  impurities.
- 935 Olefin:**  
Subject matter specific to the recovery of products of separation having the formula  $C_NH_{2N}$  (e.g. ethylene, propylene, etc.).
- 936 Erickson:**  
A collection of patents issued to Donald C. Erickson.
- 937 Cheng:**  
A collection of patents issued to Chen-Yen Cheng.
- 938 Mehra:**  
A collection of patents issued to Yuv R. Mehra.
- 939 Partial feed stream expansion(air):**  
Subject matter specific to air separation wherein the compressed feed stream is partially heat exchanged against products of separation and flowline expanded prior to entering a distillation column.
- 940 High pressure column:**  
Subject matter under 939 specific to expanded streams which enter a high pressure column.
- END