CLASS 210, LIQUID PURIFICATION OR SEPARATION

SECTION I - CLASS DEFINITION

STATEMENT OF CLASS SUBJECT MATTER

This is the primary class for patents directed to treating water or waste liquid, and when not more specifically provided for, the class for patents directed to treating liquids in general or of any kind and provides (1) process and apparatus for (a) separating a component from (b) purifying or (c) effecting a change in water or waste liquid, such process or apparatus not being more specifically provided for in another class; (2) process of treating liquids in general and treating liquid compositions of either general or diverse utilities; (3) apparatus not provided for in other classes, for performing the foregoing processes and treating liquids of any kind; (4) filter materials or compositions peculiar to the above-mentioned processes; and (5) Processes for purification of liquids containing hazardous or toxic waste to produce a nonhazardous or nontoxic product.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

A. GENERAL GUIDELINESS

1. Placement of Patents

a. A claim directed to the production, regeneration, or purification of a particular compound or composition (including) solutions in water is classified with the particular compound or composition. The classes providing for these compounds or compositions are set out in section III, B, 2.

A claim directed to purification or separation of water or of liquids in general with disclosure of several species each differently classifiable is classified in this class (210).

b. In classifying a claim to a combined process in which a liquid (e.g., sewage, etc.) is treated, and a useful by-product, energy or treatment is also recovered or achieved, placement is in Class 210 where the primary purpose is liquid treatment and the by-product, energy or other treatment is incidental. Placement is in the other pertinent class if the liquid treatment is incidental to the other process. If it cannot be determined which is the primary purpose of the combined process, placement is in the appropriate chemical class(es) when a chemical by-product is recovered and in this class (210) in all other instances.

Since the identical combined process may be placed as an original in either of two classes, based on intent of the inventor, a cross-reference copy should be placed in the other class involved.

See section II, A, 2 infra, for exceptions to the general rule here stated.

2.. Specific Exceptions.

a. Class 95, Gas Separation: Processes, will take a process including a liquid separation step in a Class 95 operation (e.g., regenerating a scrubbing liquid in a gas scrubbing operation, etc.).

b. A purely physical separation, e.g., filtering, specifically directed to mineral oil, is classified in this class (210), subclasses 767+.

c. A claim to a process of drying a flowable slurry or mass by physical separation, e.g., centrifuging without a step or means of contacting with a gas, is in this class (210) rather than Class 34. See line note to Class 210 in (3) Note to Class 34 definition.

d. Some classes which provide for compositions which may be used in a Class 210 process may also take a claim to a mere use of such composition. These classes include 424 and 521 and the line notes in section II, C set out the conditions which govern placement of patents in these circumstances.

e. The rehabilitation or regeneration of a filter medium, in situ is classified in this class (210), subclasses 791+, rather than in Class 134, Cleaning and Liquid Contact With Solids.

f. Separating liquids by direct application of electrolysis or electric force to the liquid, alone or combined with a step provided for in subclasses 767-808 of this class, is classified in Class 205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, when electrolysis is involved, or in Class 204, Chemistry: Electrical and Wave Energy, when other electrical force as provided for in the Class 204 definition is involved.

B. CLASSES PROVIDING FOR RELATED SUBJECT MATTER.

1. Classes Providing A Specific Unit Operation Treatment Of Liquids.

References to Other Classes, below, contains classes pertaining to the following specific unit operation treatment of liquids.

Analyzing:

Burning;

Chlorinating;

Condensing;

Crystal Forming, Single;

Crystallization;

Degassing;

Disinfecting;

Dispensing;

Distilling;

Drinking Storage;

Electrolysis;

Emulsifying;

Evaporating;

Fluoridating;

Freezing;

Handling;

Heating;

Magnetizing;

Mixing;

Preserving;

Refrigerating;

Separating, Centrifugally;

Softening;

Sprinkling, Spraying, Diffusing;

Sterilizing;

Storage;

Testing;

Transporting;

2. Classes Providing Treatment Of A Specific Liquid.

References to Other Classes, below, contains classes pertaining to the following treatment of a specific liquid.

Beverage;

Black Liquor;

Cleaning Fluid;

Colloids;

Coolant;

Culture Broth;

Detergent;

Drug;

Dye;

Electrolyte;

Emulsion;

Fats;

Fertilizer;

Food;

Fuel;

Ink;

Inorganic;

Lubricants;

Medicine;

Oil;

Paints;

Photographic;

3. Classes Having Liquid Treating Apparatus.

References to Other Classes, below, contains classes having liquid treating apparatus in the following art areas.

Analysis;

Carbureting;

Cooling;

Crystal Forming, Single;

Crystallizer;

Dispensing;

Distilling;

Evaporating;

Gas Contact;

Handling;

Heat Exchange;

Mixing;

Oil Refining;

Packing;

Preserving;

Reaction (Chemical);

Reaction, Physical;

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

8, Bleaching and Dyeing; Fluid Treatment Chemical Modification of Textiles and Fibers, appropriate subclasses for a purification process claimed or solely disclosed for a dye composition.

8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, (Class Providing Treatment Of A Specific Liquid--Dye).

15, Brushing, Scrubbing, and General Cleaning, appropriate subclasses for apparatus which may remove a liquid from a solid by means provided for in that class (15), particularly subclass 1.7 for submerged cleaners; and subclass 246.5 for tank cleaners.

19, Textiles: Fiber Preparation, appropriate subclasses which may involve the manufacture of a filter element, particularly subclasses 144+ for the bringing together of fibers with relation to each other to form a coherent mass.

23, Chemistry: Physical Processes, subclasses 293+ for a physical purification process claimed or solely disclosed for an inorganic compound or nonmetallic element (or solution with no art use).

23, Chemistry: Physical Processes, subclasses 230+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Testing).

34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses. See the note to the class definition of Class 34 for the line with Class 210.

44, Fuel and Related Compositions, especially subclasses 300+ for a purification process claimed or solely disclosed for liquid fuel.

44, Fuel and Related Compositions, (Class Providing Treatment Of A Specific Liquid--Oil).

44, Fuel and Related Compositions, (Class Providing Treatment Of A Specific Liquid--Fuel).

51, Abrasive Tool Making Process, Material, or Composition, for a purification process claimed or solely disclosed for an abrading composition.

53, Package Making, (Class Having Liquid Treating Apparatus--Packing).

53, Package Making, (Class Providing A Specific Unit Operation Treatment Of Liquids--Preserving).

53, Package Making, (Class Providing A Specific Unit Operation Treatment Of Liquids--Storage).

62, Refrigeration, (Class Providing A Specific Unit Operation Treatment Of Liquids--Condensign).

62, Refrigeration, subclasses 600+ for a separating or purification process for liquified gas.

62, Refrigeration, subclasses 66+ and 532+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Crystallization).

62, Refrigeration, especially subclasses 56+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Freezing).

62, Refrigeration, (Class Providing A Specific Unit Operation Treatment Of Liquids--Refrigerating).

62, Refrigeration, (Class Having Liquid Treating Apparatus--Cooling).

68, Textiles: Fluid Treating Apparatus, subclass 1 and 18 for means to reclaim and revise a solvent combined with a laundry machine.

71, Chemistry: Fertilizers, (Class Providing Treatment Of A Specific Liquid--Fertilizer).

71, Chemistry: Fertilizers, appropriate subclasses for fertilizer producing processes including more than mere treatment of sewage or waste liquids for this class (210); and for a purification process claimed or solely disclosed for a fertilizer composition.

73, Measuring and Testing, especially subclasses 32+, 53+, 149, 170.29+, 861+, 290+, Dig. 5+, and Dig. 8. (Class Providing A Specific Unit Operation Treatment Of Liquids--Testing)

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, appropriate subclasses for a separating or purification process that produces a metal; and especially subclass 2 for beneficiating ores by chemical treatment and flotation; and subclasses 97+ for hydrometallurgical processes, particularly subclasses 101+ for chemical leaching.

95, Gas Separation: Processes, for processes involving steps resulting in separation of a gas from a fluid mixture comprising (a) a gas and solid or liquid particles entrained therein, (b) a liquid and gas entrained therein, or (c) a plurality of gases. Class 210 is superior to Class 95 and takes separating processes, per se, generically disclosed or claimed as fluid separation or if the disclosure or a claim is restricted to liquid separation. Class 210 also takes processes which remove or vent gas formed incidentally to the handling of the fluid mixture or as a result of a Class 210 treatment (see particularly subclasses 603, 640, 664, 718, and 750). However, Class 95 takes processes operating to remove gas initially present in an inflowing liquid mixture, with or without liquid separation. The removal of a volatile organic compound (e.g., ethanol (C_2H_5OH), gasoline, etc.) from a liquid is not taken to be degasification of a liquid for Class 95 when the volatile organic compound is initially present as a liquid mixed with another liquid. The removal of a volatile organic compound from a liquid may be found in Class 210 for liquid purification or separation or Class 203 for separatory distillation processes. Class 95 will also take a process including a liquid separation step in a Class 95 operation (e.g., regenerating a scrubbing liquid in a gas scrubbing operation).

95, Gas Separation: Processes, especially subclasses 241+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Degassing).

96, Gas Separation: Apparatus, especially subclasses 155+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Degassing).

96, Gas Separation: Apparatus, for apparatus used in separation of a gas from a fluid mixture comprising (a) a gas and solid or liquid particles entrained therein, (b) a liquid and gas entrained therein, or (c) a plurality of gases. Class 210 is superior to Class 96 and takes separating apparatus, per se, generically disclosed or claimed for use in fluid separation or if the disclosure or a claim is restricted to liquid separation apparatus. Class 210 also takes apparatus which removes or vents gas formed incidentally to the handling of the fluid mixture or as a result of a Class 210 treatment (see particularly subclasses 120, 180, 188, 218, 406, and 436). However, Class 96 takes apparatus operating to remove gas initially present in an inflowing liquid mixture, with or without liquid separation. Apparatus for the removal of a volatile organic compound (e.g., ethanol (C_2H_5OH), gasoline, etc.) from a liquid is not taken to be apparatus for the degasification of a liquid for Class 96 when the volatile organic compound is initially present as a liquid mixed with another liquid. Apparatus for the removal of a volatile organic compound from a liquid may be found in Class 210 for liquid purification or separation or Class 202 for separatory distillation. Class 96 will also take apparatus

including a liquid separation means in a Class 96, Gas Separation: Apparatus (e.g., means to regenerate a scrubbing liquid in a gas scrubbing apparatus, etc.).

99, Foods and Beverages: Apparatus, appropriate subclasses for apparatus of the type classified in this class (210) when combined with other food or beverage preparation means; and subclasses 457+ and 495+ for separation apparatus wherein a liquid is separated.

100, Presses, subclass 37 for process of separation of liquid from expressed material; and subclasses 104+ for presses having drain means for expressed liquids, and see the reference to Class 210 in the class definition for the general line.

106, Compositions: Coating or Plastic, appropriate subclasses for a purification or regeneration by separation process which is claimed or solely disclosed for a composition or ingredient of that class.

106, Compositions: Coating or Plastic, subclasses 31.13+. (Class Providing Treatment Of A Specific Liquid--Ink).

106, Compositions: Coating or Plastic, (Class Providing Treatment Of A Specific Liquid--Paints

110, Furnaces, (Class Providing A Specific Unit Operation Treatment Of Liquids--Burning).

117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, (Class Having Liquid Treating Apparatus--Crystal Forming, Single).

117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, (Class Providing A Specific Unit Operation Treatment Of Liquids--Single Crystal Forming).

122, Liquid Heaters and Vaporizers, appropriate subclasses for conversion of liquid to vapor by application of heat.

122, Liquid Heaters and Vaporizers, (Class Providing A Specific Unit Operation Treatment Of Liquids--Heating).

126, Stoves and Furnaces, subclasses 344 through 363.1 for a liquid heater that may include a kettle, a steam generator, stove pipe for use with a stove, a domestic water heater or boiler (e.g., kitchen boiler, range boiler, etc.) for use with a stove or furnace.

127, Sugar, Starch, and Carbohydrates, appropriate subclasses for processes and apparatus peculiar to the treatment of such materials.

128, Surgery, appropriate subclasses for a process of or apparatus for purifying or separating the fluid (e.g., blood) of a living animal body, combined with a claimed specifically detailed step or means of removing or returning the fluid from or to the body. A method of treating the fluid including a nominally recital step of or means for removing or returning the fluid from or to a patient will be placed in this class (210). Similarly, a process of or apparatus for purifying or separating such a fluid combined with a step of or means for monitoring a condition of the body to control the purifying or separating will be placed in Class 128, Surgery. Terms as “withdrawing”, “injecting”, and “needle”, are considered nominal while withdrawing from a named artery or vein or structurally defining a needle are considered specific detail.

134, Cleaning and Liquid Contact With Solids, and see Note (4) of the definition of that class for the line with Class 210.

137, Fluid Handling, (Class Having Liquid Treating Apparatus--Handling).

137, Fluid Handling, appropriate subclasses for fluid handling generally, particularly subclasses 1+ for processes; and subclasses 98+ for proportional flow systems, as chemical feeders.

137, Fluid Handling, subclasses 1+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Transporting).

137, Fluid Handling, subclasses 1+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Handling).

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, (Class Providing A Specific Unit Operation Treatment Of Liquids--Dispensing)

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, (Class Providing A Specific Unit Operation Treatment Of Liquids--Handling).

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, (Class Having Liquid Treating Apparatus--Dispensing).

159, Concentrating Evaporators, subclasses 47.1+ (Class Providing A Specific Unit Operation Treatment Of Liquids--Evaporating).

159, Concentrating Evaporators, (Class Having Liquid Treating Apparatus--Evaporating).

162, Paper Making and Fiber Liberation, (Class Providing Treatment Of A Specific Liquid--Black Liquor).

162, Paper Making and Fiber Liberation, appropriate subclasses for processes and apparatus for making paper by depositing fibers from a

slurry on a foraminous screen. Where the screening step is for the purpose of dewatering the slurry and a formless mass of fibers is produced rather than a felted product, the patent is classified in Class 210. Where there is a disclosure of a felted self-sustaining product being produced by the dewatering step or means are provided to remove the product intact from the mold, the patent is classified in Class 162.

165, Heat Exchange, (Class Having Liquid Treating Apparatus--

165, Heat Exchange, (Class Providing A Specific Unit Operation Treatment Of Liquids--Refrigerating).

165, Heat Exchange, (Class Providing A Specific Unit Operation Treatment Of Liquids--Condensign).

165, Heat Exchange, (Class Providing A Specific Unit Operation Treatment Of Liquids--Heating).

165, Heat Exchange, (Class Having Liquid Treating Apparatus--Cooling).

166, Wells, subclasses 265+ for well processes involving separation of fluids leaving the well, appropriate subclasses for corresponding well apparatus; subclasses 311+ and subclasses there noted for processes of cleaning wells, and appropriate subclasses for corresponding apparatus; subclasses 227+ and subclasses there noted for well screens; and see subclass 227 for the line between Classes 210 and 166 as to screens.

196, Mineral Oils: Apparatus, (Class Having Liquid Treating Apparatus--Oil Refining).

196, Mineral Oils: Apparatus, for apparatus peculiar to mineral oil treatment other than by mere manipulative treatment for this class (210), particularly subclass 14.5 for dewaxing apparatus; and subclass 46.1 for refining apparatus including a filter in combination.

202, Distillation: Apparatus, appropriate subclasses for distillation apparatus with or without separation means of the type classified in Class 210.

202, Distillation: Apparatus, (Class Having Liquid Treating Apparatus--Distilling).

203, Distillation: Processes, Separatory, subclasses 28+ and 39+ for a liquid distillation process including a chemical treating step or a disparate physical separating step not otherwise provided for.

203, Distillation: Processes, Separatory, (Class Providing A Specific Unit Operation Treatment Of Liquids--Distlling).

204, Chemistry: Electrical and Wave Energy, for the separation or purification of a liquid solely by the application of an electrical force directly to the liquid or when combined with a separation step classifiable in Class 210, subclasses 767 through 808. Exemplary is electro-osmosis with or without filtration or electrophoresis with or without gravitational setting. A Class 204 step combined with a Class 210 process provided for higher in the Class 210 schedule than subclasses 767-808 is classifiable in Class 210. Such combinations are exemplified by sorption plus electro-osmosis, precipitation plus electrophoresis, etc. Class 204 also takes a combined process which may include a preparatory liquid purification step for the process. See the reference to Class 210 in the Class 204 definition, References to Other Classes section for an elaboration of the class line between Class 204 and Class 210.

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, appropriate subclasses for an electrolytic process which may include a preparatory liquid purification step for the process, for a composition intended for use in such a process (e.g., electrolyte, etc.), for a process of regenerating or rehabilitating an electrolyte composition used or intended to be used for electrolysis as designated for Class 205, and subclasses 775 through 794.5 for electrolytic analysis or testing. A Class 205 step combined with a Class 210 process provided for higher in the schedule than subclasses 767-808 is classifiable in Class 210. Such combinations are exemplified by aerobic digestion plus electrolysis, etc. Class 205 also takes an electrolytic process which may include a preparatory liquid purification step for the process.

208, Mineral Oils: Processes and Products, for a purification or separation claimed as solely disclosed for mineral oil and which is not purely a physical operation as provided for in subclasses 767+ of this class (210). Class 210, in subclasses 767+ provides for merely physically separating a mineral oil as by filtering, settling decanting, etc. Class 208 provides for chemical, including sorption and solvent, processes for purifying or separating a mineral oil.

208, Mineral Oils: Processes and Products, (Class Providing Treatment Of A Specific Liquid--Lubricants).

208, Mineral Oils: Processes and Products, (Class Providing Treatment Of A Specific Liquid--Oil).

208, Mineral Oils: Processes and Products, (Class Providing Treatment Of A Specific Liquid--Fuel).

209, Classifying, Separating, and Assorting Solids, appropriate subclasses, and see the reference to Class 210 under (3) Note of the class definition of Class 209 for the general line.

219, Electric Heating, (Class Providing A Specific Unit Operation Treatment Of Liquids--Heating).

222, Dispensing, (Class Providing A Specific Unit Operation Treatment Of Liquids--Dispensing)

222, Dispensing, (Class Having Liquid Treating Apparatus--Dispensing).

239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclasses for separating means incidental or ancillary to handling a fluid to be sprinkled or sprayed, especially subclasses 86, 462, 553+, 575, and 590+ for nozzle structures in which filtering means are present or are inherent in the nozzle.

239, Fluid Sprinkling, Spraying, and Diffusing, (Class Providing A Specific Unit Operation Treatment Of Liquids--Handling).

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 1+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Sprinkling, Spraying, Diffusing).

241, Solid Material Comminution or Disintegration, subclasses 24 and 68+ for the comminution of solids combined with the separation of liquid therefrom. See section 8 of the class definition of Class 241 for the line with Class 210.

250, Radiant Energy, (Class Providing A Specific Unit Operation Treatment Of Liquids--Sterilizing).

250, Radiant Energy, subclasses 527+. (Class Having Liquid Treating Apparatus--Reaction (Chemical)).

252, Compositions, subclasses 175+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Softening).

252, Compositions, subclasses 380+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Preserving).

252, Compositions, appropriate subclasses for a purification or separation claimed or solely disclosed for a composition classifiable in that class, and search subclasses 61 and 175+ for a composition which may be used in a liquid purification or separation process of this class. Class 252 provides for a purification or separation process specific to a single type of composition by claim or by sole disclosure. Class 210 provides for a purification or separation process generic to several types of compositions, all of which may be classified in Class 252 (e.g., perfumes and denaturants; detergents; fire extinguishing and heat exchange materials). Class 252 provides for certain compositions for use in Class 210 processes and for a process, per se, of regenerating or rehabilitating them. The use of these compositions in a liquid purification or separation, per se, or combined with regenerating them is provided for in Class 210.

252, Compositions, subclasses 71+. (Class Providing Treatment Of A Specific Liquid--Coolant).

252, Compositions, various subclasses based on function of emulsion. (Class Providing A Specific Unit Operation Treatment Of Liquids--Emulsifying).

260, Chemistry of Carbon Compounds, appropriate subclasses for such compounds and related compound producing or treating processes, particularly subclasses 704+ for general physical treatment processes peculiar to carbon compounds, and see the references to Class 210 in the class definition.

261, Gas and Liquid Contact Apparatus, subclasses 2+ for separating means combined with apparatus to produce an intimate contact between gases and liquids to exchange properties or mutually modify conditions.

261, Gas and Liquid Contact Apparatus, (Class Having Liquid Treating Apparatus--Gas Contact).

261, Gas and Liquid Contact Apparatus, (Class Having Liquid Treating Apparatus--Carbureting).

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, appropriate subclasses for processes for shaping or molding plastic materials within the class definition, which may involve the manufacture or use of fiber elements or separators, or porous articles, per se.

324, Electricity: Measuring and Testing, especially subclasses 29+, 71+, 204, 425+, and 459+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Testing).

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, (Class Providing A Specific Unit Operation Treatment Of Liquids--Magnetizing).

361, Electricity: Electrical Systems and Devices, (Class Providing A Specific Unit Operation Treatment Of Liquids--Magnetizing).

366, Agitating, (Class Having Liquid Treating Apparatus--Mixing).

366, Agitating, subclasses 2+ and 348. (Class Providing A Specific Unit Operation Treatment Of Liquids--Mixing).

399, Electrophotography, subclass 250 for liquid carrier condensation of liquid developer material within an electrophotographic device.

406, Conveyors: Fluid Current, especially subclasses 168+ and 197 for transporting a solid by suspending it in a fluid and separating the solid from the liquid after transporting.

406, Conveyors: Fluent Current, (Class Providing A Specific Unit Operation Treatment Of Liquids--Transporting).

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for a process of treating water to prevent corrosion of a conduit or a container and for chemical apparatus of general utility.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 243+. (Class Having Liquid Treating Apparatus--Reaction, Physical).

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, (Class Having Liquid Treating Apparatus--Preserving).

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 129+. (Class Having Liquid Treating Apparatus--Reaction (Chemical)).

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 245.1+ for non-coating means not including means for chemical reaction and not provided for elsewhere. (Class Having Liquid Treating Apparatus--Crystallizer.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 13 and 14+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Softening).

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 1+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Preserving).

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, (Class Providing A Specific Unit Operation Treatment Of Liquids--Storage).

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+. (Class Having Liquid Treating Apparatus--Analysis).

423, Chemistry of Inorganic Compounds, appropriate subclasses for chemical manufacturing involving a chemical reaction and for extracting, leaching, or dissolving not elsewhere provided for.

423, Chemistry of Inorganic Compounds, (Class Providing Treatment Of A Specific Liquid--Inorganic).

424, Drug, Bio-Affecting and Body Treating Compositions, (Class Providing Treatment Of A Specific Liquid--Drug).

424, Drug, Bio-Affecting and Body Treating Compositions, (Class Providing A Specific Unit Operation Treatment Of Liquids--Disinfecting).

424, Drug, Bio-Affecting and Body Treating Compositions, especially subclasses 661+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Chlorinating).

424, Drug, Bio-Affecting and Body Treating Compositions, subclasses 56+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Fluoridating).

424, and 514, Drug, Bio-Affecting and Body Treating Compositions, especially Class 424, subclasses 127+ and Class 514, subclasses 1+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Sterilizing).

424, Drug, Bio-Affecting and Body Treating Compositions, (Class Providing Treatment Of A Specific Liquid--Medicine).

426, Food or Edible Material: Processes, Compositions, and Products, (Class Providing A Specific Unit Operation Treatment Of Liquids--Preserving).

426, Food or Edible Material Processes, Compositions, and Products, (Class Providing Treatment Of A Specific Liquid--Beverage).

426, Food or Edible Material: Processes, Compositions, and Products, (Class Providing A Specific Unit Operation Treatment Of Liquids--Storage).

426, Food or Edible Material: Processes, Compositions, and Products, appropriate subclasses for (a) process of the type classified in this class (210) when combined with other food working operations, or (b) a process of the type classified in this class (210), which process is limited to treatment of a food or edible material except water.

426, Food or Edible Material: Processes, Compositions, and Products, (Class Providing Treatment Of A Specific Liquid--Food).

426, Food or Edible Material: Processes, Compositions, and Products, subclasses 66+. (Class Providing A Specific Unit Operation Treatment Of Liquids--Drinkign Storage).

429, Chemistry: Electrical Current Producing Apparatus, Product, and Process, especially subclasses 101 through 109, 188-207, and 408-412. (Class Providing Treatment of a Specific Liquid).

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, (Class Providing Treatment Of A Specific Liquid--Emulsion).

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, (Class Providing Treatment Of A Specific Liquid--Photographic).

431, Combustion, (Class Providing A Specific Unit Operation Treatment Of Liquids--Burning).

432, Heating, (Class Providing A Specific Unit Operation Treatment Of Liquids--Heating).

435, Chemistry: Molecular Biology and Microbiology, (Class Providing Treatment Of A Specific Liquid--Culture Broth).

436, Chemistry: Analytical and Immunological Testing, subclasses 1+ and 129.2+. (Classes Providing A Specific Unit Operation Treatment Of Liquids--Analyzing).

494, Imperforate Bowl: Centrifugal Separators, appropriate subclasses, for apparatus and process for breaking up a mixture of fluids or fluent substances into two or more components by centrifuging within a generally solid-walled, receptacle-like member.

494, Imperforate Bowl: Centrifugal Separators, (Class Providing A Specific Unit Operation Treatment Of Liquids--Centrifugally separating).

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a composition comprising a catalyst or sorbent, per se.

504, Plant Protecting and Regulating Compositions, subclasses 150+ for compositions designed or intended for retarding, inhibiting, or killing algae and the processes of using such compositions or compounds which are no more than the mere application of the compounds or the compositions.

508, Solid Anti-friction Devices, Materials Therefor, Lubricant or Separant Compositions for Moving Solid Surfaces, and Miscellaneous Mineral Oil Compositions, particularly subclasses 110+. (Class Providing Treatment Of A Specific Liquid--Lubricants).

508, Solid Anti-friction Devices, Materials Therefor, Lubricant or Separant Compositions for Moving Solid Surfaces, and Miscellaneous Mineral Oil Compositions, particularly subclasses 110+. (Class Providing Treatment Of A Specific Liquid--Oil).

510, Cleaning Compositions for Solid Surfaces, Auxiliary Compositions Therefor, or Processes of Preparing the Compositions, (Class Providing Treatment Of A Specific Liquid Detergent).

510, Cleaning Compositions for Solid Surfaces, Auxiliary Compositions Therefor, or Processes of Preparing the Compositions, appropriate subclasses, especially subclasses 285+, 405+, etc. (Class Providing Treatment Of A Specific Liquid--Cleaning Fluid).

514, Drug, Bio-Affecting and Body Treating Compositions, especially subclasses 939+. (Class Providing Treatment Of A Specific Liquid--Emulsion).

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for subject matter relating to: colloid systems (such as sols*, emulsions, dispersions, foams, aerosols, smokes, gels, or pastes) or wetting agents (such as leveling, penetrating, or spreading); subcombination compositions of colloid systems containing at least an agent specialized and designed for or peculiar to use in making or stabilizing colloid systems; compositions and subcombination compositions specialized and designed for or peculiar to use in breaking (resolving) or inhibiting colloid systems; processes of making the compositions or systems of the class; processes of breaking (resolving) or inhibiting colloid systems; in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in

which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210. (Class Providing A Specific Unit Operation Treatment Of Liquids--Emulsifying) (Class Providing Treatment Of A Specific Liquid Colloids) (Class Providing Treatment Of A Specific Liquid Emulsion).

520, Series, Synthetic Resins or Natural Rubbers, (Class Providing Treatment Of A Specific Liquid--Paints).

520, Synthetic Resins or Natural Rubbers, particularly Classes 523 and 524. (Class Providing Treatment Of A Specific Liquid--Emulsion).

554, Organic Compounds, subclasses 1+. (Class Providing Treatment Of A Specific Liquid--Fats).

585, Chemistry of Hydrocarbon Compounds, subclass 14. (Class Providing Treatment Of A Specific Liquid--Fuel).

588, Hazardous or Toxic Waste Destruction or Containment, subclasses 300 through 415 and 249-260, for the chemical destruction or containment of hazardous or toxic waste. Class 210 provides for the purification of water (liquids) as useful product even though hazardous or toxic waste may be removed from or destroyed in the water (liquids).

SECTION IV - GLOSSARY

The meaning to be given various “Art” terms appearing in this class, but which have not been included in the GLOSSARY below, is the same as that generally accepted or in common usage.

ABSORB

See SORB.

ACCELERATOR

Agent which promotes an action, but does not necessarily cause the action. An example is a catalyst as contrasted with a reactant. In subclasses 696+ and 702+ no distinction is made between an agent which promotes or one which causes and a search for a compound used as a flocculant is the same as if the compound reacted to cause precipitation.

ACTIVATED SLUDGE

Common term for an aerobic process of treating sewage with micro-organisms in which part of the settled sludge from the treatment is diverted and introduced into the feed of incoming sewage.

ADDITIVE

An agent added to a liquid being treated to either cause a desired result or to promote a result which would occur more slowly or incompletely without the additive. Catalysts filter aids, chemical agents, seeding agents, buffers are all additives.

ADSORB

See SORB.

AEROBIC

Treating liquids, generally sewage, with micro-organisms in the presence of oxygen generally supplied as air or other source of oxygen but sometimes using residual dissolved oxygen. Best known method is “activated sludge”. The micro-organisms convert noxious materials to less noxious stuff, e.g., to water, methane, nitrogen oxides, carbon dioxide.

ALGAECIDE

Any material capable of inhibiting or destroying algal growth.

ANAEROBIC

Treating liquids, generally sewage by micro-organisms which change noxious stuff to innocuous materials, in the absence of oxygen. Some solids are made into water and gases as methane, carbon monoxide, etc. A septic tank is an example of anaerobic digestion of sewage.

ANGSTROM

A unit of length used to measure wavelength of lights and diameters of atoms or molecules.

Designated by A and equal to 10^{-8}cm.

AQUEOUS

A liquid containing water. Generally water is the major part as in blood, brine, milk, etc., but may comprise a substantial but not major portion as in a water-alcohol mixture of various proportions. Usually trace amounts of water are not considered aqueous.

BACTERICIDE

Any material capable of inhibiting or destroying bacteria.

BRACKISH

Somewhat salty, but substantially less so than sea water.

BRINE

A relatively concentrated salt water solution sometimes from wells or industrial sources and including sea water.

CENTRIFUGE

A process or means in which a liquid is revolved about an axis at such a number of revolutions per unit of time that the apparent weight of constituents increases to a point where the constituents tend to concentrate in strata similar to gravity-induced separation based on relative densities.

CHROMATOGRAPHY

A process in which a liquid is flowed along a linear path comprising a sorbent, with which the liquid competes in affinity for a constituent of the liquid. The constituent is sorbed from the moving liquid by the relatively immobile sorbent and redissolved by a later passing portion of the liquid until an equilibrium of the sorbing-dissolving step is set up causing the constituent to concentrate in a specific volume of the sorbent and to move along the path of the liquid at a slower rate than such liquid.

A comprehensive treatise on chromatography is to be found in Kirk-Othmer Encyclopedia of Chemical Technology 2nd ed. Vol. 5, pp. 413-450.

COALESCE

The merging together of small droplets or particles of a material or constituent dispersed in a liquid to form larger bodies of the material or constituent which may be more easily handled.

COLLOIDAL

A state of very fine division of a material dispersed throughout a liquid almost to the point of a true solution and either impossible or extremely difficult to filter or cause to settle.

CONDUCTIVITY WATER

An extremely pure water characterized by high ohmic resistance due to very low rate of ionization. See POLISHING.

CYCLONE

A device using centrifugal force to separate. The process is called cyclonic; see centrifuge.

DESALINATION

The process of removing inorganic salts, most usually sodium chloride, from water.

DIALYSATE

See DIALYSIS.

DIALYSIS

A process of separating a dissolved constituent from a liquid by transport or migration from the liquid through a membrane into a second liquid. The membrane may be semipermeable or the second liquid may have greater affinity for the constituent but the net effect of the combined membrane-extracting liquid is to selectively remove a constituent from the first liquid. The process is provided for in subclasses 644+. An in-depth explanation is given in Kirk Othmer Encyclopedia of Chemical Technology 2nd ed. Vol. 7, pp. 1-20. Dialysate is the product of a dialysis method and the term is not always used for the same product, including retentate and diffusate.

DIFFUSATE

The material passed through in a diffusing process.

DIFFUSE

The passing of a constituent through a membrane or septum.

DIGEST

Process in which material is acted upon by micro-organisms to cause a chemical change. The composting of sludge is a digestion process.

DISPERSION

A mixture of a liquid with an insoluble material in very fine subdivision almost but not quite a true solution.

EFFLUENT

The liquids flowing out of a process, normally the mainstream, can be either a desired product or discard.

FEED

The liquid to be treated, prior to processing.

FILTER

Method of and apparatus for removing solid particles from a liquid by passing the same through a medium with openings smaller than the particles. Microfiltration is filtration down to coolidal and polymeric molecular size. Ultrafiltration and hyperfiltration are more likely transport or diffusion across a membrane process but are called filtration down to molecular and ionic size. See subclasses 650 and 652.

FILTER ELEMENT

Filter medium combined with supporting structure or having a specified shape.

FILTER MEDIUM

Solid separating material or member for separating a constituent from the prefilt due to openings between material particles or in the member.

FILTRATE

Liquid which has been clarified by passing it through a filter medium.

FILTRATION

The separation of solids from a liquid or a liquid from liquids by a solid separating medium due to openings in the medium or between discrete particles.

FLOC

Flocculated clumps of suspended or dispersed small particles resulting from accretion and used as sites for further accretion of suspended matter. See subclass 715.

FLOCCULATION

A clumping together of finely divided particles of material dispersed in a liquid to a state where filtration or settling of the material is possible. See subclasses 702+.

FLUID

Material that flows, generally gas or liquid but sometimes including mixtures of these with particulate solids such as slurry, sludge, gels, etc. Some materials are thixatropic, i.e., fluid when agitated but jellylike when at rest. Pumpable sludge is considered a liquid for treatment in this class.

FOULING

The act of depositing on the membrane surface something which will impede its proper functioning. Sometimes also termed “blinding”.

GEL

A colloidal dispersion of a solid in a liquid with a jellylike texture. Use of a gel in chromatography is in subclass 635, and separating the constituents of a gel are in subclass 702.

GRAVITY, BY

A separation process depending on differences in density to separate freely movable constituents such as cream rising to the top of the milk. Draining or allowing a liquid to drip from solids held by a screen or grid is not gravity separation.

HYDROPHILIC

Water attractive or wettable.

HYDROPHOBIC

Water-repellent or nonwettable.

HYPERFILTRATION

Filtration to the ultimate degree to molecular or ionic size, but most likely membrane transport or diffusion phenomenon. See FILTER and subclass 652.

IMHOFF

A two-story septic tank of special design to allow digestion of sludge in lower chamber with settling in upper chamber and passage of settled sludge from upper to lower chamber. Process is anaerobic and provided for in subclasses 602+.

INERT MATERIAL

Stuff that does not cause or promote any change in liquid or component being treated. May act as filler, support, or carrier for active material. See subclass 679.

LIQUID

A flowable material comprising at least one component that is a true liquid under the conditions of treatment. A slurry, wet sludge, pumpable sediment, emulsion, froth, all are considered liquid for treatment in this class.

MAINSTREAM

The main body of liquid being treated as constrasted with separated constituents. The mainstream may comprise several divided streams, some of which undergo treatment and which are a substantial part of the overall feed but a relatively small stream diverted for a dosing technique in which agents are added in a concentrated amount and the diverted stream is diluted with the main body is not considered to be the mainstream, per se. A recirculated portion of the stream is not considered to be the mainstream.

MEMBRANE

A skinlike thin film which acts as a barrier or container wall; the usual form of a permeable or semipermeable septum. A semipermeable membrane is a skinlike, relatively thin film which serves to define a barrier or container wall to at least one of the constituents of a solution or colloidal suspension and allows at least one other constituent to pass through by a mechanism which may include but goes beyond mere straining and which mechanism is in part due to differences in behavior of the constituents of the solution or suspension with respect to the material of the membrane. The constituents vary in their ability to diffuse through or to wet the membrane.

Membranelike includes mambrane, per se, and material which, while not strictly in a self-supporting skinlike structure, functions in an analogous manner and includes a layer of fine particulate matter or an emulsion as set out in subclass 643.

A process which depends only on the relative size of pores and molecules or ions of a constituent is a filtering or straining process and is classified under separation, subclass 767.

MICRON

A linear measurement equal to one millionth of a meter, one thousandth of a mm, 39 millionths of an inch.

MICRO-ORGANISM

Living plants or animals of a size normally visible only through a microscope and includes bacteria, yeast, fungi, and virus. For purposes of this class, algae are not considered micro-organisms. The scope of this term is coextensive with the organisms of Class 435, Molecular Biology and Microbiology.

MICROFILTER

See FILTER.

MOLECULAR SIEVE

A sorbent with an extremely large volume of pores, each of about molecular size, capable of selectively sorbing gases and other material in molecular form; generally of Zeolite.

OIL

Organic material of slick or slippery feel including long chain hydrocarbons esters of higher fatty acid and derived from petroleum, fats, greases, and oils of animal or vegetable origin.

OLEOPHILIC

Oil attractive or wettable by oil.

OLEOPHOBIC

Oil repelling.

OSMOSIS

Phenomenon in which solvent migrates or is transported across a barrier from a less concentrated solution to a more concentrated solution separated by the barrier tending to equalize the concentrations. The force driving the solvent is dependent on the materials of the liquids and the barrier or septum, and a counter force of greater magnitude will effect reverse migration or reverse osmosis causing solvent to migrate from the more concentrated to the less concentrated solution. A comprehensive treatise on osmosis and reverse osmosis is given in Kirk-Othmer Encyclopedia of Chemical Technology 2nd ed. Vol. 14, pp. 345-355.

OXIDANT

An agent which extracts electrons from a chemical moiety and increases its positive or decreases its negative valence. Often an oxygen or halogen containing material.

PERMEABLE

Property of allowing passage or migration of other material through a barrier or septum of the material so designated. The migration phenomenon is due primarily to the chemical nature of the materials involved and may include molecular weight or size as a factor.

PERMEATE

Material which has passed through a permeable or semipermeable membrane.

PH

The measure of the acidity or basicity (alkalinity) of a liquid. Also determines the sweetness or sourness of a liquid. The original value was the log of the reciprocal of the hydrogen ion concentration.

POLISHING

An ion exchange process in which the ions released to the liquid are only H^+ and OH^-. A method of achieving very pure water. See CONDUCTIVITY WATER.

PREFILT

Material to be filtered, also known as feed, influent, intake.

RESIDUE

Material retained by membrane, septum, filter, settling tank, etc.

RETENTATE

Material held back by membrane or filter, not allowed to migrate or pass through.

REVERSE OSMOSIS

See OSMOSIS.

SEMIPERMEABLE

Permeable to only some of materials which may be in intimate association as in a solution. Usually applied to membrane, see MEMBRANE.

SLUDGE

Concentrate of settled colloidal suspension with a mushy or mud texture, a gel with up to more than 90 percent usually water) but quite viscous. It may contain indiscriminate solids as grits, fiber, wood chip, and emulsions. While still wet, treatment is proper for this class, but the same material when completely dry may be referred to as sludge. See ACTIVATED SLUDGE.

SORB, SORBING

The attracting by a solid material of a liquid wherein the liquid permeates the body of the solid, either in pores or throughout the material itself or of a finely divided constituent, suspended or dissolved in a liquid, on the surface of or in pores of the material. Examples of the former are methods using sponges, mops, and pads and of the latter are methods using activated charcoal clays and zeolites. In this class, no distinction is made between absorption and adsorption. Processes using sorption for separation are provided for in subclasses 660+. (See Kirk-Othmer Encyclopedia of Chemical Technology 2nd ed. Vol. 1, pp. 44-75 and 421-469.)

SUSPENSION

Liquid carrying throughout its volume in extremely fine subdivision an insoluble substance (solid or another liquid) which will not settle under gravity nor can be filtered without special treatment such as addition of chemical agents. A DISPERSION. See FLOCCULATION, GEL, and MEMBRANE.

SYNTHETIC

A material not found in nature, but man-made from chemical building blocks, with properties resembling naturally occurring materials. It does not include man-made duplicates of natural material or chemical modified natural materials. For example, regenerated cellulose and cellulose acetate are not included nor is zein, but polyester, vinyl, and nylon are included.

TRICKLING FILTER

A particulate bed of designed coarseness through which liquid is gravity fed at a rate to maintain relatively thin films on the particles and enhance air liquid contact to promote aerobic treatment of the liquid. An alternate method may be programmed flooding and draining of the bed. The treatment using such a bed is in subclasses 616+.

ULTRAFILTRATION

Filtration of a solution or colloid, retaining a constituent of macromolecule dimension. See FILTRATION and MEMBRANE.

VAPOR

A normally liquid material in a gaseous state, e.g., steam. Separating or purifying a fluid in the gaseous state is proper for Class 55, Gas Separation, but treating a liquid with gaseous constituents is provided for in subclasses 603+, 640, 664, 707, 718, and 750.

WASTE

A liquid that is to be discarded. The term includes effluent from domestic or industrial sources, e.g, sewage wash water spent processing fluids, etc., and refers to liquid to be treated and liquid which has been treated to allow discharge to the environment.

SUBCLASSES

85 WITH ALARM, INDICATOR, REGISTER, RECORDER, SIGNAL OR INSPECTION MEANS:
This subclass is indented under the class definition. Apparatus with an alarm indicator, register, recorder or signal, showing a condition of the subject matter of the class; or with means which permit inspection of normally hidden parts of the apparatus or of the fluid inside the apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:
138+, for controlled devices including only the driving mechanism of a clock without any indication other than that of a conventional clock.

SEE OR SEARCH CLASS:
73, Measuring and Testing, appropriate subclasses, for pressure, level, temperature, etc., measuring and indicating means, per se, especially subclass 61.41 for methods and means for testing which determines a characteristic of a separated constituent.
116, Signals and Indicators, appropriate subclasses, for mechanical signals and indicators, per se.
118, Coating Apparatus, subclasses 712+ for coating apparatus and a signal or an indicator.
222, Dispensing, subclasses 23+ for dispensers with recorder, register, indicator, signal or exhibitor.
235, Registers, appropriate subclasses, for registers, per se.
340, Communications: Electrical, subclasses 603+ for electrical automatic fluent material responsive indicating systems.
346, Recorders, appropriate subclasses, for recorders, per se.

86 Material level or thickness responsive:
This subclass is indented under subclass 85. Apparatus responsive to a change in the level or thickness of a material being treated within the apparatus.

87 Responsive to fluid flow:
This subclass is indented under subclass 85. Apparatus responsive to flow of fluids.

88 Meter-controlled cyclic systems:
This subclass is indented under subclass 87. Apparatus in which a meter controls an operating cycle of the apparatus.

89 With time control:
This subclass is indented under subclass 88. Apparatus including means operating during or after a predetermined interval of time.

90 Fluid pressure responsive:
This subclass is indented under subclass 85. Apparatus responsive to fluid pressure.

91 Position or extent of motion:
This subclass is indented under subclass 85. Apparatus comprising means which gives information as to the position of a movable or adjustable part of the apparatus.

92 Test valve:
This subclass is indented under subclass 85. Apparatus including a valve which may be opened for test purposes.

93 In effluent conduit:
This subclass is indented under subclass 85. Apparatus comprising a section in a conduit downstream from treating means.

94 Transparent:
This subclass is indented under subclass 85. Apparatus in which the inspection means is a transparent part of a treating means.

SEE OR SEARCH CLASS:
222, Dispensing, subclasses 154+ for dispensers with inspection devices.

95 Sight glass:
This subclass is indented under subclass 94. Apparatus comprising transparent means associated with treatment apparatus through which material being treated can be viewed.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 323+ for liquid level sight glasses of general application.

96.1 CONSTITUENT MIXTURE VARIATION RESPONSIVE:
This subclass is indented under the class definition. Apparatus in which an operating condition of the apparatus is controlled by variations of a constituent quality of a liquid mixture as determined by physical or chemical tests of the liquid mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:
662 for composition testing in ion exchange or sorption processes.

SEE OR SEARCH CLASS:
23, Chemistry: Physical Processes, subclass 230 for analytical and analytical control methods there provided for.
137, Fluid Handling, subclasses 3+ for processes of mixing plural fluids of diverse characteristics; and subclasses 88+ for a system involving mixture condition maintaining or sensing.

96.2 With membrane:
This subclass is indented under subclass 96.1. Apparatus having a filtering means composed of a thin, enveloping or lining substance, i.e., membrane.

SEE OR SEARCH THIS CLASS, SUBCLASS:
257.1 for a membrane within a storage unit in serially connected distinct treating apparatus.
348+, for apparatus which uses a semipermeable septum which does not provide for continuous streams on both sides of the septum.
433+, for similar apparatus which uses in ordinary filter septum.
500.1 for membrane, per se.
541 for membrane supports, frames, and spaces.
634+, for process of using a septum selective as to composition.

SEE OR SEARCH CLASS:
127, Sugar, Starch, and Carbohydrates, subclass 10 for a sugar solution dialyzer.
204, Chemistry: Electrical and Wave Energy, subclasses 252+ for a similar device using an electric current.
604, Surgery, subclass 6.09 for membrane separation devices used in blood treat

97 FLOW, FLUID PRESSURE OR MATERIAL LEVEL, RESPONSIVE:
This subclass is indented under the class definition. Apparatus having means responsive to variations in flow, material level or fluid pres-

sure to control means to effect an operation or change in an operating condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

156+, for a fluid stream or residue operated flume stream type separator.

349 for a filter with pulsation dampening means.

354 for a filter medium or cleaner or agitator moved by fluid.

SEE OR SEARCH CLASS:

162, Paper Making and Fiber Liberation, subclass 258 for paper making apparatus having automatic control of stock consistency, and subclass 259 for automatic control of stock feed to the foraminous forming screen.

204, Chemistry: Electrical and Wave Energy, subclass 662 for an electrical or magnetic apparatus to separate or purify a liquid with a control means responsive to a sensed liquid level.

98 Fluid current controlled cyclic system:

This subclass is indented under subclass 97. Apparatus in which an operating cycle is controlled in response to the liquid flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:

88+, for a meter controlled cyclic system.

99 Prefilt deverting to drain by prefilt accumulation:

This subclass is indented under subclass 97. Apparatus in which there is means for diverting the initial charge of prefilt to drain, said means being responsive to accumulation of prefilt in a nonseparating receiver.

SEE OR SEARCH THIS CLASS, SUBCLASS:

130+, for a fluid pressure responsive bypass.

421 for a filter with a manually operated prefilt deflector.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 120 for self-controlled branched flow systems having alternate outflows including liquid level sensing means.

100 Flow cut-off requiring reset:

This subclass is indented under subclass 97. Apparatus which causes a flow controller to close, after which a necessary resetting operation must be preformed by an external operator.

101 Proportionate feed means:

This subclass is indented under subclass 97. Apparatus including means to maintain the ratio between plural flows at a predetermined value in response to means sensing a change in fluid condition in at least one of the flow lines.

SEE OR SEARCH THIS CLASS, SUBCLASS:

105 for diverse condition responsive controls one of which controls an auxiliary liquid inlet.

127 for a separator having a float controlled auxiliary fluid inlet.

198+, for separatory means having means to add treating material.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 9 for self-proportioning fluid handling processes and subclasses 98+ for self-proportioning apparatus.

222, Dispensing, subclass 57 for dispensing devices which are automatically controlled by the weight, volume or pressure of a second dispensed material, and subclass 130 for plural sources at least one of which is non-dispensing.

102 Programming plural units:

This subclass is indented under subclass 97. Apparatus governing the order in which individual separatory units of a plurality of such units are used.

103 Diverse sensing means:

This subclass is indented under subclass 97. Apparatus which includes plural sensing means differing characteristics other than mere size.

104 Responsive to material level:

This subclass is indented under subclass 103. Apparatus responsive to a change in the level of the liquid or solids.

105 With control for auxiliary liquid inlet:
This subclass is indented under subclass 103. Apparatus including the control of introduction of an auxiliary liquid to a treatment chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
101 for separatory apparatus combined with means to feed treating material thereto proportionately to the material being treated.

106 Filter cleaning:
This subclass is indented under subclass 97. Apparatus relating to means to rehabilitate or clean a filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
407+, for filter means combined with cleaning means.

107 Rotary movement of filter or mechanical cleaner:
This subclass is indented under subclass 106. Apparatus wherein the filter medium or the rehabilitating means is rotated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
359+, for a movable filter medium.

108 Backwash or blowback:
This subclass is indented under subclass 106. Apparatus comprising backwash or blowback means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
420+, for a filter provided with a flow controller providing selective direction flow therethrough.

109 Discharge of treated material:
This subclass is indented under subclass 97. Apparatus which controls a treated material discharge outlet.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 395+ for liquid level responsive outlet controls for tanks of general utility, and subclasses 577+ for fluid handling tanks of general utility having adjustable outlets, especially subclass 578 for float supported outlets.

110 With separator inlet control:
This subclass is indented under subclass 109. Apparatus with means controlling an inlet to a separator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103+, for control by diverse sensing means.

111 Responsive to prefilt accumulation or filter clogging:
This subclass is indented under subclass 109. Apparatus responsive to liquid to be treated or to an increase in pressure upstream of a filter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
99 for means diverting prefilt to drain responsive to prefilt accumulation.
130+, for bypass means responsive to pressure.

112 Heavier constituent:
This subclass is indented under subclass 109. Apparatus in which the material is a heavier constituent.

113 By weight of solids:
This subclass is indented under subclass 112. Apparatus responsive to weight of accumulated solids.

114 By treated liquid accumulation:
This subclass is indented under subclass 112. Apparatus responsive to treated liquid accumulation.

115 With lighter constituent outlet control:
This subclass is indented under subclass 112. Apparatus controlling a lighter constituent discharge outlet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103+, for apparatus including diverse sensing means.

116 Permitted by filtrate accumulation:
This subclass is indented under subclass 109. Apparatus wherein the discharge outlet is normally closed and permits discharge of filtrate responsive to filtrate accumulation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
114 for means controlling discharge of a heavier constituent responsive to treated liquid accumulation.
117+, for valve means responsive to change in direction of the flow to prevent backflow.

117 Check valve controlled:
This subclass is indented under subclass 109. Apparatus including flow control means allowing flow in only one direction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
137 for means maintaining stream pressure or flow in separatory apparatus.

118 Non-closing, e.g., sand valve:
This subclass is indented under subclass 117. Apparatus comprising a variable restrictor responsive to flow direction whereby flow increases during backwash.

119 Float type:
This subclass is indented under subclass 117. Apparatus comprising a float operated valve means.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 247.15+ for line condition change responsive flow controllers combined with liquid seal traps, subclasses 409+ for float operated valves, and subclasses 455+ for line condition responsive valves, especially subclasses 511+ for check valves.

120 Vent control:
This subclass is indented under subclass 97. Apparatus comprising means controlling an opening above a liquid level for entrance or exit of a gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:
130+, for a liquid bypass which may also serve as a vent.
472 for a filter means with vent means.

121 Float:
This subclass is indented under subclass 97. Apparatus in which the responsive means is a float.

SEE OR SEARCH THIS CLASS, SUBCLASS:
104 for diverse sensing means responsive to material level.

122 Controls movable separator:
This subclass is indented under subclass 121. Apparatus which controls the movement of a separatory medium.

123 Controls valve:
This subclass is indented under subclass 121. Apparatus in which the float controls valve means.

124 Controls flow between two separators:
This subclass is indented under subclass 123. Apparatus in which the valve means is located in the flow stream between two separators.

125 Separator between float and valve:
This subclass is indented under subclass 123. Apparatus in which the float and the valve means are on opposite sides of a separatory means.

126 Float in separate rehabilitating fluid tank:
This subclass is indented under subclass 123. Apparatus in which the float is located in a separate tank or compartment provided for the storage of rehabilitating fluid.

127 Additional fluid inlet control:
This subclass is indented under subclass 123. Apparatus in which the valve means controls admission of a fluid other than liquid being treated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
101+, for a separator with proportionate feed means for adding treating material.

198+, for a separator with means to add treating material.

128 Float in receptacle other than that of separator:
This subclass is indented under subclass 123. Apparatus in which the float is in a nontreating chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
126 for a float in separate rehabilitating fluid tank.

129 In flow between inlet and separator:
This subclass is indented under subclass 128. Apparatus in which the float is in the flow between a controlled inlet and a separator.

130 Fluid pressure responsive by-pass:
This subclass is indented under subclass 97. Apparatus comprising means responsive to pressure to bypass liquids around treatment means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
99 for means to divert on initial charge of prefilt to drain.
790 for separating processes involving dividing and recombining the flow.

131 By movement of separation medium:
This subclass is indented under subclass 130. Apparatus in which the responsive means is a separating element or filter medium which provides a bypass by flexing or compression thereof or by movement in its entirety.

SEE OR SEARCH THIS CLASS, SUBCLASS:
356 for fluid operated means to flex a filter means during operation.
398+, for movable elements within a casing, the movement of which may open a bypass.
738, for processes including pulsation or oscillation essential to the separation or purification.

132 With additional separation or treating means:
This subclass is indented under subclass 130. Apparatus in which the by-pass contains separation or treatment means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
294+, for diverse distinct separators.
806 for processes including plural separatory steps.

133 In inlet and outlet closure header:
This subclass is indented under subclass 130. Apparatus in which a separator casing is closed by a unitary attached header which header includes at least an inlet and an outlet and the pressure response bypass means therebetween.

134 Plural elements controlled:
This subclass is indented under subclass 97. Apparatus including plural variable flow affecting elements, at least one of which is controlled by the sensing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103+, for apparatus including diverse sensing means controlling an operating phase or phases in a separator.
110 for line condition responsive means controlling discharge of treated material and the inlet to a separator.
115 for line condition responsive means controlling discharge of a heavier constituent and discharge of a lighter constituent.

135 Including manually controlled element:
This subclass is indented under subclass 134. Apparatus including at least one manually operated flow controller.

136 Check valve:
This subclass is indented under subclass 97. Apparatus having means responsive to a change in a flow line condition acting of the face of a valve disc or plug itself to permit flow in one direction only.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103 for diverse sensing means.

117+, for a check valve controlling discharge of treated material.
120 for a check valve controlled vent.
130+, for a fluid pressure responsive bypass.
416 for valves which form a part of a pump organization.

137 Maintaining stream pressure or flow:
This subclass is indented under subclass 97. Apparatus to regulate pressure of or rate of flow of a liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
111 for means discharging treated material responsive to filter clogging.
114 for means discharging the heavier constituent responsive to treated liquid accumulation.
116 for discharge of treated material responsive to filtrate accumulation.
130 for a fluid pressure responsive bypass.

138 WITH TIME CONTROL:
This subclass is indented under the class definition. Apparatus in which the time at which an element of an treating means is actuated, or the length of time taken to perform an operation thereof is controlled.

SEE OR SEARCH CLASS:
68, Textiles: Fluid Treating Apparatus, subclasses 12 and 23+ for treating machines having centrifugal extractor features and time-controlled means associated therewith.

139 Of additional fluid:
This subclass is indented under subclass 138. Apparatus which introduces to the treating means a fluid in addition to that being treated.

140 Preparation for treating operation:
This subclass is indented under subclass 139. Apparatus in which the additional fluid serves to prepare the treating means for a treating operation.

141 WITH PROGRAM ACTUATOR:
This subclass is indented under the class definition. Apparatus in which an actuating means provides either a continuously repetitive operation of a treating device or a single operation terminating in a position to restart an additional cycle, which cycle is more complex than a mere starting or stopping of a single treating device.

142 Plural treating units or sections sequentially controlled:
This subclass is indented under subclass 141. Apparatus in which there is a plurality of treating units or sections which are controlled in sequence.

143 AUTOMATIC CONTROL:
This subclass is indented under the class definition. Apparatus having means to sense some condition of a treatment operation and operate a control device.

SEE OR SEARCH THIS CLASS, SUBCLASS:
86 for a material level responsive indicator.
87 for a fluid flow responsive indicator.
90 for a fluid pressure responsive indicator.
96.1+, for control responsive to constituent mixture variation.
97+, for control by fluid flow, fluid pressure or material level responsive means.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 87.01+ for self proportioning or correlated fluid handling systems of general utility.

144 Responsive to vibration or unbalance:
This subclass is indented under subclass 143. Apparatus responsive to vibration or unbalance of a movable part of treating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
363+, for a centrifugal extractor with rotation stabilizer.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 572+ for flywheels and rotors with balancing or vibration dampening means defining no specific feature of separator construction.
192, Clutches and Power-Stop Control, subclasses 116+ for power-stop control of more general utility.

318, Electricity: Motive Power Systems, subclasses 445+ for a motor control systems, particularly subclass 460 for vibration responsive control.

145 Responsive to rotation:
This subclass is indented under subclass 143. Apparatus responsive to a condition of rotation of a part of the treating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
144 for vibration or unbalance responsive control.

SEE OR SEARCH CLASS:
192, Clutches and Power-Stop Control, subclasses 103+ for a speed responsive clutch for a centrifugal extractor.

146 Controlled cover latch:
This subclass is indented under subclass 145. Apparatus in which there is a treatment casing provided with a closure and a latch controlled by the rotation responsive means.

SEE OR SEARCH CLASS:
192, Clutches and Power-Stop Control, subclass 136 for an automatic cover latch control for a centrifugal extractor.

147 Controlled discharge means:
This subclass is indented under subclass 145. Apparatus which controls a discharge means for a constituent of the class subject matter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
109+, for control of discharge responsive to fluid flow, pressure or material level.

148 Container movement operated:
This subclass is indented under subclass 143. Apparatus operated accidentally or unintentionally by movement of a container used in a treating operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
235 for actuation of a flow controller on assembly of parts.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclass 43 for a vent valve opened or closed by the tipping of a container.

149 Thermal:
This subclass is indented under subclass 143. Apparatus having means responsive to a thermal condition.

150 WITH GAS-LIQUID SURFACE CONTACT MEANS:
This subclass is indented under the class definition. Apparatus consisting of solid contact means to increase the surface area of a liquid in a gas-liquid contact device whereby the contact is enhanced.

SEE OR SEARCH CLASS:
261, Gas and Liquid Contact Apparatus, appropriate subclasses for gas and liquid contact apparatus there provided for.

151 With separator:
This subclass is indented under subclass 150. Apparatus combined with a separator.

153 STRUCTURAL INSTALLATION:
This subclass is indented under the class definition. Apparatus combined with (1) means performing an operation external to the subject matter of this class, (2) combined with a static construction installation, (3) specifically related to a particular geographic feature wherein there is included only enough structure foreign to this class (210) to associate it with the apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:
241+, for a separator combined with a movable support.
244+, for a draining type separator comprising a portable receptacle with a hood or closure.
419 for a filter attached to or within a portable prefilt receiver having a flow controller for the material being treated.
464+, a portable receptacle draining type filter.

473+, for a filter resting on a supporting receiver.

SEE OR SEARCH CLASS:

4, Baths, Closets, Sinks, and Spittoons, appropriate subclasses particularly subclass 652 for strainers combined with sink structure and subclasses 286+ for strainers and stoppers peculiar to that art.

37, Excavating, subclasses 318+ for a dredger combined with a screen separator.

68, Textiles: Fluid Treating Apparatus, subclasses 19+ for a laundry machine combined with a fluid extractor, and subclasses 235+ for a separator combined with a washing machine drain.

99, Foods and Beverages: Apparatus, subclass 408 for a deep fat fryer type cooker having crumb or sediment segregation means.

122, Liquid Heaters and Vaporizers, subclass 431 for a filter in a boiler.

137, Fluid Handling, subclass 140 for a siphon combined with a separatory means, and subclasses 343+ for a structural installation of a fluid handling apparatus.

159, Concentrating Evaporators, subclass 42 for a concentrating evaporator combined with a strainer or skimmer.

222, Dispensing, subclasses 189.06+ for a dispenser with a strainer, and subclass 565 for a sifting dispenser.

435, Chemistry: Molecular Biology and Microbiology, subclasses 289.1+ for fermentation apparatus including separating means, particularly subclass 295.3 for a bioreactor with the combination of a draft tube and a semipermeable membrane or filter, subclasses 297.1+ for a bioreactor including a semipermeable membrane or filter, and subclass 308.1 for an apparatus for separating a microorganism from culture media.

154 Flume stream type:

This subclass is indented under subclass 153. Apparatus comprising separating means placed in or at the entrance of an open channel confining a flowing stream to prevent solids, such as debris or fish, from passing downstream.

SEE OR SEARCH THIS CLASS, SUBCLASS:

131 for a movable animal stop in a sewer comprising a fluid pressure responsive bypass.

173+, for flume stream type separators with comminuting means.

SEE OR SEARCH CLASS:

405, Hydraulic and Earth Engineering, subclasses 118+ for specific open channel construction or flow control features other than that forming the inlet and outlet to a separator.

155 Plural or diverse screens:

This subclass is indented under subclass 154. Apparatus including plural, spaced, straining elements or straining elements of different shapes or kinds.

SEE OR SEARCH THIS CLASS, SUBCLASS:

294+, for diverse distinct separators of general utility.

322+, for plural distinct separators of general utility.

156 Fluid stream or residue operated:

This subclass is indented under subclass 154. Apparatus moved by the flowing stream or by a collection of residue on the separator medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

354+, for filter structure similarly operated.

157 Revolving cylindrical strainer:

This subclass is indented under subclass 156. Apparatus in which the separating medium is a cylindrical filter rotating about a central axis.

158 With cleaner for movable strainer:

This subclass is indented under subclass 154. Apparatus including means for cleaning the filter which is movable.

159 With cleaner and means to remove residue therefrom:

This subclass is indented under subclass 154. Apparatus including a filter cleaner which is a movable solid means, as a brush, with means to remove residue therefrom.

160 Endless belt strainer:
This subclass is indented under subclass 154. Apparatus in which the separating means is a movable endless foraminous belt.

161 Revolving strainer:
This subclass is indented under subclass 154. Apparatus in which the separating means is a strainer mounted to revolve in the fluid stream.

162 Fixed strainer:
This subclass is indented under subclass 154. Apparatus in which the separating means is a strainer stationarily mounted in the fluid stream.

163 Grated inlet surface drain:
This subclass is indented under subclass 153. Structures including a strainer in outlet means which provide drain means for a surface, as a floor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
116 for a grated surface inlet drain including means responsive to filtrate accumulation permitting discharge of treated material.
119 for a grated surface drains having back-flow preventing means.
247 for a strainer with a filtrate deflector.
459 for a pipe or plate attached filter.

SEE OR SEARCH CLASS:
4, Baths, Closets, Sinks, and Spittoons, appropriate subclasses, particularly subclasses 268+, 275+, 286+, 596+, 640+, and 650+ for plumbing apparatus including drains with grated inlets.
52, Static Structures (e.g., Buildings), subclass 12 for cover with an eave or valley gutter with a separator.
285, Pipe Joints or Couplings, subclass 42 for flashed pipe-to-plate joint.
404, Road Structure, Process, or Apparatus, subclasses 2+ for roadway drain or gutter structure.

164 Flat grating at surface level:
This subclass is indented under subclass 163. Structures where the upper face of the strainer is flat and is level with its associated surface.

165 With subsurface weep means:
This subclass is indented under subclass 164. Structures which include means to dispose of subsurface see page e.g., weep holes.

SEE OR SEARCH CLASS:
285, Pipe Joints or Couplings, subclass 14 for a pipe joint including leakage or drip disposal means comprising a weep hole.

166 Concentric guard ring or rib:
This subclass is indented under subclass 163. Apparatus comprising a concentric ring or rib between the strainer and its associated surface wherein the ring or rib projects above the plane of the surface.

167.01 Closed circulating system:
This subclass is indented under subclass 153. Apparatus comprising a group of devices, including liquid purification or separation means, through which the liquid being purified or separated is continuously returned and reused.

SEE OR SEARCH THIS CLASS, SUBCLASS:
194+, for liquid purification or separation apparatus including recirculation means.

SEE OR SEARCH CLASS:
68, Textiles: Fluid Treating Apparatus, subclass 18 for textile fluid treating apparatus including recirculation means and liquid purification or separation means for the used solvent.
118, Coating Apparatus, subclasses 600+ for coating apparatus with means for treatment of the coating material involving recirculation and liquid purification or separation.
123, Internal-Combustion Engines, subclass 41.55 for internal-combustion engine cooling system combined with liquid purification or separation means and subclass 196 for internal-combustion engine lubricator means combined with liquid purification or separation means.

134, Cleaning and Liquid Contact With Solids, subclasses 10+ and 109+ for cleaning and liquid contact with solids processes and apparatus including means for purifying or separating the cleaning or contact liquid.

167.02 For lubrication system:

This subclass is indented under subclass 167.01. Apparatus in which the liquid purification or separation means is adapted for use in a closed circulating system that provides lubricant to moving parts of a machine.

SEE OR SEARCH THIS CLASS, SUBCLASS:

416.5, for a filter, with a pump, gas pressure, or suction source, adapted for use in a lubricating or oil treating system.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclass 196 for internal-combustion engine lubricator means combined with liquid purification or separation means.

184, Lubrication, subclass 1.5 for automobile crank and gear case service apparatus including liquid purification of separation means and subclasses 6.24+ for lubrication systems combined with liquid purification or separation means.

167.03 Having magnetic treating means:

This subclass is indented under subclass 167.02. Apparatus having means that attract iron and certain other materials because of a surrounding field of force produced by motion of its atomic electrons and alignment of its atoms.

(1) Note. The magnetic treating means generally is used to cause separation of iron-containing material from the lubricant. However, the magnetic treating means may subject the lubricant to a process that otherwise improves or alters the lubricant (e.g., mixing, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

167.29, for liquid purification or separation apparatus comprising a closed circulating system having magnetic treating means not for a lubrication system.

222+, for liquid purification or separation apparatus including magnetic treating means not in a closed circulating system.

167.04 Plural separators:

This subclass is indented under subclass 167.02. Apparatus that has two or more means for liquid purification or separation.

167.05 Having bypass line:

This subclass is indented under subclass 167.04. Apparatus that has means to conduct the lubricant around a device in the closed circulating system.

167.06 With heating or cooling means:

This subclass is indented under subclass 167.02. Apparatus that has means to raise or lower the temperature of the lubricant.

SEE OR SEARCH THIS CLASS, SUBCLASS:

167.32, for liquid purification or separation apparatus comprising a closed circulating system with heating or cooling means not for a lubrication system.

175+, for liquid purification or separation apparatus with a heater or a heat exchanger not in a closed circulating system.

167.07 Evaporator:

This subclass is indented under subclass 167.06. Apparatus in which the means to raise the temperature of the lubricant vaporizes a component to be separated.

167.08 Separator for transmission system:

This subclass is indented under subclass 167.02. Apparatus in which the liquid purification or separation means is adapted for use in a closed circulating system that comprises an assembly of parts by which power is transmitted from an engine to a drive axle.

SEE OR SEARCH CLASS:

180, Motor Vehicles, subclasses 337+ for motor vehicle transmission mechanisms.

167.09 With separator cleaning means:
This subclass is indented under subclass 167.02. Apparatus in which means are provided to remove the separated component from the liquid purification or separation means.

167.1 For swimming pool or spa (e.g., skimmer, etc.):
This subclass is indented under subclass 167.01. Apparatus in which the liquid purification or separation means is adapted for use with a tank, made of concrete, plastic, or other materials, for holding water that is open at the top for a user to enter, for swimming, relaxation, or recreation (e.g., swimming pool, spa, hot tub, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
416.2, for a filter, with a pump, gas pressure, or suction source, adapted for use with a swimming pool.
470, for a filter with a handle.

SEE OR SEARCH CLASS:
4, Baths, Closets, Sinks, and Spittoons, subclasses 488+ for pools for swimming, relaxation, or recreation.

167.11 With means to add treating material:
This subclass is indented under subclass 167.1. Apparatus in which the liquid purification or separation means is combined with means to supply a substance to the water being purified or separated that subjects the water to a chemical or physical process that improves or alters the water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167.3, for liquid purification or separation apparatus comprising a closed circulating system with means to add a treating material not for a swimming pool or spa.
198.1+, for liquid purification or separation apparatus with means to add a treating material not in a closed circulating system.

SEE OR SEARCH CLASS:
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 255+ for physical type apparatus having means separating or dissolving a material constituent, particularly subclasses 261+ for liquid-solid contact means and particularly subclass 265 for buoyant holders.

167.12 Separator external to swimming pool or spa:
This subclass is indented under subclass 167.1. Apparatus in which the liquid purification or separation means is located outside of the swimming pool or spa.

(1) Note. The liquid purification or separation means may be attached to the exterior of the swimming pool or spa or may be connected to the swimming pool or spa by a system of pipes.

167.13 Particulate solid filter:
This subclass is indented under subclass 167.12. Apparatus in which the liquid purification or separation means comprises a plurality of small, distinct, separate, nonfilamentous solids in which a component of the water is entrapped and retained while permitting the water to pass through (e.g., sand filter, etc.).

167.14 With separator cleaning means (e.g., backwash means, etc.):
This subclass is indented under subclass 167.12. Apparatus in which means are provided to remove the separated component from the liquid purification or separation means.

167.15 Separator for use on swimming pool or spa bottom and separator for use at water surface:
This subclass is indented under subclass 167.1. Apparatus that has two or more means for liquid purification or separation in which one means is located on a surface that is lowest in the swimming pool or spa during operation and another means is located at a surface of the water that is highest in the swimming pool or spa during operation.

167.16 Separator for use on swimming pool or spa bottom:

This subclass is indented under subclass 167.1. Apparatus that has means for liquid purification or separation located on a surface that is lowest in the swimming pool or spa during operation.

167.17 Debris collecting bag:

This subclass is indented under subclass 167.16. Apparatus in which the liquid purification or separation means comprises a usually flexible container that may be closed that is used to gather the component that is separated from the water.

167.18 Skimmer arm at skimmer opening at water surface:

This subclass is indented under subclass 167.1. Apparatus in which the liquid purification or separation means comprises a deflecting device that is positioned at a surface of the water that is highest at an opening of a weir in a wall of the swimming pool or spa and that diverts a portion of the water and debris into the opening.

167.19 Mesh or screen filter at or near water surface:

This subclass is indented under subclass 167.1. Apparatus in which the liquid purification or separation means comprises a material with an open network of interlacing threads or wires in which a component of the water is entrapped and retained while permitting the water to pass through and is located at or near a surface of the water that is highest in the swimming pool or spa.

167.2 Having floating means:

This subclass is indented under subclass 167.19. Apparatus having means to support buoyantly the mesh or screen filter at or near the water surface in the swimming pool or spa.

167.21 For aquarium:

This subclass is indented under subclass 167.01. Apparatus in which the liquid purification or separation means is adapted for use with a water-filled container in which aquatic animals are kept, with the container having one or more transparent portions so that the aquatic animals therein can be observed from the exterior.

SEE OR SEARCH THIS CLASS, SUBCLASS:

416.2, for a filter, with a pump, gas pressure, or suction source, adapted for use in an aquarium.

SEE OR SEARCH CLASS:

119, Animal Husbandry, subclasses 259+ for specific aquarium structure in combination with liquid purification or separation means.

167.22 Separator using living organism:

This subclass is indented under subclass 167.21. Apparatus in which the liquid purification or separation means includes an agent that has the ability to reproduce itself.

(1) Note. For purposes of this subclass, living organism includes animals, plants, and microorganisms (e.g., bacteria, fungus, algae, etc.), but not enzymes. The organism may reproduce sexually, asexually, or by mechanical division (caused by external agents) and regeneration (e.g., layering or cloning, etc.).

167.23 Separator or part thereof associated with bottom of aquarium (e.g., means positioned under gravel, etc.):

This subclass is indented under subclass 167.21. Apparatus in which the liquid purification or separation means or a portion thereof (e.g., an inlet or an outlet, etc.) is located at or near a surface that is lowest in the aquarium (e.g., means positioned under gravel, etc.).

167.24 Having solid sorbent:

This subclass is indented under subclass 167.23. Apparatus having a solid sorbent that is used to retain on its internal or external surfaces a component of the water passing in contact therewith.

(1) Note. A solid sorbent is a solid material that separates one or more components from a fluid mixture containing such components in a “quasi-chemical” manner. The action in most instances is that of selective retention (i.e., the sorbent removes only that part of the fluid mix-

ture for which it has the greatest affinity). The retained component cannot be removed by shaking, brushing, or similar mechanical action, but can generally be removed by heating, pressure reduction, or use of a stripping or denuding fluid.

A filter has no particular "chemical" affinity for a component of a fluid mixture. The separation in the case of a filter depends on a mechanical entrapment of solid particles because of their relatively large size compared with the interstices or spaces between individual elements of the filter. The retained particles can be removed by brushing, wiping, shaking, or similar mechanical action.

167.25 Particulate filter or particulate sorbent:
This subclass is indented under subclass 167.21. Apparatus in which the liquid purification or separation means comprises a plurality of small, distinct, separate, nonfilamentous solids in which a component of the water is entrapped and retained while permitting the water to pass through or apparatus having a solid sorbent that is used to retain on its internal or external surfaces a component of the water passing in contact therewith.

(1) Note. A solid sorbent is a solid material that separates one or more components from a fluid mixture containing such components in a "quasi-chemical" manner. The action in most instances is that of selective retention (i.e., the sorbent removes only that part of the fluid mixture for which it has the greatest affinity). The retained component cannot be removed by shaking, brushing, or similar mechanical action, but can generally be removed by heating, pressure reduction, or use of a stripping or denuding fluid.

A filter has no particular "chemical" affinity for a component of a fluid mixture. The separation in the case of a filter depends on a mechanical entrapment of solid particles because of their relatively large size compared with the interstice or spaces between individual elements of the filter. The retained particles can be removed by brushing, wiping, shaking, or similar mechanical action.

167.26 Separator with aerator:
This subclass is indented under subclass 167.21. Apparatus in which the liquid purification or separation means is combined with means to supply the water with a gas (e.g., oxygen, air, etc.).

167.27 Separator mounted on top edge of aquarium wall:
This subclass is indented under subclass 167.21. Apparatus in which the liquid purification or separation means is located on an upper rim of the aquarium.

167.28 For cooking oil system:
This subclass is indented under subclass 167.01. Apparatus in which the liquid purification or separation means is adapted for use with a cooking apparatus in which food articles or materials are supported or manipulated for heat treating by contact with a body of heated oil (e.g., deep fat fryer, etc.).

SEE OR SEARCH CLASS:
99, Foods and Beverages: Apparatus, subclass 408 for a deep fat fryer type cooker with crumb or sediment segregation means.

167.29 Having magnetic treating means:
This subclass is indented under subclass 167.01. Apparatus having means that attract iron and certain other materials because of a surrounding field of force produced by the motion of its atomic electrons and the alignment of its atoms.

(1) Note. The magnetic treating means generally is used to cause separation of iron-containing material from the liquid. However, the magnetic treating means may subject the liquid to a process that otherwise improves or alters the liquid (e.g., mixing, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
167.03, for liquid purification or separation apparatus comprising a closed circulating system having magnetic treating means for a lubrication system.

222+, for liquid purification or separation apparatus including magnetic treating means not in a closed circulating system.

167.3 With means to add treating material:
This subclass is indented under subclass 167.01. Apparatus in which the liquid purification or separation means is combined with means to supply a substance to the liquid being purified or separated that subjects the liquid to a chemical or physical process that improves or alters the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167.11, for liquid purification or separation apparatus comprising a closed circulating system with means to add a treating material for a swimming pool or spa.
198.1+, for liquid purification or separation apparatus with means to add a treating material not in a closed circulating system.

167.31 Plural separators:
This subclass is indented under subclass 167.01. Apparatus that has two or more means for liquid purification or separation.

167.32 With heating or cooling means:
This subclass is indented under subclass 167.01. Apparatus that has means to raise or lower the temperature of the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167.06, for liquid purification or separation apparatus comprising a closed circulating system with heating or cooling means for a lubrication system.
175+, for liquid purification or separation apparatus with a heater or a heat exchanger not in a closed circulating system.

170.01 Geographic:
This subclass is indented under subclass 153. Apparatus in which liquid purification or separation means are part of a system installed in the ground or related to a particular feature of the earth s surface (e.g., a body of water, etc.).

(1) Note. Included in this subclass is in situ purging of flowing or still liquid (e.g., drainage ditch, septic system, pond, etc.) in a structural installation in which the liquid purification or separation means is (a) part of a system installed on natural or modified terrain to convey rain, snowmelt, a river, sewage, well water or oil, etc. or (b) related to a particular nonland geographic feature, such as a lake, ocean, sea, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
154+, for a flume stream type separator.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclass 236.1 for a distribution system involving a geographic feature.
405, Hydraulic and Earth Engineering, subclasses 36+ for drainage devices for collecting and removing surplus water from soil and subclasses 52+ for fluid control, treatment, or containment.

170.02 For fishpond:
This subclass is indented under subclass 170.01. Apparatus in which the liquid purification or separation means is adapted for use with a small, still body of clear water stocked with fish.

SEE OR SEARCH CLASS:
119, Animal Husbandry, subclasses 226+ for a fish enclosure of the recirculating type with treatment means and subclasses 228+ for a fish enclosure of the nonrecirculating type with treatment means.

170.03 For stormwater treatment (e.g., rainwater runoff, stormsewer treatment, etc.):
This subclass is indented under subclass 170.01. Apparatus in which the liquid purification or separation means is adapted for use to subject fallen precipitation to a chemical or physical process that improves or alters the fallen precipitation (e.g., rainwater runoff, stormsewer treatment, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

163+, for a grated inlet surface drain.

SEE OR SEARCH CLASS:

52, Static Structures (e.g., Buildings), subclass 12 for a roof with a surface water receiver at an eave with a separator.

404, Road Structure, Process, or Apparatus, subclasses 2 through 5 for roadway drain or gutter structure.

170.04 For excavating means:

This subclass is indented under subclass 170.01. Apparatus in which the liquid purification or separation means is adapted for use with an apparatus that digs, moves, and handles material either on the earth s surface or beneath a body of water.

SEE OR SEARCH CLASS:

37, Excavating, for excavating apparatus.

170.05 Floating means:

This subclass is indented under subclass 170.01. Apparatus in which the liquid purification or separation means is buoyed on or in the liquid.

170.06 Separator with aerator:

This subclass is indented under subclass 170.01. Apparatus in which the liquid purification or separation means is combined with means to supply the liquid with a gas (e.g., oxygen, air, etc.).

170.07 Groundwater:

This subclass is indented under subclass 170.01. Apparatus in which the liquid purification or separation means purifies or separates water within the earth s surface.

SEE OR SEARCH CLASS:

166, Wells, for well apparatus.

405, Hydraulic and Earth Engineering, subclasses 128.1+ for soil remediation.

170.08 Septic system including drain field or leach field or waste liquid treatment system:

This subclass is indented under subclass 170.01. Apparatus in which the liquid purification or separation means comprises a tank in which a continuous flow of waste material is decomposed by bacteria and from which liquids overflow through an outlet of the tank into a disposal field where they can leach into the soil or comprises a group of devices including liquid purification or separation means that purify or separate the waste liquid.

(1) Note. While septic tanks are normally found to be underground, the term septic tank is not considered to be a geographic feature.

SEE OR SEARCH THIS CLASS, SUBCLASS:

532.2, for a septic tank not associated with a geographic feature.

170.09 Body of freshwater (e.g., pond, lake, reservoir, etc.):

This subclass is indented under subclass 170.01. Apparatus in which the particular feature of the earth s surface that the liquid purification or separation means is related to is a bounded aggregate of still water that is not salty (e.g., pond, lake, reservoir, etc.).

170.1 Surface flowing freshwater (e.g., stream, river, ditch, canal, etc.):

This subclass is indented under subclass 170.01. Apparatus in which the particular feature of the earth s surface that the liquid purification or separation means is related to is a bounded aggregate of nonsalty, running water flowing on the earth s surface (e.g., stream, river, ditch, canal, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

154+, for a flume stream type separator.

170.11 Body of saltwater (e.g., sea, ocean, etc.):

This subclass is indented under subclass 170.01. Apparatus in which the particular feature of the earth s surface that the liquid purification or separation means is related to is an aggregate of salt water covering most of the earth s surface (e.g., sea, ocean, etc.).

171 Machinery:
This subclass is indented under subclass 153. Apparatus including means having moving parts.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167.02 through 167.09, for a closed circulating system for a lubrication system.

SEE OR SEARCH CLASS:
68, Textiles: Fluid Treating Apparatus, subclass 208 for fluid textile treating means having a drain and strainer means associated therewith.
118, Coating Apparatus, subclass 610 for reconditioning by separation of coating materials.
134, Cleaning and Liquid Contact With Solids, subclass 104 for cleaning apparatus having material collectors (e.g., strainers) for escaping cleaning liquid.

172.1 Separator ancillary to storage tank:
This subclass is indented under subclass 153. Apparatus in which the liquid purification or separation means is auxiliary to a supply container.

172.2 Submerged separator:
This subclass is indented under subclass 172.1. Apparatus in which the liquid purification or separation means is covered with liquid.

172.3 On pump suction intake:
This subclass is indented under subclass 172.2. Apparatus in which the liquid purification or separation means is located on an inlet to a pump.

172.4 Filter supported by frame (e.g., bag shaped filter in fuel tank for engine, etc.):
This subclass is indented under subclass 172.3. Apparatus in which the liquid purification or separation means comprises a medium, in which a component of the liquid is entrapped and retained while permitting the liquid to pass through, that is held up by a skeletal structure (e.g., bag shaped filter in fuel tank for engine, etc.).

172.5 Having tethering means:
This subclass is indented under subclass 172.2. Apparatus in which the liquid purification or separation means is fastened to a part of the supply container by something (e.g., a rope or chain, etc.) with a set radius that allows the liquid purification or separation means to move about.

172.6 In tank inlet:
This subclass is indented under subclass 172.1. Apparatus in which the liquid purification or separation means is located at the opening to the supply container.

173 COMMINUTING:
This subclass is indented under the class definition. Apparatus comprising unitary separators and means to comminute solids.

SEE OR SEARCH THIS CLASS, SUBCLASS:
154+, for a flume stream type separator, per se.
359+, for a movable filter or separator which may break up “flocs” or residue incidental to agitation or material handling.
407 for a filter having means for agitation of the liquid.
769 for related processes.

SEE OR SEARCH CLASS:
241, Solid Material Comminution or Disintegration, and see the reference to Class 210 in section 8 of the class definition.

174 Cylindrical strainer:
This subclass is indented under subclass 173. Apparatus in which the separating medium comprises a cylindrical filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
161 for a revolvable flume screen strainer, per se.
402+, for a movable drum type filter.

175 WITH HEATER OR HEAT EXCHANGER:

This subclass is indented under the class definition. Apparatus having heat exchanging means comprising an imperforate heat transfer member, radiant heater or heat generator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

167.06, for liquid purification or separation apparatus comprising a closed circulating system for a lubrication system with heating or cooling means.

167.32, for liquid purification or separation apparatus comprising a closed circulating system with heating or cooling means.

768+, for separating processes with treatment of separated solids, and subclasses 774+ for separating processes involving treatment by heating or cooling.

SEE OR SEARCH CLASS:

62, Refrigeration, for refrigeration means or steps combined with fluid cooling or gas liquefaction or solidification. For particular subclasses in Class 62 involving refrigeration and fluid separation, see the reference to Class 62 in the class definition of this class (210).

96, Gas Separation: Apparatus, appropriate subclasses for gas separation apparatus combined with heating or cooling means.

122, Liquid Heaters and Vaporizers, subclasses 379+ for processes and apparatus for cleaning liquid heaters or vaporizers or for purifying the water while the boiler is in operation.

126, Stoves and Furnaces, subclass 343.5 for melting furnaces which may include liquid separating means.

159, Concentrating Evaporators, subclass 42 for strainers or skimmers specialized for that class.

165, Heat Exchange, subclass 119 for a heat exchange with an ancillary filter.

202, Distillation: Apparatus, subclass 178 for combined distilland preheater and strainer, and subclasses 202+ for still with condensate treating means.

266, Metallurgical Apparatus, subclasses 277+ for apparatus for separating molten metal for undesired constituents.

176 Thermal diffusion:

This subclass is indented under subclass 175. Apparatus which separate a liquid mixture into two or more dissimilar fractions by subjecting a thin film of liquid mixture to a temperature gradient.

SEE OR SEARCH THIS CLASS, SUBCLASS:

775 for related processes.

177 With treating fluid addition:

This subclass is indented under subclass 175. Apparatus having means for adding a treating fluid.

178 With mechanical agitator or movable separator:

This subclass is indented under subclass 177. Apparatus in which the separator is provided with a mechanical agitator or in which the separating medium is movable.

179 With mechanical agitator or movable separator:

This subclass is indented under subclass 175. Apparatus provided with mechanical agitating means or with means for moving a separator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

178 for similar structure with addition of treating fluid.

180 Vapor or gas removal:

This subclass is indented under subclass 175. Apparatus provided with means to remove vapor or gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:

472 for a vented filter.

181 Flow line connected in series with distinct separator:

This subclass is indented under subclass 175. Apparatus in which a heater or heat exchanger is connected in series by a flow line for the liquid under treatment.

SEE OR SEARCH THIS CLASS, SUBCLASS:

252+, for other serially connected distinct treating or storage units.

182 Diverse separators:

This subclass is indented under subclass 175. Apparatus in which the separators are of different kinds.

SEE OR SEARCH THIS CLASS, SUBCLASS:

294+, for other diverse distinct separators.

183 Common casing coaxial with heater:

This subclass is indented under subclass 182. Apparatus wherein the heat exchanger is coaxial with the casing enclosing the diverse separators.

184 For filter:

This subclass is indented under subclass 175. Apparatus wherein the separator is a filter.

185 Imbedded or between filter media:

This subclass is indented under subclass 184. Apparatus in which the heat exchanger is embedded in the filter medium or is sandwiched between filter media.

186 External of casing:

This subclass is indented under subclass 184. Apparatus wherein the heat exchanger is external of the means confining the liquid undergoing treatment.

187 Within gravitational separator:

This subclass is indented under subclass 175. Apparatus in which the heat exchanger is within a liquid holding container of a gravitational separator.

188 WITH GAS SEPARATOR:

This subclass is indented under the class definition. Apparatus combined with a gas or vapor separator, which is more than a mere vent and must (1) remove gases evolved during a treating operation or (2) treat gas removed from a Class 210 separator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

472 for a filter with vent means.

539 for a gravitational separator having a vent.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, for apparatus for gas separation, per se. See the Class 210 class definition for an amplification of the line.

189 PLURAL CHAMBERS WITH MOVEMENT OF GRANULES THEREBETWEEN:

This subclass is indented under the class definition. Apparatus comprising means providing distinct chambers or areas for solid-liquid contact with means for circulating granular separatory material between at least two of the chambers.

SEE OR SEARCH THIS CLASS, SUBCLASS:

268 for a separator having means providing gravity flow of particles therethrough.

270 for moving rehabilitation means which pick up and redeposit particles on the same bed.

271+, for surface traversing rehabilitation means for a particulate material bed.

190 WITH EXTERNAL SUPPLY MEANS FOR REGENERATING MEDIUM, E.G., WATER SOFTENING SYSTEM:

This subclass is indented under the class definition. Apparatus in which means is provided for the purpose of conveying, preparing or storing a liquid which is used to restore a chemical affinity of the separatory medium.

191 With pump, injector or siphon:

This subclass is indented under subclass 190. Apparatus including a pump, injector or siphon.

192 WITH PRELIMINARY CHEMICAL MANUFACTURE:

This subclass is indented under the class definition. Systems comprising means to make one or more of the chemical reagents used in the treatment combined with apparatus of this class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

715 for processes of seeding with sludge of the system.

716+, for processes including reagent manufacture.

SEE OR SEARCH CLASS:

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 186.8+ for ozonizers with preparatory or product treating means; and subclass 186.23 for arc or spark discharge reactors having preparatory or product treating means.

193 WITH PRECOAT ADDING OR APPLYING MEANS:

This subclass is indented under the class definition. Apparatus with means to apply an additional solid material usually discrete particles, as a coating to a filtering medium, the additional material then acting as a primary filtering medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

503+, for diverse granular or fibrous filter materials.

506+, for a coated or impregnated filter material.

777+, for separating processes including use of a filter aid.

194 RECIRCULATION:

This subclass is indented under the class definition. Apparatus in which at least a portion of the fluent material is circulated in a closed circuit from and back to the separator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

167.01 through 167.32 , for a structural installation with a closed circulating system.

189 for separatory apparatus including means to circulate filter particles between plural chambers.

621+, 712+, 765, and 805, for separating processes including recirculation.

779 for processes with residual returned to prefilt.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 268 for infiltration means ancillary to a fluid handling system, and subclass 563 for a closed circulating system of general utility.

204, Chemistry: Electrical and Wave Energy, subclass 238 for an electrolytic cell which includes a filter and recirculating means.

195.1 Serially connected distinct treating or storage units:

This subclass is indented under subclass 194. Apparatus including two or more vessels connected in series or two or more zones in a single vessel separated by a baffle connected in series.

(1) Note. The vessels or zones may be either functionally or physically distinct from one another.

195.2 With semipermeable membrane, e.g., dialyzer, etc.:

This subclass is indented under subclass 195.1. Apparatus including a septum selective as to composition.

195.3 With sediment recycle means directly to main stream:

This subclass is indented under subclass 195.1. Apparatus including means to return sediment to a point upstream with respect to the flow of material to be treated, which means provides for recombination of the sediment with the material to be treated.

195.4 Means is baffle slot:

This subclass is indented under subclass 195.3. Apparatus in which the means to return sediment is an aperture in a wall dividing a vessel into separate treating zones.

196 Of filtrate:

This subclass is indented under subclass 194. Apparatus in which filtrate is returned to prefilt.

SEE OR SEARCH THIS CLASS, SUBCLASS:

409+, for a filter with fluid cleaning involving mere return of filtrate for backwashing.

197 From bottom of separator:

This subclass is indented under subclass 194. Apparatus in which the material recirculated is removed from a bottom portion of the separator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

713 for processes of precipitation including return of removed solids to the separator.

198.1 WITH MEANS TO ADD TREATING MATERIAL:

This subclass is indented under the class definition. Apparatus combined with means to add a treating material.

(1) Note. By "treating material" is meant (a) a material, usually a fluid, having a function other than rehabilitating a separating medium or cleaning a separator, (b) a fluid merely serving as a source of pressure, or (c) a fluid not in itself serving as a separating medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

96.1+, for separators with constituent mixture variation controls.

101 for flow fluid pressure or material level proportional feed means.

105 for diverse sensing including control means for an auxiliary liquid inlet.

127 for a float controlled valve controlling an additional fluid inlet.

151 for a separator and gas-liquid surface contact means.

167.11, for liquid purification or separation apparatus comprising a closed circulating system for a swimming pool or spa with means to add a treating material.

167.3, for liquid purification or separation apparatus comprising a closed circulating system with means to add a treating material.

177+, for separators with a heater or heat exchanger and treating fluid addition means.

192 for a separator with preliminary chemical manufacturing means.

296 and 511, for separators using a liquid as a separating medium.

601+, particularly subclasses 11 and 15+, for processes of teating by living organisms.

633 and 634+, for processes of extraction from liquid by solvent or solute.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 87.01+ for self-proportioning and correlating systems; and subclass 268 for holders for materials to be entrained into a fluid handling system.

261, Gas and Liquid Contact Apparatus, subclasses 2+ for such apparatus combined with means for separating constituents from the contact liquid; and subclasses 75+ for gas and liquid contact devices, per se.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for extracting, leaching, or dissolving apparatus.

423, Chemistry of Inorganic Compounds, appropriate subclasses for extracting, leaching, or dissolving processes therein provided for; and subclass 658.5 for extracting, leaching, or dissolving processes not otherwise provided for.

198.2 Chromatography:

This subclass is indented under subclass 198.1. Apparatus for carrying out the process of chromatography.

SEE OR SEARCH THIS CLASS, SUBCLASS:

656+, for process involving chromatography.

198.3 Thin layer, e.g., plate, etc:

Apparatus under subclass under 198.2 utilizing an absorbent cake spread on usually a smooth plate to a depth of about 0.5 mm.

199 Spaced along flow path:
This subclass is indented under subclass 198.1. Apparatus wherein at least two distinct treating material feeding means supply to inlets spaced with respect to the direction of the flow of material being treated.

200 Plural distinct separators:
This subclass is indented under subclass 198.1. Systems comprising a plurality of distinct separating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
294+, for diverse distinct separators.

201 Serially connected:
This subclass is indented under subclass 200. Systems connected in such a manner that at least one of the separating means delivers to another.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 571+ for plural tanks or compartments connected for serial flow.

202 Diverse type:
This subclass is indented under subclass 201. Systems comprising at least two different types of separating means.

203 Filters:
This subclass is indented under subclass 200. Apparatus having two or more filtering units.

204 Sectional chamber press type:
This subclass is indented under subclass 203. Apparatus in which the filters are of the sectional chamber press type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
224+, for other sectional press type filters.

205 With distinct reactor tank, trough or compartment:
This subclass is indented under subclass 198.1. Systems comprising structure providing a distinct reactor tank, trough or compartment wherein the plural in-flows are intermingled to enhance reaction (e.g., precipitation), said tank, trough or compartment being in series with the separator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
209+, for tanks, troughs or compartments which serve both as a reactor and as a separator.

206 Chemical holder in series with separator:
This subclass is indented under subclass 205. Apparatus comprising a single flow path having the separating means in seral relation with means for holding a chemical.

SEE OR SEARCH THIS CLASS, SUBCLASS:
199 for plural material inlets spaced along a flow path.

207 Within gravitational separator:
This subclass is indented under subclass 205. Apparatus wherein the reactor tank, trough or compartment is located within the separator which is of the gravitational type.

208 With mechanical agitator:
This subclass is indented under subclass 207. Systems comprising movable mechanical means to cause materials to commingle.

SEE OR SEARCH THIS CLASS, SUBCLASS:
407+, for fixed filter and liquid agitating means.

209 Directly applied to separator:
This subclass is indented under subclass 198.1. Apparatus provided with means to add the treating material directly to the separator.

SEE OR SEARCH CLASS:
68, Textiles: Fluid Treating Apparatus, appropriate subclasses for textile treating apparatus combined with a liquid remover, particularly subclass 1 for waste reclaiming apparatus, subclasses 5+ for gas steam or mist treating, subclass 18 for solvent recovery, and subclasses 19+ for fluid extractor combinations.
127, Sugar, Starch, and Carbohydrates, subclasses 16+ for means for purging sugar crystals.

210 To interior of moving filter, e.g., drum:
This subclass is indented under subclass 209. Apparatus wherein the material to be separated and the treating material are directly introduced into the interior space of the separator element which moves.

SEE OR SEARCH CLASS:
68, Textiles: Fluid Treating Apparatus, subclasses 12 and 237 for textile treating apparatus having textile washing features in addition to a liquid extractor.
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 258+ and 269+ for rotary extractor or leacher.

211 Through separator supporting rotary shaft:
This subclass is indented under subclass 210. Apparatus in which the separator is supported on a rotary shaft having passage means therein through which the treating material is introduced.

212 With stationary casing closure feature:
This subclass is indented under subclass 210. Apparatus in which the filtering rotor is enclosed in a casing having a closure and means attached to or projecting through the closure for feeding treating material to the rotor.

213 With coaxial rotary impeller or distributor:
This subclass is indented under subclass 210. Apparatus in which the filter element is rotary and there is a rotary impeller or distributor for the treating material which is coaxial with the axis of rotation of the filter element.

214 With stationary mount for movable distributor:
This subclass is indented under subclass 210. Apparatus comprising a distributor for the treating material mounted upon a stationary support and movable with respect to such support.

215 With effluent dividing means:
This subclass is indented under subclass 210. Apparatus including means for dividing the separated effluent into a plurality of fractions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
378 for a centrifugal extractor with a filtrate receiving means having plural filtrate outlets.

216 Moving filter medium:
This subclass is indented under subclass 209. Apparatus by which the additional material is applied to a moving filter medium.

217 Drum:
This subclass is indented under subclass 216. Apparatus in which the moving filter medium comprises a rotary drum.

218 Gas removed from closed tank:
This subclass is indented under subclass 209. Apparatus provided with means to remove gases or vapors from a liquid treating tank which is closed except for fluid handling inlets and/or outlets.

SEE OR SEARCH THIS CLASS, SUBCLASS:
472 for a vented filter.

219 With mechanical agitator:
This subclass is indented under subclass 209. Apparatus in which there is a mechanical agitator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
402+, for a drum having an agitator fixed thereto.
407+, for fixed filters with liquid agitating means.

220 Submerged fluid inlet:
This subclass is indented under subclass 209. Apparatus in which the exit from the additional fluid introducing means is submerged in the liquid being treated.

SEE OR SEARCH CLASS:
43, Fishing, Trapping, and Vermin Destroying, subclasses 56+ for minnow buckets having aerating means.
261, Gas and Liquid Contact Apparatus, subclasses 121+ for submerged blast liquid and gas contact devices.

221.1 With outlet at surface, e.g., froth:
This subclass is indented under subclass 220. Apparatus in which there is a means to remove a lighter constituent.

SEE OR SEARCH CLASS:
209, Classifying, Separating, and Assorting Solids, subclasses 162+ for flotation processes and apparatus for separating one solid component from another.

221.2 And gas injecting means other than by mechanical agitation:
This subclass is indented under subclass 221.1. Apparatus having means to produce a gas other than mechanical agitation.

222 MAGNETIC:
This subclass is indented under the class definition. Apparatus including magnetic treating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167.03, for liquid purification or separation apparatus comprising a closed circulating system for a lubrication system having magnetic treating means.
167.29, for liquid purification or separation apparatus comprising a closed circulating system having magnetic treating means.
695 for processes of precipitation which may involve magnetic separation.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, particularly subclasses 155+ for the production of a compound or element by chemical reaction brought about by electrical or wave energy in a magnetic field; subclasses 157.15+ for processes of treating materials involving a chemical reaction brought about by wave energy; and subclasses 660+ for a liquid treatment apparatus which is specialized for: magnetic treatment, per se, when some effect other than mere separation is desired or produced or simultaneous electrical and magnetic separation of the liquid which does not result in the production of a compound or element by chemical reaction brought about by electrical or wave energy in a magnetic field.
209, Classifying, Separating, and Assorting Solids, subclasses 38, 39, 40, 212, 213+, and 478 for processes and apparatus involving applying a magnetic field to material (which may be suspended in a liquid) for the purpose of separating one solid component from another.
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 209+ for magnets and electromagnets, per se.

223 With additional separator:
This subclass is indented under subclass 222. Apparatus in which there is at least one separating means, other than the magnet.

224 SECTIONAL CHAMBER PRESS TYPE:
This subclass is indented under the class definition. Apparatus comprising abutting filter plates or alternating abutting filter plates and spacing frames which are pressed together by at least one movable end member, the end members, plates and/or frames when pressed together constituting a casing which is closed except for fluid handling connections.

SEE OR SEARCH THIS CLASS, SUBCLASS:
185 for heater or heat exchanger combinations wherein the heater or heat exchanger is embedded or between filter media.
323+, for plural distinct filters.
445 for a filter element clamped in a casing joint.

SEE OR SEARCH CLASS:
100, Presses, appropriate subclasses particularly subclasses 113+ and 194+ for presses which force filter plates or frames towards each other to express the liquid by mechanical pressure.

225 With residue removal or liquid agitation:
This subclass is indented under subclass 224. Apparatus provided with residue removal or liquid agitation means.

226 With porous filler:
This subclass is indented under subclass 224. Apparatus in which the filtering medium comprises a mass of fibers or discrete particles within the filter plates or frames.

SEE OR SEARCH THIS CLASS, SUBCLASS:
263+, for a particulate material type separator.
317 for spaced diverse filters including nonself supporting media.
343 for stacked elements having liquid distributors separating filter media, including porous masses.
417 for a liquid distributor imbedded in a filter mass.

227 Medium clamped in joint:
This subclass is indented under subclass 224. Apparatus in which the filtering medium is clamped at and between the peripheral edges of plate or frame sections.

SEE OR SEARCH THIS CLASS, SUBCLASS:
445 for other filter mediums clamped in a casing joint.

228 With spacing frame:
This subclass is indented under subclass 227. Apparatus in which the filtering medium is clamped at and between the peripheral edges of the spacing frames and filter plate sections.

229 Imperforate base recess in plate:
This subclass is indented under subclass 227. Apparatus in which the filter sections are of I or channel cross-section forming a recess, the web of which is imperforate except for filtrate drain openings, and the filter medium abuts the web within the recess.

SEE OR SEARCH THIS CLASS, SUBCLASS:
455 for modified spacing surfaces or supports for a filter medium.

230 With repair or assembling means:
This subclass is indented under subclass 224. Apparatus including means for assembly or disassembly or to restore or aid in restoring the device to its former condition after decay.

231 Plates or frames:
This subclass is indented under subclass 224. Apparatus comprising frame and/or plate structure, per se, restricted to use with sectional chamber press type filter elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:
230 for plates and frames having supporting means which aid in assembling and disassembling.
541 for separator adjuncts of general application.

SEE OR SEARCH CLASS:
100, Presses, subclasses 295+ for platens or pressure surfaces there provided for.

232 WITH REPAIR OR ASSEMBLING MEANS:
This subclass is indented under the class definition. Apparatus which is provided with auxiliary means, in addition to the parts making up the separation or treatment apparatus or the means to secure said parts in operative relation, to aid in assembling or disassembling said apparatus or a subcombination thereof; or to restore, or aid in restoring the apparatus or a subcombination thereof to its former condition after decay, injury, or partial destruction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
230 for a sectional chamber press having repair or assembly means.
329 for separators relatively movable during treatment.
350+, for adjustable means compressing a filter medium within a container even though the operator for the compressing means can be moved to inoperative position.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 315.01 through 329.4 for a fluid handling system with repair, tapping, or assembly means.

233 Piercing or closure knock out means:
This subclass is indented under subclass 232. Apparatus for piercing a container, or for knocking out a closure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
235 for a device in which placement of a container opens a flow controller.
240 for a sealed filter unit provided with a frangible or knockout section for conversion of flow direction.

234 Removable treatment part with normally disabled flow controller:
This subclass is indented under subclass 232. Apparatus comprising a treatment part arranged to be removable and a valve in flow relationship thereto biased to close but being maintained open in normal use of the part.

SEE OR SEARCH THIS CLASS, SUBCLASS:
235 for a device in which placement of a container opens a flow controller.

235 Placement of container opens flow controller:
This subclass is indented under subclass 232. Apparatus in which the placement of a container opens a flow controller.

SEE OR SEARCH THIS CLASS, SUBCLASS:
234 for a treatment part maintaining a controller open when in position.

236 Sliding or rolling on guide means:
This subclass is indented under subclass 232. Apparatus including guide means, on which the element to be assembled or disassembled rolls or slides.

SEE OR SEARCH THIS CLASS, SUBCLASS:
241 for a separator mounted on a movable support.

237 Hoist or handle means:
This subclass is indented under subclass 232. Apparatus comprising (1) a handle attached to a separating element, or (2) means attached to a separating element cooperating with a hoist.

SEE OR SEARCH THIS CLASS, SUBCLASS:
249 for a leg, hanger or bracket for a filter assembly.

238 Hand manipulable:
This subclass is indented under subclass 237. Apparatus which is hand manipulable.

SEE OR SEARCH THIS CLASS, SUBCLASS:
244+, for a portable receptacle having a closure with a handle.
464+, for a handled portable receptacle and drainer.
470+, for a filter element having handle means.

239 CONVERTIBLE:
This subclass is indented under the class definition. Apparatus so constructed that its mode of operation can be changed by reassembling all or some of its parts in a different relationship to each other or by addition or omission of a part.

SEE OR SEARCH THIS CLASS, SUBCLASS:
473+, for a filter unit having adjustable supporting means or having plural supporting surfaces.

240 Filter having selectively usable flow connector means:
This subclass is indented under subclass 239. Apparatus comprising selectively assembable separate flow connections.

241 WITH MOVABLE SUPPORT:
This subclass is indented under the class definition. Apparatus which is movably supported.

SEE OR SEARCH THIS CLASS, SUBCLASS:
236 for slide or roller guide means for assembly.
237+, for assembling hoist or handle means.
249+, for a bracket or leg support for a static separator assembly.
271+, for the mounting of rehabilitation means for movement with respect to a particulate bed.
359+, for a filter having a medium movable for treating purposes.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 899+ for a vehicle mounted distribution system.
209, Classifying, Separating, and Assorting Solids, subclass 421 for a vehicle mounted sifter.

242.1 Float:
This subclass is indented under subclass 241. Apparatus in which the assembly is buoyantly supported.

SEE OR SEARCH THIS CLASS, SUBCLASS:
121+, for fluid flow or material level responsive floats having a controlling function.

242.2 With aerating means:
This subclass is indented under subclass 242.1. Apparatus having means to inject a gas.

242.3 With oil water skimmer:
This subclass is indented under subclass 242.1. Apparatus having means to remove the top layer of the oil water system.

242.4 With oil water sorption means:
This subclass is indented under subclass 242.1. Apparatus having means to soak up a portion of the oil water system.

243 ELECTRICAL INSULATING OR ELECTRICITY DISCHARGING:
This subclass is indented under the class definition. Apparatus in which parts are electrically insulated or there is means to discharge electricity.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 212+ for static electricity discharging of more general utility.

244 PORTABLE RECEPTACLE WITH HOOD OR CLOSURE:
This subclass is indented under the class definition. Apparatus comprising a filter incorporated in a portable receptacle not having any flow connections attached thereto, which receptacle is provided with (1) a hood, or (2) means forming a complete closure of the top side thereof, which closure may have a foraminous section provided with means for completely covering such section.

SEE OR SEARCH THIS CLASS, SUBCLASS:
380+, for a rotating centrifugal extractor element having a removable closure.
464+, for a portable receptacle draining type filter.
473+, for a filter removably supported on a portable container.

SEE OR SEARCH CLASS:
141, Fluid Material Handling, With Receiver or Receiver Coacting Means, appropriate subclasses, for fluent material handling devices, with receiver or receiver coacting means.
220, Receptacles, subclasses 24+ for receptacle closures, subclasses 694+ for attachments for receptacles.
222, Dispensing, subclasses 189.06+ for a dispenser having a filter.
297, Chairs and Seats, subclasses 175+ for a seat combined with a pail or the like for milking operations.

245 Attached variable flow controller:
This subclass is indented under subclass 244. Apparatus in which there is a controlling means mounted on or supported by the closure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
418+, for a filter and flow controller, per se.

246 Limited opening cover:
This subclass is indented under subclass 244. Apparatus provided with means for holding the cover for limited movement with respect to the upper edge of the receptacle so that solids will be retained and liquid escape between the cover and the receptacle upper edge.

SEE OR SEARCH THIS CLASS, SUBCLASS:
382 for a centrifugal extractor having a discharge between the upper edge of a receptacle and a cover therefor.
464+, for a portable receptacle with attached strainer for draining.

247 FILTRATE SPLASH PLATE AND/OR DEFLECTOR:

This subclass is indented under the class definition. Apparatus provided with a splash plate or deflector located downstream of and spaced from a filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

456 for a filter with a prefilt flow director or diverter.

248 WITH DRIP, OVERFLOW OR CONTENT DRAINING FEATURE:

This subclass is indented under the class definition. Apparatus with (1) means for receiving drip or overflow, or (2) means to receive the contents of a filter unit when it is disassembled.

SEE OR SEARCH THIS CLASS, SUBCLASS:

299+, particularly subclasses 312+ for a filter and sediment trap with drain means.

SEE OR SEARCH CLASS:

222, Dispensing, subclasses 108+ for a dispenser with drip, leakage or waste catching features.

249 BRACKET OR LEG SUPPORT FOR STATIC SEPARATOR ASSEMBLY:

This subclass is indented under the class definition. Apparatus provided with a bracket, hanger or leg support for an entire separating assembly.

SEE OR SEARCH THIS CLASS, SUBCLASS:

468 for a filter having means for supporting it from a receptacle spout.

SEE OR SEARCH CLASS:

248, Supports, appropriate subclasses particularly subclass 94 for a support for a strainer or funnel.

250 Leg:

This subclass is indented under subclass 249. Apparatus in which the filter assembly is supported by means extending directly below and freely resting on a base or attached to a base.

SEE OR SEARCH CLASS:

248, Supports, subclass 188 for leg attaching connections for stands, and subclasses 188.1+ for supporting substructure for a stand.

251 COMBINED:

This subclass is indented under the class definition. Apparatus comprising a device in addition to or combined with separator structure or liquid purification apparatus (1) having functions other than purification or separation, or (2) serving to perfect the purification or separation apparatus for its intended purpose.

SEE OR SEARCH THIS CLASS, SUBCLASS:

85+, for apparatus with a single, indicator, register, recorder or inspection means.

151 for gas liquid surface contact means and a separator.

153+, for treating apparatus of this class in another installation not sufficiently included to form a basis of classification in the other art class.

173+, for a separator structurally combined with a comminutor.

175+, for treating apparatus with heat exchange.

188 for a liquid separator and a gas separator.

192 for treating apparatus with preliminary chemical manufacture.

239+, for a convertible feature of treating apparatus.

241+, for treating apparatus with a movable support.

243 for electrical insulating or discharging.

249+, for a support for a separator.

418+, for a filter and a flow controller.

456 for prefilt restrictors or diverters.

SEE OR SEARCH CLASS:

4, Baths, Closets, Sinks, and Spittoons, subclasses 286+ for strainers in devices of that type.

252 SERIALLY CONNECTED DISTINCT TREATING WITH OR WITHOUT STORAGE UNITS:

This subclass is indented under the class definition. Apparatus comprising plural distinct treating or storage casings connected by means for transferring material from one unit to another.

SEE OR SEARCH THIS CLASS, SUBCLASS:

172.1 through 172.6 , for a structural installation in which the separator is ancillary to a storage tank.
181 for flow line connected heater or heat exchanger.
201+, for similar subject matter with means to add material.

253 Parallel:

This subclass is indented under subclass 252. Apparatus in which two or more units are in parallel.

254 With by-pass:

This subclass is indented under subclass 252. Apparatus in which there is a means to bypass one or more units.

SEE OR SEARCH THIS CLASS, SUBCLASS:

130+, for a fluid pressure responsive bypass.
433+, for a bypass around a filter.

255 Cascade:

This subclass is indented under subclass 252. Apparatus in which the units or parts thereof are in stepped relationship.

SEE OR SEARCH THIS CLASS, SUBCLASS:

262 for serial diverse units one above another.

256 One unit inside another:

This subclass is indented under subclass 252. Apparatus in which one unit is within another.

SEE OR SEARCH THIS CLASS, SUBCLASS:

207+, for a distinct reactor, tank trough or compartment within a gravitational separator.
315 for a diverse spaced filter within another.
337+, for nested distinct separators in series.
342 for one separator within another.

257.1 With storage unit:

This subclass is indented under subclass 252. Apparatus in which at least one of the units merely holds liquid.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 571+ for plural tanks or compartments connected for serial flow.
184, Lubrication, subclass 1.5 for crankcase service apparatus including separators.

257.2 Having membrane:

This subclass is indented under subclass 257.1. Apparatus constructed with a filtering means composed of a thin, enveloping or lining substance, i.e., membrane.

SEE OR SEARCH THIS CLASS, SUBCLASS:

96.2 for a membrane in an apparatus with constituent mixture variation responsive.
348+, for apparatus which uses a semipermeable septum which does not provide for continuous streams on both sides of the septum.
433+, for similar apparatus which uses an ordinary filter septum.
500.1 for a membrane, per se.
541 for membrane supports, frames, and spaces.
634+, for process of using a septum selective as to composition.

SEE OR SEARCH CLASS:

127, Sugar, Starch, and Carbohydrates, subclass 10 for a sugar solution dialyzer.
204, Chemistry: Electrical and Wave Energy, subclasses 252+ for a similar device using an electric current.
604, Surgery, subclasses 4.01, 5.01-5.04, 6.01-6.09, 6.01, 6.11-6.16 for drawing blood from the body, treating the blood, and returning it the body.

258 **With pump, gas pressure or vacuum source:**
This subclass is indented under subclass 252. Apparatus provided with (1) a pump, (2) means to supply a gas under pressure to cause fluid flow, or (3) means for applying a vacuum to at least one of the units.

SEE OR SEARCH THIS CLASS, SUBCLASS:
406 for a filter with a vacuumized filtrate receiver.
416 for a filter with a pump, gas pressure or vacuum source.

259 **Diverse:**
This subclass is indented under subclass 252. Apparatus in which the units differ from each other as to their separating structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
294+, for diverse distinct separators.

260 **Including multiple operation unit:**
This subclass is indented under subclass 259. Apparatus in which more than one operation is accomplished in a single unit.

261 **One unit supports another:**
This subclass is indented under subclass 259. Apparatus in which one unit supports another.

262 **On different levels:**
This subclass is indented under subclass 259. Apparatus in which units are at different levels.

SEE OR SEARCH THIS CLASS, SUBCLASS:
255 for serial units in cascade relationship.
261 for serial units in which one supports another.

263 **PARTICULATE MATERIAL TYPE SEPARATOR, E.G., ION EXCHANGE OR SAND BED:**
This subclass is indented under the class definition. Apparatus comprising a bed of discrete particles each capable of movement within the bed and readily separable from each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
118 for flow of fluid pressure responsive operation of sand valves.
189 for plual chambers with movement of granules therebetween.
190+, for a separator with external supply means for regenerating material in, water softening systems,
193 for a filter with precoat adding or supplying means.
226 for a sectional chamber press type filter with a porous filler.
317 for spaced filters including a nonself-supporting medium.
350+, for a filter with movable means to compress a medium.
500.1+, for filter materials, particularly subclasses 503+ for diverse granular or fibrous materials.
615 for processes of aerobic treatment utilizing contact surfaces.
660+, for processes involving ion exchange or sorption.
767+, for separating processes, particularly subclasses 777+ for processes employing precoats or filter-aids, and subclass 80 for separating and rehabilitation of a particulate bed.

SEE OR SEARCH CLASS:
96, Gas Separation: Apparatus, subclasses 108+ for solid sorbent apparatus for gas separation.
166, Wells, subclasses 51 and 278 for processes of and apparatus for forming gravel filters in wells.

264 **Selective units or compartments:**
This subclass is indented under subclass 263. Apparatus comprising a plurality of compartments, and means for using and/or rehabilitating the particles in each compartment selectively.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102 for programming of plural units by means responsive to flow, fluid pressure or material level responsive means.
142 for program actuated sequentially controlled plural units or sections.

265 With gravitational separator:
This subclass is indented under subclass 263. Apparatus combined with a gravitational separator.

266 With spaced non-particulate separating means:
This subclass is indented under subclass 263. Apparatus combined with an additional separating means other than a particulate material type and spaced therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 265 for a gravitational separator combined with a particulate material.
- 273 279, 289, and 291+, for a particulate material type separator having a fluid distributor even though such distributor be foraminous and may incidentally separate large particles.
- 283 for a pervious separator contacting and between particulate beds.

267 Trunnion mounted casing:
This subclass is indented under subclass 263. Apparatus in which the bed of separating material is contained in a casing mounted for rotation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 399 for another filter element mounted within a closed movable casing.

268 Gravity flow of particles type:
This subclass is indented under subclass 263. Apparatus in which means is provided for removing particles from the bottom of the bed so that the bed of separating material as a whole moves downwardly by gravity.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 189 for apparatus wherein the particles are moved between plural containers or plural compartments in the same container.
- 270 for apparatus which is provided with moving means to pick up and redeposit the particles during rehabilitation.

269 With rehabilitation means:
This subclass is indented under subclass 263. Apparatus in which means is provided for restoring the separating medium to the condition it was in before separation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 189 for such a device with a separate rehabilitation chamber.
- 190 for a chamber provided with external regenerating medium supply.
- 407+, for a filter combined with residue removal of liquid agitation means.
- 656+, and 660+, for processes of ion exchange or sorption involving rehabilitation of the separation medium.
- 791+, for separating processes involving rehabilitation of a filtering medium.

270 Movable means for particle pickup and redeposit:
This subclass is indented under subclass 269. Apparatus having moving means to pick up particles from the bed and redeposit them on the bed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 189 for apparatus wherein the particles are moved between plural containers or plural compartments in the same container.
- 268 for a particle type separator with gravity flow of the particles from the bottom of the bed.

SEE OR SEARCH CLASS:
- 299, Mining or In Situ Disintegration of Hard Material, subclasses 7+ for mining combined with separating.

271 Surface traversing type:
This subclass is indented under subclass 269. Apparatus having rehabilitation means which moves in a path parallel to and above the upper bed surface with or without parts projecting into the bed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

270 for apparatus having moving means to pick up and redeposit the particles of the separating medium.

272 Rotating on stationary axis:

This subclass is indented under subclass 271. Apparatus in which the rehabilitation means is rotatable about a stationary axis.

273 Moving fluid distributor:

This subclass is indented under subclass 271. Apparatus which is provided with moving means for introducing a fluid to the bed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

274 for nonsurface traversing means to apply gas to a bed.

274 Including means to apply gas to bed:

This subclass is indented under subclass 269. Apparatus comprising means to introduce gas into the separating medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

198.1 for a separator with means to add a treating fluid, particularly subclasses 220+ for a separator with submerged fluid inlet.

275 Backwash or blowback means:

This subclass is indented under subclass 269. Apparatus including means for passing a fluid through the medium in a direction of flow during separation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

411 425 and 427, for similar apparatus in another type of filter.

276 With mechanical agitator or residue remover:

This subclass is indented under subclass 275. Apparatus in which mechanical means is provided for agitating the bed or removing residue therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

273 for apparatus provided with a movable imbedded fluid distributor which functions as an agitator as well as a distributor.

277 Flow controller external of closed casing:

This subclass is indented under subclass 275. Apparatus in which flow of fluid is controlled by a flow controller external of the casing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

190 for external supply for regenerating medium combinations.

418+, for a filter with a flow controller.

278 Multi-way valve unit:

This subclass is indented under subclass 277. Apparatus in which a single valve controls communication with three or more flow lines.

SEE OR SEARCH THIS CLASS, SUBCLASS:

424+, for a filter with a multiway valve.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 625+ for multiway valves, per se.

279 With embedded fluid distributor:

This subclass is indented under subclass 275. Apparatus having a stationary fluid distributor extending into the bed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

289 and 291+, for another particulate bed and a fluid distributor.

280 With agitator:

This subclass is indented under subclass 269. Apparatus in which means in provided for agitating the bed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

271+, for apparatus including bed surface traversing means which may also function as an agitator.

276 for a particulate bed separator with backwash means and agitator.

407+, for other types of filters with residue remover or agitators.

281 With access opening to normally closed casing:

This subclass is indented under subclass 269. Apparatus wherein a closed casing which holds particulate material is provided with an opening through which the separatory material may be reached, or through which solid regenerating material may be inserted.

SEE OR SEARCH THIS CLASS, SUBCLASS:

268 for gravity flow of particulate material in a separator.

282 Removable cartridge or hand-manipulated container:

This subclass is indented under subclass 263. Apparatus in which separatory material is encased in a magazine type holder or container.

SEE OR SEARCH THIS CLASS, SUBCLASS:

237+, for handle assembly means.
465 for a separator provided with handles for draining.
470 for a handled filter.
484 for a shaped filter element with a foraminous container or sheath.

283 Pervious divider between and contacting beds:

This subclass is indented under subclass 263. Apparatus comprising plural beds separated by and each contacting pervious means therebetween.

SEE OR SEARCH THIS CLASS, SUBCLASS:

266 for a particulate type separator combined with a spaced nonparticulate separating means.

284 Spaced beds:

This subclass is indented under subclass 263. Apparatus which comprises a plurality of beds of particulate material which are spaced from each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:

266 for spaced particulate and nonparticulate type separators.
283 for a pervious separator which contacts and is between beds.
314+, for spaced diverse filters.

285 Embedded baffle:

This subclass is indented under subclass 263. Apparatus provided with at least one baffle completely or partially embedded in the particulate material.

286 Vertical:

This subclass is indented under subclass 285. Apparatus in which the baffle extends vertically.

287 Within flow line or flow line connected closed casing:

This subclass is indented under subclass 263. Apparatus wherein the separatory material is confined within a container which is imperforate except for fluid conduit openings or access openings closed in normal operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

435+, for fixed filter mediums within a flow line connected closed casing.

288 Conduit through bed, inlet and outlet at same end of casing:

This subclass is indented under subclass 287. Apparatus in which all the inlets and outlets to the casing are located at the same end of the casing, one communicating with the bed by means of a conduit surrounded by the bed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

439 for a nonparticulate type filter having similar structure.

289 With particular liquid receiving means or foraminous bed retainer:

This subclass is indented under subclass 287. Apparatus which comprises particular means for introducing the untreated liquid to the bed of separatory material, particular means for collecting treated liquid from the bed of separa-

tory material, or particular strainer means within the casing.

290 With multi-layer beds:
This subclass is indented under subclass 263. Apparatus having a bed comprising a plurality of layers of particulate material which are in contact with each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
283 for a pervious divider between and contacting the beds.
284 for similar apparatus in which the beds are spaced from each other.
286 for vertical layers.

291 Particular liquid receiving means or foraminous bed retainer:
This subclass is indented under subclass 263. Apparatus comprising particular means for introducing liquid into a bed of separating material, particular means for removing liquid from a bed of separating material, or particular strainer means within the casing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
172.1 through 172.6 , for a structural installation in which the separator is ancillary to a storage tank.
289 for apparatus of this type which is within a flow line or flow line connected closed casing.

SEE OR SEARCH CLASS:
405, Hydraulic and Earth Engineering, subclass 36 for fluid distributing or collecting apparatus buried in the earth.

292 Hood or top protector type:
This subclass is indented under subclass 291. Apparatus in which the liquid distributing means is provided with (1) an imperforate cap or hood extending around or over it, or (2) caps or hoods over openings in the distributor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
118 for a sand valve, i.e., nonclosing check valve associated with a sand bed.
456 for a filter with prefilt flow director or distributor.

293 Floor type, e.g., false bottom:
This subclass is indented under subclass 291. Apparatus wherein the bed retainer comprises a pervious floor.

294 DIVERSE DISTINCT SEPARATORS:
This subclass is indented under the class definition. Apparatus having plural separation means identifiable as separate units, (1) of different kinds, or (2) of the same kind but differing in shape or other structure other than different mesh size.

SEE OR SEARCH THIS CLASS, SUBCLASS:
124 for float control between two separators.
132 for a fluid pressure responsive by-pass and an additional separator.
142 for plural units operated by a program actuator.
151 for gas-liquid surface contact means and a separator.
155 for plural or diverse flume screens.
182+, for a heater or heat exchanger and diverse separators.
188 for a liquid treater and gas separator.
189 for plural chambers with movement of granules therebetween.
195.1 for recirculation between serially connected distinct treating or storage units.
200+, for plural distinct separators and means to add a treating material.
223 for a magnetic and another separator.
252+, for serially connected distinct treating units with or without a storage unit.
263+, particularly subclasses 265, 266 and 284, for particulate bed type separators.
322+, for plural distinct separators of the same kind.
483+, particularly subclasses 488+ for single filter units formed by contacting filter mediums.
521+, for superposed compartment gravitational separators.
663+, for processes of ion exchange or sorption with preliminary separation.
806 for plural separating processes.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclasses 12.1+ for combined classifying, separating and assorting of solids.

295 Including a filter:

This subclass is indented under subclass 294. Apparatus in which at least one of the diverse distinct separators is a filter.

296 Including liquid as a separating medium:

This subclass is indented under subclass 295. Apparatus in which a separating medium comprises a liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

511 for a single operation apparatus using liquid as a separating medium.

633 and 634+, for separating processes involving extraction from a liquid by solvent or solute.

297 Moving filter medium:

This subclass is indented under subclass 295. Apparatus in which there is means to give the filter medium motion during the filtering operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

359+, for movable medium filters, per se.

298 With mechanical residue or sediment mover:

This subclass is indented under subclass 295. Apparatus having driven mechanical means to remove residue or sediment.

SEE OR SEARCH THIS CLASS, SUBCLASS:

390+, for a moving filter medium and a residue remover.

407+, for a fixed filter medium and a residue remover.

523+, for a gravitational separator and a mechanical sediment mover.

299 Including constituent trapping feature:

This subclass is indented under subclass 295. Apparatus including a feature depending upon the different specific gravities of constituents of a liquid mixture for removing a constituent or trapping it in a recess.

SEE OR SEARCH THIS CLASS, SUBCLASS:

248 for drip or overflow catchers or means for receiving the contents of a filter unit when the casing is opened.

300 Alternate filters and traps in series:

This subclass is indented under subclass 299. Apparatus in which the liquid is passed through (1) at least two filter media, a constituent trap being positioned therebetween, or (2) at least two constituent traps with a filter medium therebetween.

301 Plural traps:

This subclass is indented under subclass 300. Apparatus in which at least two constituent traps are provided.

302 Flow-line valve upstream of separator:

This subclass is indented under subclass 299. Apparatus provided with a valve in a flow line upstream of the separating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

136 for a check valve upstream of a separator.

303 Cut-off sediment trap:

This subclass is indented under subclass 299. Apparatus having a valve arranged to isolate a sediment chamber from a filter unit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

418+, for a filter with a flow controller.

304 Tangential flow, spiral or convolute baffle:

This subclass is indented under subclass 299. Apparatus in which there is a spiral or convolute baffle or tangential liquid inlet to give the liquid a whirling motion.

SEE OR SEARCH THIS CLASS, SUBCLASS:

512.1 for a gravitational separator having tangential flow or centrifugal fluid action.

305 Baffle preceding or within sediment trap:
This subclass is indented under subclass 299. Apparatus provided with a baffle member to deflect liquid entering a sediment chamber or a baffle within a sediment chamber to catch sediment or quiet flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:
304 for a sediment trap and filter with spiral or convolute baffle means or a tangential inlet.

306 Deflecting prefilt from filter medium:
This subclass is indented under subclass 305. Apparatus in which the baffle deflects prefilt from the filtering medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
456 for a filter with prefilt a flow distributor or diverter.

307 Downstream of filter medium:
This subclass is indented under subclass 299. Apparatus in which the sediment removing, trapping or removing feature is downstream of the filter, to remove sediment from the filtrate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
300+, for alternate traps and filters.

308 Directly communicating with tubular filter interior:
This subclass is indented under subclass 299. Apparatus in which a sediment trap directly communicates with the interior of a tubular filter element.

309 Attached to filter element:
This subclass is indented under subclass 308. Apparatus in which the filter element and the sediment chamber means are directly attached to each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
454 for a filter within a flow line connected casing which filter element is attached to a casing closure.

310 Lateral trap:
This subclass is indented under subclass 299. Apparatus in which the liquid flows generally axially through a conduit containing the filter medium and there is means communicating with the sediment trap, which extends laterally of the axis of the conduit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
447 for a laterally removable filter element.

311 Downflow inlet, upflow through filter medium:
This subclass is indented under subclass 299. Apparatus in which entering liquid flows downwardly and then passes through the filter medium in an upward direction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
305+, for filter and constituent trap means with a baffle preceding or within the sediment trap.
456 for a filter with a prefilt flow distributor or diverter.

312 Sediment discharge means:
This subclass is indented under subclass 299. Apparatus provided with means discharging sediment.

SEE OR SEARCH THIS CLASS, SUBCLASS:
422+, for a closed casing filter and a variable flow controller which casing has plural outlets for flushing the casing or diverting prefilt around the filter medium.
433.1 for a filter in a casing having filtered and unfiltered passages.
533+, for a gravitational separator with a closure or valve controlled discharge.

313 Valve controlled:
This subclass is indented under subclass 312. Apparatus in which the drain means is controlled by a valve.

SEE OR SEARCH THIS CLASS, SUBCLASS:

109+, for automatic discharge of treated material.

314 Spaced filters:

This subclass is indented under subclass 295. Apparatus which comprises a plurality of isolated filters or filter elements abutting along a surface to enclose an empty space.

SEE OR SEARCH THIS CLASS, SUBCLASS:

323+, for plural distinct similar filters.

315 One within another:

This subclass is indented under subclass 314. Apparatus wherein one of the filters surrounds the other.

316 One adjacent inlet or outlet conduit:

This subclass is indented under subclass 314. Apparatus wherein one filter is arranged in such a manner that entering liquid contacts the filter before contacting any part of the casing, or leaving liquid once having contacted the filter, does not contact the casing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

335+, for plural similar filters arranged for series prefilt flow.

338 and 342, for plural distinct similar filter elements arranged one within another.

464+, for a portable receptacle draining filter.

317 Including non-self-supporting medium:

This subclass is indented under subclass 314. Apparatus in which one or more of the filters include loose or flaccid nonparticulate material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

263+, for particulate material type separators, particularly subclass 266 for particulate and spaced nonparticulate separators.

484 for filter medium within a foraminous container or sheath.

496 for shaped bound, fused or matted filter mediums.

500+, for filter materials.

318 Incompatible shapes:

This subclass is indented under subclass 314. Apparatus in which the separate filters are of such shapes that they cannot be nested or superimposed.

319 With agitator:

This subclass is indented under subclass 294. Apparatus in which there is a mechanical agitator to impel liquid to break up, remove or prevent scum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

198+, particularly subclasses 207+ and 219, for a separator with means to add material.

407+, for a filter having a fixed medium combined with an agitator.

320 With baffle perpendicular to flow direction:

This subclass is indented under subclass 294. Apparatus in which there is a baffle perpendicular to the direction of liquid flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:

348+, for apparatus which uses a semipermable septum which does not provide for continuous streams on both sides of the septum.

513+, for a gravitational separator.

321.6 CASING DIVIDED BY MEMBRANE INTO SECTIONS HAVING INLET(S) AND/OR OUTLET(S):

This subclass is indented under the class definition. Apparatus comprising a casing sealingly divided by a barrier comprising a semipermeable membrane into at least two sections, each section having means providing liquid inlet and/or outlet provided by said semipermeable membrane.

SEE OR SEARCH CLASS:

604, Surgery, subclass 507 for methods of introducing material into or removing it from the human vasculature system

321.61 Membrane secured with adhesive of specified composition:
This subclass is indented under subclass 321.6. Apparatus including an adhesive of specified composition securing at least one membrane.

321.62 Antithrombogenic membrane:
This subclass is indented under subclass 321.6. Apparatus including at least one membrane having at least a portion thereof modified (e.g., by chemical treatment or ionizing radiation) to be antithrombogenic.

321.63 Rotating mechanical agitator adjacent membrane:
This subclass is indented under subclass 321.6. Apparatus including a rotating mechanical agitator (e.g., stirrer) adjacent a membrane.

321.64 Plural diverse structured membranes within a single casing:
This subclass is indented under subclass 321.6. Apparatus including plural diverse structured membranes (e.g., stirrer) adjacent a membrane.

SEE OR SEARCH THIS CLASS, SUBCLASS:
641 for processes utilizing plural diverse membranes.

321.65 Permeated liquid quantity measurement or control:
This subclass is indented under subclass 321.6. Apparatus including means to measure and/or control a quantity of liquid which has permeated through a membrane (e.g., ultraflitrate, dialysate, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
929 for hemoultrafiltrate volume measurement or control processes.

321.66 Energy recovery from treated liquid:
This subclass is indented under subclass 321.6. Apparatus including means for energy recovery (e.g., turbine, flow work exchanger, etc.), from a treated liquid.

321.67 Membrane movement during purification:
This subclass is indented under subclass 321.6. Apparatus including means causing membrane movement during liquid purification.

321.68 Nontranslatory rotary:
This subclass is indented under subclass 321.67. Apparatus wherein said means causes nontranslatory rotary membrane movement during liquid purification.

321.69 With membrane cleaning or sterilizing means (other than by filter movement or rotating agitator):
This subclass is indented under subclass 321.6. Apparatus including means providing membrane cleaning (removing accumulated undesired material) or sterilizing (destroying a pathogenic micro-organism), other than by a rotating mechanical agitator or membrane movement.

SEE OR SEARCH THIS CLASS, SUBCLASS:
321.63 and 321.67, for membrane cleaning apparatus including a rotating mechanical agitator or membrane movement.
636 for processes of cleaning or sterilizing.

321.7 Solid cleaning material (e.g., balls):
This subclass is indented under subclass 321.69. Apparatus wherein said means providing membrane cleaning or sterilizing includes a plurality of solid discrete object other than a rotating mechanical agitator, e.g., particles, granules, sponge balls, beads, etc., and means for moving said object, adjacent to and/or in contact with, a membrane, for cleaning or sterilizing said membrane.

SEE OR SEARCH THIS CLASS, SUBCLASS:
321.63 for apparatus including a rotating mechanical agitator.

321.71 Dialyzer with dialysate proportioning means:
This subclass is indented under subclass 321.6. Apparatus including a dialyzer and means for proportioning dialysate fed to said dialyzer.

321.72 Each section having inlet(s) and outlet(s):
This subclass is indented under subclass 321.6. Apparatus further comprising each said section having at least one means providing liquid inlet and at least one means providing liquid outlet.

321.73 Noncoiled nonannular cross section tube:
This subclass is indented under subclass 321.72. Apparatus wherein at least on e membrane is, (a) generally tubular, (b) noncylindrical in defining a cross section (said cross section being taken perpendicularly to the central axis of the tube) which is nonannular (e.g., inner and/or outer surface(s) define noncircular cross section), and (c) not coiled.

(1) Note. A coiled flatted membrane tube is provided for in subclasses 321.74 and 321.83.

321.74 Coiled membrane:
This subclass is indented under subclass 321.72. Apparatus said semipermeable membrane is a strip or flattened tube (i.e., is noncyclindrical) which is spirally coiled (e.g., including either a planar spiral or a helical spiral).

321.75 Planar membrane:
This subclass is indented under subclass 321.72. Apparatus wherein said semipermeable membrane is in an essentially planar configuration.

321.76 Spiral flow:
This subclass is indented under subclass 321.75. Apparatus including means providing spiral liquid flow (moving essentially in a plane around a center with increasing or decreasing distance from said center) adjacent a membrane(s).

321.77 Pleated membrane:
This subclass is indented under subclass 321.72. Apparatus wherein said semipermeable membrane is pleated (i.e., folded back and forth).

321.78 Cylindrical membrane:
This subclass is indented under subclass 321.72. Apparatus wherein said semipermeable membrane comprises at least one hollow generally cylindrical tube.

321.79 Plural cylindrical membrane all connected for parallel flow:
This subclass is indented under subclass 321.78. Apparatus including plural cylindrical semipermeable membrane tubes all or which, are connected for parallel flow therethrough (i.e., each said tube has, a first end directly communicating with a first end directly communicating with a first header, and a second end directly communication with a second Header), and are within a single casing.

321.8 All cylindrical membranes are parallel:
This subclass is indented under subclass 321.79. Apparatus wherein all said plural cylindrical semipermeable membrane tubes are parallel with respect to each other.

321.81 With embedded baffle:
This subclass is indented under subclass 321.8. Apparatus wherein a baffle which is a solid material, which serves as a flow restrictor, diverter or distributor, is embedded between said plural parallel cylindrical semipermeable membrane tubes such that, a straight line drown from an exterior active surface (e.g., a membrane tube sheet, etc.), or any one of said tubes, perpendicular to a longitudinal axis of that tube, to an exterior active surface of any other of said tubes, intersects said baffle.

321.82 Noncoiled nonannular cross section tube:
This subclass is indented under subclass 321.6. Apparatus wherein at least one membrane is, (a) generally tubular, (b) noncylindrical in defining a cross section (said cross section being taken perpendicularly to the central axis of the tube) which is nonannular (e.g., inner and/or outer surface(s) define noncircular cross section, and (c) not coiled.

(1) Note. A coiled flattened membrane tube is provided for in subclasses 321.74 and 321.83.

321.83 Coiled membrane:
This subclass is indented under subclass 321.6. Apparatus wherein said semipermeable membrane is a strip or flattened tube (i.e., is noncylindrical), which is spirally coiled (e.g., including either a planar spiral or a helical spiral).

321.84 Planar membrane:
This subclass is indented under subclass 321.6. Apparatus wherein said semipermeable membrane is in an essentially planar configuration.

321.85 Spiral flow:
This subclass is indented under subclass 321.84. Apparatus including means providing spiral liquid flow (moving essentially in a plane around a center with increasing or decreasing distance from said center adjacent a membrane(s).

321.86 Pleated membrane:
This subclass is indented under subclass 321.6. Apparatus wherein said semipermeable membrane is pleated, i.e., folded back and forth.

321.87 Cylindrical membrane:
This subclass is indented under subclass 321.6. Apparatus wherein said semipermeable membrane comprises at least on hollow, generally cylindrical tube.

321.88 Plural cylindrical membranes all connected for parallel flow:
This subclass is indented under subclass 321.87. Apparatus including plural cylindrical semipermeable membrane tubes all of which, are connected for parallel flow therethrough (i.e., each said tube has a first end directly communication with a first header, and a second end directly communication with a second header), and are within a single ceasing.

321.89 All cylindrical membranes are parallel:
This subclass is indented under subclass 321.88. Apparatus wherein all said plural cylindrical semipermeable membrane tubes are parallel with respect to each other.

321.9 With embedded baffle:
This subclass is indented under subclass 321.89. Apparatus wherein a baffle which is a solid material, which serves as a flow restrictor, diverter or distributor, is embedded between said plural parallel cylindrical semipermeable membranse tubes such that, a straight line drawn fro an exterior active surface (e.g., a membrane tube surface not covered by casting resin, tube sheet, etc.) of any one of said tubes perpendicular to a lingitudinal axis of that tube, to an exterior active surface of any other of said tubes, intersects said baffle.

322 PLURAL DISTINCT SEPARATORS:
This subclass is indented under the class definition. Apparatus comprising two or more distinct separators each of which treats a portion of a liquid mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:
252+, for serially connected distinct treating units with or without storage units.
294+, for diverse distinct separators.
488+, for superimposed contacting filter mediums forming a single element even though defined as differing in kind.
521 for a gravitational separator with superposed compartments.

323.1 Filters:
This subclass is indented under subclass 322. Apparatus in which there are plural distinct filter units.

SEE OR SEARCH THIS CLASS, SUBCLASS:
314 for diverse types of filters in a single unit.

323.2 Tublar:
This subclass is indented under subclass 323.1. Apparatus tubelike in form with filtration through the perpendicular axis of the tube.

324 Movable separating elements:
This subclass is indented under subclass 323.1. Apparatus which are movable for material treating purposes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
359+, for a movable filter which may comprise compartments or sections abutted to form a single effective surface.

325 Planetary:
This subclass is indented under subclass 324. Apparatus in which each rotates about an individual axis and also moves about another axis, the construction being such that rotation about both axes are or can be continuous during operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

370 for a centrifugal extractor wherein the filter medium has plural motions about a fixed point.

326 Drum type on parallel axis:

This subclass is indented under subclass 324. Apparatus comprising plural rotary filter drums arranged on parallel axes which drums are of the type in which prefilt contacts the outer periphery of both drums simultaneously and the filtrate flows to their interiors in parallel.

327 Plural cleaners and plural movable elements:

This subclass is indented under subclass 324. Apparatus with plural cleaning means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

330+, for plural moving filter units connected for group operation.

334 for plural fixed units and alternating cleaners.

328 Pivotally mounted sections:

This subclass is indented under subclass 324. Apparatus connected by hinges or mounted on parallel pivots so that they can be partially rotated to dump the cake (residue).

SEE OR SEARCH THIS CLASS, SUBCLASS:

370 for a centrifugal extractor wherein the basket is made up of plural sections which are pivotally mounted for discharging the portion of the residue thereon.

385 for a filter unit having plural motions.

329 Relatively movable:

This subclass is indented under subclass 324. Apparatus in which at least one filter and its support moves with respect to another, usually for cleaning while at least one remains in filtering service.

SEE OR SEARCH THIS CLASS, SUBCLASS:

232+, particularly subclasses 237+ for a separator with repair or assembly means for removal of a filter from its casing.

328 for filters comprising pivotally mounted sections.

341 for parallel units individually controlled, so that a selected unit can be removed.

330 Connected for group operation:

This subclass is indented under subclass 324. Apparatus having means connecting them so that they move together as a connected group.

SEE OR SEARCH THIS CLASS, SUBCLASS:

359+, for moving filter medium types in which the medium is continuous or comprises abutting filtering sections forming in effect a continuous medium except for separating strips or partitions.

331 Spaced filter wall type, e.g., multiple hollow leaves:

This subclass is indented under subclass 330. Apparatus comprising spaced wall type filter elements, e.g., multiple hollow circular leaves.

SEE OR SEARCH THIS CLASS, SUBCLASS:

327 for alternating moving elements and cleaning means.

486+, for similar elements, per se.

332 With residue removal or liquid agitation:

This subclass is indented under subclass 323. Apparatus in which there is means for removing residue or for agitating the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

298 for diverse separators having mechanical residue or sediment removers.

407 for a single filter having a residue remover or agitator.

333.01 Backwash of blowback:

This subclass is indented under subclass 332. Apparatus having means for causing a reverse flow through the filter medium that is out of service.

333.1 Sequential backwash:

This subclass is indented under subclass 333.01. Apparatus having means to successively clean the filter units.

334 Alternating filter and residue remover:
This subclass is indented under subclass 332. Apparatus in which the filter units and cleaning means are arranged in alternation.

335 In series for prefilt flow:
This subclass is indented under subclass 323.1. Apparatus which are in series.

SEE OR SEARCH THIS CLASS, SUBCLASS:
252+, for serially connected distinct treating units.
300+, for alternate traps and filters in series.
314+, for spaced diverse filters.
489+, for abutted or superimposed members forming a single filter element, arranged for series flow through the members.

336 Tortuous path:
This subclass is indented under subclass 335. Apparatus in which the flow of fluid is in a tortuous or zig-zag path.

SEE OR SEARCH THIS CLASS, SUBCLASS:
285+, for baffles imbedded in a particulate bed.

337 Nested units:
This subclass is indented under subclass 335. Apparatus arranged in superimposed or nested relation, each unit being removable from the other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
315 for diverse concentric spaced filters.
342 for concentric filter elements arranged for parallel flow.

338 Concentric filter elements:
This subclass is indented under subclass 337. Apparatus in which the nested units are concentric filter elements.

339 Internal flange supporting filter element:
This subclass is indented under subclass 335. Apparatus comprising a frame or casing having inwardly extending flanges or protuberances supporting the filter elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:
451+, for a filter element supported within a casing by an internal fixed shoulder.

340 Parallel filters with flow controller:
This subclass is indented under subclass 323.1. Apparatus having means for interrupting flow to at least one filter unit while another remains in service, said filters being in parallel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
418+, for a single filter with a flow controller.

341 Individually controlled for removal with common receiver:
This subclass is indented under subclass 340. Apparatus in which there is provision for using different filter elements with a common receiver and each filter element has an individual flow control means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
329 for relatively movable filters which may act to cut off flow.

342 One element within another:
This subclass is indented under subclass 323.1. Apparatus wherein the filter units are arranged one within another.

SEE OR SEARCH THIS CLASS, SUBCLASS:
315 for spaced diverse filters, one within another.
337+, for nested filter units arranged for series prefilt flow.

343 Alternating oppositely opening liquid distributors:
This subclass is indented under subclass 323.1. Apparatus in which the units alternate with liquid receivers, alternate receivers acting respectively as liquid inlet and discharge means, at least one of a pair of liquid receivers separating one filter medium from another and contacting the separated filter mediums on opposite faces.

SEE OR SEARCH THIS CLASS, SUBCLASS:

417 for similar devices in which the alternate liquid receivers are located within a continuous body of filter medium.

344 Abutted alternating medium and pan type receiver:

This subclass is indented under subclass 323.1. Apparatus in which each filter unit comprises a filter medium and an imperforate pan-like liquid receiver substantially coextensive with the filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

224 for a sectional chamber press type filter.

492 for stacked dissimilar elements, the entire stack forming a single unit.

345 Radial or radially connected to central header:

This subclass is indented under subclass 323.1. Apparatus in which the units are radially arranged or which are connected to means extending radially from a central header.

346 Spaced wall-type filters:

This subclass is indented under subclass 323.1. Apparatus in which the units each comprise a filter medium enclosing a space, the filter medium having separate or distinct walls.

SEE OR SEARCH THIS CLASS, SUBCLASS:

331 for similar structure among movable elements.

486+, for a spaced wall type filter unit.

492 for filter elements divided into alternate prefilt and filtrate spaces by alternately arranged dissimilar elements.

347 Central header:

This subclass is indented under subclass 346. Apparatus in which there is a header extending centrally of the group of spaced wall type filter elements.

348 FILTER:

This subclass is indented under the class definition. Apparatus in which constituents of a prefilt (usually solids and liquid) are separated by passing the prefilt through a medium having openings which retain at least one constituent.

SEE OR SEARCH CLASS:

4, Baths, Closets, Sinks, and Spittoons, subclass 286 for strainers specialized for that class.

55, Gas Separation, appropriate subclasses beginning with subclass 474 for gas filters.

166, Wells, subclasses 227+ for screens peculiar to wells.

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

349 Pulsation dampener or gas trapping:

This subclass is indented under subclass 348. Apparatus provided with means dampening pulsations in liquid flow or for trapping a gas, usually air.

SEE OR SEARCH THIS CLASS, SUBCLASS:

410 for a device which traps a gas and then releases it to blowback a filter medium.

350 With movable means to compress medium:

This subclass is indented under subclass 348. Apparatus in which a filter medium is enclosed by a receptacle and provided with adjustable or movable means to compress the filtering material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

226 for a sectional pressure type filter and porous filler.

351 Actuating means external of closed casing:

This subclass is indented under subclass 350. Apparatus including means external of a closed receptacle to actuate or adjust the means which compresses the filter medium.

352 Internal spring:
This subclass is indented under subclass 350. Apparatus wherein the means to compress comprises a spring encased by the receptacle.

353 Free cleaning means, e.g., loose abrading particles:
This subclass is indented under subclass 348. Apparatus in which there is a cleaning means, as loose abrading particles or wiping elements, which are free to move, (not attached to a retaining means).

SEE OR SEARCH THIS CLASS, SUBCLASS:
263+, for a filter having loose material acting as a filter medium.

354 Medium, cleaner or agitator moved by fluid:
This subclass is indented under subclass 348. Apparatus in which either the filter medium, residue remover or agitator is moved by the fluid being treated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
97+, for fluid responsive controls, particularly subclasses 121+ for float responsive controls.
242 for a float supported separator.
396+, for a movable medium and solid cleaning member which may be forced against the medium by fluid pressure.

355 Cleaner:
This subclass is indented under subclass 354. Apparatus in which the only element moved by the fluid is a residue remover.

356 Medium flexed:
This subclass is indented under subclass 354. Apparatus in which the filter element is so mounted or specially constructed as to be flexed or compressed by movement of liquid therethrough.

SEE OR SEARCH THIS CLASS, SUBCLASS:
359+, for means to flex an anchored filter.
391+, for moving filter mediums and blow back means in which flexing may occur incidental to such operation.

357 Relatively movable members interleaved for cleaning:
This subclass is indented under subclass 348. Apparatus in which a cleaning member is extendable between filter mediums or through openings in the filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
334 for distinct filters alternating with residue removers.
396+, for a movable filter and an adjacent cleaner.

358 Imperforate drum, medium on arc, chord or end:
This subclass is indented under subclass 348. Apparatus in which there is an imperforate drum having a filter element extending across a segment, covering an arc, or covering either or both end walls of the drum.

SEE OR SEARCH THIS CLASS, SUBCLASS:
399 for another type of movable sealed casing enclosing a filter medium.

359 Movable medium:
This subclass is indented under subclass 348. Apparatus in which the filter medium is capable of movement for treatment purposes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
107 for flow fluid pressure or material level responsive movement of a filter medium.
122 for float control of a movable separator.
154+, for a flume type movable filter.
178 for a movable separator with a heat exchanger.
189 and 263+, particularly subclasses 267 and 268 for particulate material type separators.
232 for separators combined with handling means.
297 for diverse distinct separators including a movable filter medium.
324+, for plural movable separating elements.
354+, for motion due to flowing fluids.

447 for a closed casing having provision for laterial removal of the filter element.

680+, for processes involving movement of filter medium.

360.1 Centrifugal extractor:

This subclass is indented under subclass 359. Apparatus wherein structure including the filter medium is particularly adapted for rapid movement about an axis of rotation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

144 for a filter automatically controlled in response to vibration.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, subclass 58 for a centrifugal filter combined with a distinct and separate drying unit or for rotary work holders acting as driers, and see search notes for other devices involving the use of centrifugal force.

57, Textiles: Spinning, Twisting, and Twining, subclasses 76+ for centrifugal pots and guides.

68, Textiles: Fluid Treating Apparatus, subclasses 23+ for washing machines having centrifugal extractor features.

118, Coating Apparatus, subclasses 52+ for centrifugal coating apparatus.

127, Sugar, Starch, and Carbohydrates, subclass 19 for sugar treatment including purging and molding centrifugals.

162, Paper Making and Fiber Liberation, subclass 384 for paper making apparatus utilizing centrifugal force to dewater the slurry on the mold surface.

192, Clutches and Power-Stop Control, subclass 136 for a cover latch control interlocked with driving mechanism for a centrifugal extractor.

494, Imperforate Bowl: Centrifugal Separators, appropriate subclasses, for apparatus for breaking up a mixture of fluids or fluent substances into two or more components by centrifuging within a generally solid-walled, receptacle-like member, and see especially subclass 36 for a separator of that class provided with filtering means.

360.2 With inward flow of feed component:

This subclass is indented under subclass 360.1. Apparatus wherein at least a portion of the medium moves in an inward direction.

361 With individual article container or support:

This subclass is indented under subclass 360.1. Apparatus in which means are provided for individually supporting articles for the removal of liquid therefrom, e.g., honey extractors.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, subclass 58 for centrifugal devices for removing liquid from articles, e.g., honey from combs not having any means for separating by filtration or straining.

362 Container or support reversible:

This subclass is indented under subclass 361. Apparatus in which the position of the article supporting means is reversible relative to the axis of rotation to alternaterly present opposite sides of the article away from such axis.

363 With adjustable rotation stabilizer:

This subclass is indented under subclass 360.1. Apparatus wherein adjustable means is provided to position the center of gravity of the structure on the geometric axis of rotation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

145+, for variable rotation condition responsive control.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 572+ for flywheels or rotors with balancing or vibration dampening means defining no features of separator construction.

364 Casing, shaft and filter unit gyratorily mounted:
This subclass is indented under subclass 360.1. Apparatus wherein the filter medium is mounted on a shaft and is enclosed by a nonrotating casing, both the rotating structure and casing being mounted for gyratory movement as a unit.

SEE OR SEARCH CLASS:
248, Supports, subclasses 637+ for machinery supports.

365 Shaft and filter unit gyratorily mounted:
This subclass is indented under subclass 360.1. Apparatus wherein the filter medium is mounted upon a rotating shaft, both the filter medium and shaft being mounted for gyratory movement as a unit.

366 Gyratory mounting above filter:
This subclass is indented under subclass 365. Apparatus wherein the mounting is above the filter medium.

367 Filter gyratorily mounted on shaft:
This subclass is indented under subclass 360.1. Apparatus wherein the filter medium is gyratorily supported.

SEE OR SEARCH THIS CLASS, SUBCLASS:
325 for plural centrifugal extractors with planetary motion.

368 With rotation brake:
This subclass is indented under subclass 360.1. Apparatus with means for slowing or stopping rotation.

SEE OR SEARCH CLASS:
192, Clutches and Power-Stop Control, subclasses 215+ for brake and power transmission control of general utility.

369 Discharging residue:
This subclass is indented under subclass 360.1. Apparatus including structure to discharge residue.

370 Secondary motion of filter medium:
This subclass is indented under subclass 369. Apparatus comprising means giving the filter medium, in whole or in part, an additional motion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
232+, for means assembling and disassembling a filter, particularly subclasses 237+ for a filter with hoist or handle means.

371 With variable flow controller:
This subclass is indented under subclass 369. Apparatus comprising a variable controller for flow of residue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
418+, for fixed filter and flow controller and see the search notes thereunder.

372 By residue engaging means:
This subclass is indented under subclass 369. Apparatus in which discharge of the residue is effected or controlled by means engaging it, e.g., doctor blades.

SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, subclass 256.5 for a moving surface scraper, wiper or brush of general application.

373 Fixed:
This subclass is indented under subclass 372. Apparatus in which the residue engaging means is stationarily mounted.

374 Rotatable:
This subclass is indented under subclass 372. Apparatus in which the residue engaging means is rotatably mounted with respect to the filter medium.

375 Pivoted:
This subclass is indented under subclass 374. Apparatus in which the residue engaging means is pivotably mounted.

376 Axially reciprocable:
This subclass is indented under subclass 372. Apparatus in which the residue engaging means is axially reciprocable parallel to the axis of rotation.

377 Internal work distributor:
This subclass is indented under subclass 360.1. Apparatus within the rotating filter medium for distributing the incoming material feed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
213 and 214, for a moving filter element having a movable distributor for introducing a treating material to the interior thereof.

378 Including filtrate receiving means having plural filtrate outlets:
This subclass is indented under subclass 360.1. Apparatus including filtrate receiving means provided with a plurality of separate outlets.

SEE OR SEARCH THIS CLASS, SUBCLASS:
215 for similar structure having means to add a treating material within the separator.

379 Including filtrate receiving trough adjacent top discharge:
This subclass is indented under subclass 360.1. Apparatus in which the separating structure rotates about an upright axis and in which the filtrate discharge therefrom is restricted to a zone at or adjacent the top thereof, combined with a filtrate receiving trough disposed above the bottom of the rotating structure and surrounding the filtrate discharge.

380.1 Rotating element construction:
This subclass is indented under subclass 360.1. Apparatus comprising the rotating separator structure, per se.

SEE OR SEARCH THIS CLASS, SUBCLASS:
369+, for a tapered basket for discharging residue.
483+, particularly subclass 497 for a cylindrical or conical filter medium of general application.

SEE OR SEARCH CLASS:
220, Receptacles, subclasses 200+ for a container cover in which no special features peculiar to rotatable extractor operation are defined.

380.2 Laundry:
This subclass is indented under subclass 380.1. Apparatus for washing or drying clothes.

380.3 Horizontal axis:
This subclass is indented under subclass 380.1. Apparatus which rotates around horizontal axis.

381 Inwardly extending partitions:
This subclass is indented under subclass 380.1. Apparatus including inwardly extending partitions dividing the interior of the separating structure into compartments.

SEE OR SEARCH CLASS:
34, Drying and Gas or Vapor Contact With Solids, subclass 109 for a compartmented drier drum.
68, Textiles: Fluid Treating Apparatus, subclass 143 for a compartmented tumbling and washing drum.

382 Top filtrate discharge:
This subclass is indented under subclass 380.1. Apparatus in which the separating structure rotates about an upright axis, and its filtrate discharge is restricted to a zone at or adjacent the top.

SEE OR SEARCH THIS CLASS, SUBCLASS:
246 for a portable receptacle having a cover limited as to its opening movement.
379 for a filtrate receiving trough at or adjacent the top of the separating structure.

383 Separate agitator:
This subclass is indented under subclass 359. Apparatus having separate agitating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

167.01 through 167.32, for a structural installation with a closed circulating system.

194+, for recirculation means.

407 for a fixed filter medium and an agitator or a cleaner, and see the search notes thereto.

384 Vibrator and unidirectional motion filter medium:

This subclass is indented under subclass 359. Apparatus comprising means for vibrating the filter medium which is moving continuously in one direction, e.g., belt or drum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

388 for other types of vibrating movable filters.

385 With plural motion:

This subclass is indented under subclass 359. Apparatus in which the filter unit has more than one motion, e.g., rotation and translation or rotation on plural axes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

323+, for plural movable filter elements which may have plural motions.

370 for a centrifugal extractor having plural motions of the filter medium.

384 for a unidirectional motion filter and vibrator for the medium.

386 Rolls or confining members contacting residue:

This subclass is indented under subclass 359. Apparatus in which there are rolls or confining members which contact the residue on the moving medium, e.g., for compacting, shielding or takeoff.

SEE OR SEARCH THIS CLASS, SUBCLASS:

401 for a belt type filter superimposed on a moving support.

402+, for a drum filter.

387 Unrollable:

This subclass is indented under subclass 359. Apparatus unrollable from a spool or equivalent source so as to present successive areas for the filtering operation.

388 Vibrating or longitudinally reciprocating:

This subclass is indented under subclass 359. Apparatus in which the filter medium vibrates or has motion back and forth in a plane parallel to the surface of the filtering medium during filtration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

354 for a filter medium flexed by fluid flow.

384 for a vibrator acting on a unidirectional motion filter medium.

385 for a filter having plural motions.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclasses 325+, 331, 333+, and 341 for shaking sifters for solids, and subclasses 437+ for reciprocating liquid treatment stratifiers.

389 Longitudinally moving prefilt type:

This subclass is indented under subclass 388. Apparatus in which the prefilt is fed in at one point of a filter medium, usually one end, and moves along it.

390 Mounted on movable valve element:

This subclass is indented under subclass 359. Apparatus supported by a movable valve part.

SEE OR SEARCH THIS CLASS, SUBCLASS:

385 for a filter element having at least two motions.

395 for a moving filter with cleaning means so connected to a valve that movement of the medium actuates the valve.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 547+ for a movable strainer for gas separation combined with flow control means.

391 With cleaning means:
This subclass is indented under subclass 359. Apparatus having means for removing residue.

SEE OR SEARCH THIS CLASS, SUBCLASS:
107 for flow, fluid pressure or material level responsive cleaning movement of a filter medium.
158 for a movable flume stream type strainer with cleaning means.
216+, for moving filter medium and means for adding a treating material.
369+, for a centrifugal extractor with residue removing means.
386 for rolls or confining members which may act as residue removers.
399 for a movable casing which may clean by merely reversing the casing position.
407 for residue remover for a fixed filter medium and see the search notes.

SEE OR SEARCH CLASS:
162, Paper Making and Fiber Liberation, subclasses 274+ for paper making apparatus having means to clean or condition a porous or foraminous member.

392 Fixed position or attached valve blocking means:
This subclass is indented under subclass 391. Apparatus having (1) a member fixed in position which contacts the filter medium or its support, or (2) a member actuating valves attached to a moving filter medium or its support; either (1) or (2) acting to block fluid flow through part of the moving filter medium.

393 Backwash or blowback and additional cleaner:
This subclass is indented under subclass 391. Apparatus having blowback or backwash cleaning means and another cleaning means, e.g., scraper or brush.

394 Discharging inside, e.g., internal-type drum:
This subclass is indented under subclass 391. Apparatus in which the moving filter medium encloses a space and the cleaning means acts to return residue to said space.

SEE OR SEARCH THIS CLASS, SUBCLASS:
194+, for recirculation.
403 for an internal feed type rotary drum filter without cleaning means.

395 With filter-driven valve means:
This subclass is indented under subclass 391. Apparatus in which flow of fluids is controlled by valve means actuated by the moving medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
142 for valves connected to a moving filter medium in combination with programming means.
390 for filter medium supported by and movable with a valve member.
392 for a fixed member operating valves attached to a moving filter unit.

396 Solid cleaner, e.g., scraper:
This subclass is indented under subclass 391. Apparatus comprising a scraper, wiper, abrader, cutter, brush or similar solid member.

SEE OR SEARCH THIS CLASS, SUBCLASS:
372 for a centrifugal extractor with a residue engaging means.
393 for a scraper, cutter or brush combined with backwash or blowback.

SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, subclass 256.5 for moving surface scrapers of general application.

397 With plural outlets from filter casing:
This subclass is indented under subclass 396. Apparatus having plural outlets from a casing for the medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
433 for divided filtered and unfiltered liquid passages and see notes thereunder.

398 Within sealed enclosure:
This subclass is indented under subclass 359. Apparatus within a casing sealed except for necessary fluid inlet or outlet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
267 for a trunnion mounted particulate material type separator.
358 for an imperforate drum with the medium on an arc, chord or end wall.

399 Movable casing:
This subclass is indented under subclass 398. Apparatus in which the closed casing is mounted for motion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
390 for a filter medium or casing attached to a movable valve element.

SEE OR SEARCH CLASS:
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 258+ and 269+ for rotary extractor or leacher.

400 Belt type:
This subclass is indented under subclass 359. Apparatus comprising a closed loop or filter elements attached to a closed loop carrier.

SEE OR SEARCH THIS CLASS, SUBCLASS:
160 for a flume stream type endless belt filter.
370 for an endless belt type filter element forming the wall of a centrifugal extractor.

SEE OR SEARCH CLASS:
162, Paper Making and Fiber Liberation, subclasses 348+ for flexible endless band type mold paper making machines (e.g., Fourdrinier machines).
209, Classifying, Separating, and Assorting Solids, subclasses 307+ for endless belt sifters for solids.

401 Superimposed on additional moving support:
This subclass is indented under subclass 400. Apparatus supported on an additional moving means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
386 for running strand residue removers.

402 Drum type:
This subclass is indented under subclass 359. Apparatus in the shape of a drum.

SEE OR SEARCH THIS CLASS, SUBCLASS:
161 for a revolving flume stream type filter.
174 for a movable cylindrical filter having comminuting means.
210+, and 217, for a drum type separator having means to add a treating material.
326 for plural drums on parallel axes.

SEE OR SEARCH CLASS:
162, Paper Making and Fiber Liberation, subclasses 323+ and 357 for cylinder mold type paper making machines.

403 Internal feed:
This subclass is indented under subclass 402. Apparatus in which prefilt enters the inside of the rotating filter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
394 for an internally fed rotary drum with cleaning means.

SEE OR SEARCH CLASS:
209, Classifying, Separating, and Assorting Solids, subclasses 288+ for rotating drum sifters for solids.

404 Annular segmented compartment:
This subclass is indented under subclass 402. Apparatus comprising an inner wall surrounded by a filter element forming an annular space divided into segments by partitions.

405 Movable prefilt distributor:
This subclass is indented under subclass 348. Apparatus having moving means which receives and distributes the prefilt against a filter medium, e.g., rotary thrower.

SEE OR SEARCH THIS CLASS, SUBCLASS:
377 for an internal work distributor for a centrifugal extractor.
456 for a fixed prefilt flow distributor and diverter.

406 Vacuumized filtrate receiver:
This subclass is indented under subclass 348. Apparatus in which there is means to apply a vacuum to a closed filtrate receiver with no liquid being removed to the vacuum source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
416 for liquid pump, gas pressure or liquid suction source combinations.
459+, for a pipe end attached filter which pipe may be a suction pipe.
481 for a filter element of the type often used with a reflux or vacuum coffee maker.

407 With residue removing means or agitation of liquid:
This subclass is indented under subclass 348. Apparatus having means for removing residue from the filter medium or for agitating either the prefilt or filtrate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
106+, for automatic filter cleaning.
159 for means to remove residue from a cleaner for a flume stream strainer.
179 for a mechanical agitator in a heat exchanger.
208 for a mechanical agitator in a reactor tank.
219 for a mechanical agitator and means to add treating material.
225 for similar structure in a sectional chamber press filter.
251 for means for cleaning the outer casing of a separator.
269+, for rehabilitation means for a particulate bed separator.
298 for diverse separators having residue removing means.
319 for diverse separators having agitating means.
332+, for plural separators with residue removal.
353 for a filter with free cleaning means.
345+, for movement of the medium, cleaner or agitator by fluid.
791 for processes of rehabilitating filter mediums.

408 Diverse, e.g., combined agitators, scrapers, aeration blowback:
This subclass is indented under subclass 407. Apparatus provided with diverse residue removal or agitating means, e.g., agitators, scrapers, brushes, means to add a gas, means to blowback through the filter medium.

SEE OR SEARCH CLASS:
209, Classifying, Separating, and Assorting Solids, subclasses 379+ for sifting screen cleaners.

409 Fluid cleaning:
This subclass is indented under subclass 407. Apparatus having (1) means to add a fluid to or trap a fluid within the filter unit for cleaning purposes or (2) constructed to backwash the filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
433 for a bypass around a filter including those whereby a filter is cleaned by prefilt flow.

410 Air pump type:
This subclass is indented under subclass 409. Apparatus in which a fluid is trapped within the filter, which fluid, upon a release of pressure or cessation of normal flow, acts to force itself or a portion of the filtrate through the filter medium or acts to discharge trapped residue.

411 Backwash or blowback:
This subclass is indented under subclass 409. Apparatus having means to pass a fluid, usually a liquid, through the filter medium in a direction reverse to normal filtering flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:

427 for a flow controller for backwash and see the search notes thereunder.

678 793, and 798, for processes of rehabilitating a separation medium by reverse flow.

412 Liquid pulsator:

This subclass is indented under subclass 411. Apparatus having means to cause a backwash liquid, usually filtrate, to traverse the filter medium as a pressure wave, i.e., having pressures varying between two or more peaks, e.g., pistons reciprocating within a cylindrical filter medium or an intermittently actuated pulsator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

349 for a filter having pulsation dampeners or gas trapping means.

356 for a filter constructed to cause flexing of the medium by a fluid.

359 for a filter having mechanical means for flexing the medium.

384 and 388+, for a filter having vibrating means.

413 Fixed filter medium and movable stirrer or cleaner:

This subclass is indented under subclass 407. Apparatus in which the filter medium is stationary and an agitator and mechanical cleaning means moves relative to it.

SEE OR SEARCH THIS CLASS, SUBCLASS:

357 for a filter having interleaved members for cleaning.

SEE OR SEARCH CLASS:

15, Brushing, Scrubbing, and General Cleaning, subclasses 246+ for cleaning attachments there provided for.

414 With plural outlets from filter casing:

This subclass is indented under subclass 413. Apparatus in which the fixed filter medium is mounted within a closed casing having plural outlets.

SEE OR SEARCH THIS CLASS, SUBCLASS:

397 422+ and 433, for other filter combinations having plural outlets from a closed casing.

415 Nontranslatory rotary:

This subclass is indented under subclass 413. Apparatus in which the filter medium has a curved surface and in which the cleaning or agitating means moves about a fixed axis and has nontranslatory rotary motion.

416.1 With pump, gas pressure, or suction source:

This subclass is indented under subclass 348. Apparatus provided with a pump or other source of vacuum or pressure which is particularly defined as other than a suction of pressure conduit, acting to aid the flow of fluid through the strainer or filter.

SEE OR SEARCH THIS CLASS, SUBCLASS:

167.01 through 167.32 , for a structural installation with a closed circulating system.

194+, for recirculation which may include a pump.

251 for a filter combined with a mouthpiece.

258 for serially connected units including a pump.

406 for a filter combined with a vacuum source which does not pump the liquid.

412 for a liquid pulsator acting during backwash of blowback.

SEE OR SEARCH CLASS:

92, Expansible Chamber Devices, subclasses 78+ for the combination of an expansible chamber device and fluid purifying means which enhances the operation of the device; and see (2) Note in subclass 78 of Class 92 for statement of the line.

166, Wells, subclasses 105.1+ for well pumps having sediment traps or deflectors; and subclasses 105.5+ for well pumps having liquid-gas separator; i.e., gas anchors.

417, Pumps, appropriate subclasses for the combination of a pump and a filter

wherein the specific disclosure of the filter is to protect or enhance the operation of the pump.

418, Rotary Expansible Chamber Devices, subclass 47 for the combination or a rotary expansible chamber pump and a filter wherein the filter is specially disclosed as protecting or enhancing the operation of the pump.

416.2 For aquarium or swimming pool:
This subclass is indented under subclass 416.1. Apparatus adapted for use in an aquarium or swimming pool.

SEE OR SEARCH THIS CLASS, SUBCLASS:

167.1 through 167.2, for a closed circulating system for a swimming pool or spa.

167.21 through 167.27, for a closed circulating system for an aquarium.

416.3 For drinking water:
This subclass is indented under subclass 416.1. Apparatus used to produce drinking water.

416.4 For fuel system:
This subclass is indented under subclass 416.1. Apparatus used in a fuel system.

416.5 For lubricating or oil treating system:
This subclass is indented under subclass 416.1. Apparatus adapted for use in a lubricating or oil treating system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

167.02 through 167.09 , for a closed circulating system for a lubrication system.

417 Alternating oppositely opening liquid distributors:
This subclass is indented under subclass 348. Apparatus in which there are liquid distributors embedded in a filter medium, alternate distributors acting respectively as liquid inlet and discharge means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

343 for similar devices in which the filter elements form plural units.

418 With flow controller for material being treated:
This subclass is indented under subclass 348. Apparatus with a variable flow controller for the material being treated, or a constituent thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

97+, for flow, fluid pressure or material level responsive means.

138+, for a separator with time control means.

141+, for a separator with a program actuator.

143+, for automatic control of a separator.

302 for a filter and a constituent trap with a flow line valve.

313 for a filter, a constituent trap and valve controlled sediment discharge means.

340 for parallel similar filters with flow control means.

371 for a variable flow controller for residue in a centrifugal extractor.

390 for a movable medium mounted on a movable valve element.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 544+ for a flow controller combined with a gas separator.

138, Pipes and Tubular Conduits, subclass 41 for a restrictor and a screen.

166, Wells, subclass 205 for a well screen with a valve or changeable restrictor.

419 Attached to or within portable prefilt receiver:
This subclass is indented under subclass 418. Apparatus in which the flow controller is attached to or within a portable prefilt receiver, e.g., funnel or hand manipulated receptacle.

SEE OR SEARCH THIS CLASS, SUBCLASS:

244+, for a portable receptacle with hood or closure.

420 Selective directive flow relative to filter:
This subclass is indented under subclass 418. Apparatus in which the controller selects the direction of fluid flow from a given source through or by the filter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
130+, for a fluid pressure responsive bypass.
190+, and 269+, for valve controlled means for bypassing a water softening apparatus during regeneration thereof.

421 Pivoted prefilt deflector:
This subclass is indented under subclass 420. Apparatus in which a deflector is pivoted for limited motion for diverting the prefilt to one or more alternate paths, e.g., dirty rain to a receiver and clean rain water to a filter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
99 for a similar organization having means responsive to prefilt accumulation.

422 Plural outlets from filter casing:
This subclass is indented under subclass 420. Apparatus in which the filter element is within a closed casing, which casing has a residue or prefilt outlet in addition to a prefilt inlet and filtrate outlet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
299+, particularly subclasses 312+ for a filter combined with a constituent trapping feature and sediment discharge means.

423 Attached unitary plural passage header:
This subclass is indented under subclass 422. Apparatus having at least one inlet and one outlet in a unitary header.

SEE OR SEARCH THIS CLASS, SUBCLASS:
133 for a fluid pressure responsive bypass in a unitary header.
340 for parallel filters with flow control means.

424 Multi-way valve:
This subclass is indented under subclass 420. Apparatus including a multiway valve which may be adjusted to direct flow in different directions.

425 Backwash:
This subclass is indented under subclass 424. Apparatus to control backwash.

SEE OR SEARCH THIS CLASS, SUBCLASS:
278+, for a multiway valve unit controlling backwash in a particulate material type separator.

426 Encased:
This subclass is indented under subclass 425. Apparatus wherein the valve is within the same housing as the filter.

427 Backwash:
This subclass is indented under subclass 420. Apparatus to control backwash.

SEE OR SEARCH THIS CLASS, SUBCLASS:
108 for flow, fluid pressure or material level control of backwash.
190+, for external regenerating medium supply combinations.
425+, for control of backwash by a selective directive multiway valve controller.

428 Combining or dividing flow passages with filter in combined passage:
This subclass is indented under subclass 418. Apparatus in which there are at least two inflow passages and one outflow passage with the filter in the outflow or (2) at least two outflow passages and one inflow passage with the filter in the inflow; and with a flow controller for any one or more of said passages.

SEE OR SEARCH THIS CLASS, SUBCLASS:
378+, for a centrifugal extractor having plural filtrate outlets.

429 Filter coaxial with valve seat or valve stem:
This subclass is indented under subclass 418. Apparatus in which the seat or the stem of the flow controller is coaxial with the filter.

430 Filter surrounds valve:
This subclass is indented under subclass 429. Apparatus in which the filter surrounds the controller seat or head.

SEE OR SEARCH THIS CLASS, SUBCLASS:
371 for a centrifugal basket having valve means coacting with the bottom of the basket.
426 for a multiway valve unit encased in a filter housing for controlling cleaning by a backwash fluid.

431 Filter fixed to valve seat, opposed to valve head:
This subclass is indented under subclass 429. Apparatus in which the filter is fixed to the controller seat opposite the controller head.

432 Filter in valve body recess:
This subclass is indented under subclass 418. Apparatus in which the filter is in a chamber or recess in the controller body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
426 for an encased multiway valve unit to control fluid cleaning of a filter by backwashing.

433.1 Divided filtered, and unfiltered liquid outlet passages:
This subclass is indented under subclass 348. Apparatus comprising two outlet passages for liquid under treatment, one for untreated liquid and one for filtrate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
130+, for a pressure-responsive bypass.
254 for serially connected units with a bypass.
321.6+, for devices having plural inlets and outlets in which the medium is a dialyzing membrane.
385 for axially reciprocable and rotary filter medium which may act as a bypass.
420+, for a variable directive flow controller.
428 for combining and dividing flow passages with a filter in the combined passage.
436 and 472, for a vended filter.

434 Recombining:
This subclass is indented under subclass 433.1. Apparatus in which the untreated part joins the filtrate.

435 Within flow line or flow line connected close casing:
This subclass is indented under subclass 348. Apparatus wherein the filter medium is totally positioned in a casing which is imperforate except for flow line means for introducing and discharging fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
287+, for similar structure for a particulate bed.
459+, for filters attached to a plate or the end of a pipe.
473+, for filter and receptacle combinations in which part of the receptacle may resemble a pipe, e.g., funnel neck.

SEE OR SEARCH CLASS:
68, Textiles: Fluid Treating Apparatus, subclass 208 for fluid textile treating apparatus having a drain and strainer means associated therewith.

436 Vented:
This subclass is indented under subclass 435. Apparatus wherein means for venting the casing is provided.

437 Central internal liquid receiver, e.g., tube:
This subclass is indented under subclass 435. Apparatus in which a liquid receiving means such as a tube or equivalent means forming a flow passage is located centrally of a filter medium or element.

438 Imperforate central liquid tube:
This subclass is indented under subclass 437. Apparatus in which the tube is imperforate at least along a substantial length thereof directing fluid axially of the filter element.

439 Axial flow through filter element:
This subclass is indented under subclass 438. Apparatus in which the liquid to be treated flows through the imperforate tube in one direction and through the filter medium, for treating purposes, in a direction opposite to the first mentioned direction of flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:
288 for a particulate material type separator having similar structure.

440 Inlet and outlet at same end:
This subclass is indented under subclass 437. Apparatus in which the prefilt inlet and the filtrate outlet are in the same end of a closed casing.

441 Attached to casing:
This subclass is indented under subclass 437. Apparatus in which the central liquid receiving means is directly attached to a part of the casing.

442 Head and base connected:
This subclass is indented under subclass 441. Apparatus in which the central liquid receiving means is attached, at each of its ends, to opposed parts of the casing.

443 Inlet and outlet at same end:
This subclass is indented under subclass 435. Apparatus in which the prefilt inlet and the filtrate outlet are in the same end of a closed casing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
133 for fluid pressure responsive bypass in an inlet and outlet closure header.
420+, particularly subclass 423 for flow controller combinations with a prefilt inlet and outlet at the same end of the casing.
440 for similar structure with a central liquid receiver.

444 Filter suspended from head:
This subclass is indented under subclass 443. Apparatus in which the filter element is attached to and extrudes downwardly from an upper part of the casing, usually a removable head.

445 Clamped in casing joint:
This subclass is indented under subclass 435. Apparatus in which the filter medium is clamped in a joint of the casing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
227+, for sectional pressure type filters in which the medium is clamped in a casing joint.

446 Axially aligned inlet and outlet:
This subclass is indented under subclass 435. Apparatus in which the prefilt inlet and the filtrate outlet are in substantial axial alignment.

447 Laterally removable:
This subclass is indented under subclass 446. Apparatus in which the strainer or filter element is insertable in and removable from the casing by movement generally lateral to the direction of flow of the liquid to be treated, e.g., the axis of the casing or pipe.

SEE OR SEARCH THIS CLASS, SUBCLASS:
310 for a filter and a constituent trap in which the trap is lateral of a flow line.
454 for a filter element attached to a closure.

448 Single open-end-type filter element:
This subclass is indented under subclass 446. Apparatus in which the filter element is a hollow filter element having one end open.

SEE OR SEARCH THIS CLASS, SUBCLASS:
452 for a single open end type filter supported on an internal fixed shoulder.

449 Pipe end attached closed casing, e.g., faucet:
This subclass is indented under subclass 446. Apparatus in which the closed casing is attached to and extends beyond the end of a pipe.

SEE OR SEARCH THIS CLASS, SUBCLASS:
459+, for a similar filter not enclosed in a casing.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 549+ for a flow controller combined with gas separating means.

450 Gasket within casing or spaced removable end members:
This subclass is indented under subclass 435. Apparatus having (1) opposed members at each end of the element which are separable from the casing with the filter element supported between them, or (2) a gasket between the element and the walls of the casing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
445 for a filter element clamped in a casing joint which may include a gasket.

451 Internal fixed shoulder supporting filter element:
This subclass is indented under subclass 435. Apparatus in which the casing is provided with an internal shoulder from which the filter element is supported.

SEE OR SEARCH THIS CLASS, SUBCLASS:
477 for a filter resting on an internal stop or surface of a receiver of more general construction.

452 Single open-end-type filter element:
This subclass is indented under subclass 451. Apparatus in which the filter element is a hollow filter element having a single open end.

SEE OR SEARCH THIS CLASS, SUBCLASS:
448 for an axially aligned inlet and outlet to a casing enclosing a single open end filter element.

453 Filter element clamped between closure and end wall:
This subclass is indented under subclass 435. Apparatus wherein the strainer or filter element is clamped between a removable cover and an opposed wall of the casing.

454 Filter element attached to closure:
This subclass is indented under subclass 435. Apparatus in which the filter element is fixed to a removable closure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
244+, for a portable receptacle type filter with a closure.
309 for a filter element attached to a sediment trap.
447 for a filter element laterally removable from a flow line even though attached to a closure.

455 Receptacle and modified spacing surface or support for filter medium:
This subclass is indented under subclass 348. Apparatus comprising (1) a supporting receptacle for a filter medium an inner surface of which is modified as by grooves or ribs, or (2) a separate spacing member engaging the inner surface of the receptacle.

SEE OR SEARCH THIS CLASS, SUBCLASS:
224+, particularly subclass 231 for a sectional chamber press filter.
283 for a pervious divider in a particulate bed separator.

456 Prefilt flow distributor or diverter:
This subclass is indented under subclass 348. Apparatus in which the prefilt passes into contact with an imperforate member which serves as a flow restrictor, diverter or distributor for the prefilt, usually to absorb the force of the incoming prefilt or prevent swirling.

SEE OR SEARCH THIS CLASS, SUBCLASS:
247 for a filtrate splash plate or deflector.
279 and 291+, for particular liquid receiving means for a particulate bed type separator.
305+, for distinct separators having baffle means cooperating with a sediment trap.
377 for a work distributor in a centrifugal extractor.
405 for a movable prefilt distributor.
421 for a filter with variable flow control means and a pivoted prefilt deflector.

457 With central pervious tubular receiver:
This subclass is indented under subclass 348. Apparatus in which there is a pervious member centrally located within a filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
437+, for a filter with a central liquid receiver, which filter is within a flow line or closed casing.
459+, for a filter attached to and extending beyond the end of a fluid conducting tube.

458 Plural concentric receivers:
This subclass is indented under subclass 457. Apparatus in which there are two or more liquid receivers having a common axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
315 for one diverse filter spaced within another.
338 for nested concentric filters.
342 for one filter with another.
489+, for superimposed filter mediums arranged for series flow.

459 Pipe or plate attached type:
This subclass is indented under subclass 348. Apparatus in which the filter element is mounted on a pipe, plate or wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103+, for grated inlet surface drains.
172.1 through 172.6 , for a structural installation in which the separator is ancillary to a storage tank.
457+, for a filter element having a central pervious liquid receiving tube.
473+, for a filter attached to a portable receiver, as a funnel.

SEE OR SEARCH CLASS:
166, Wells, subclasses 227+ for well screens and see the Notes thereto.

460 Attached to open end of pipe:
This subclass is indented under subclass 459. Apparatus in which the filter element or its supporting structure is mounted on the open end of the pipe and extends beyond the open end.

SEE OR SEARCH THIS CLASS, SUBCLASS:
449 for a filter element totally enclosed in a flow confining casing attached to a pipe.
482 for a filter secured to the lower end of a prefilt receiver, said lower end being similar in structure to a pipe.

461 Spaced wall-type element:
This subclass is indented under subclass 460. Apparatus in which the filter element encloses a space except for a single inlet or outlet, other than those in the filter medium, the filtering medium having walls which are spaced from each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
224+, particularly subclass 231 for a sectional chamber press type filter.
346+, for plural units of the spaced wall type.
486+, for spaced wall type elements.

462 Pipe is connection to plate:
This subclass is indented under subclass 460. Apparatus in which the pipe or tube is in turn connected to a plate or wall.

463 Inserted holder:
This subclass is indented under subclass 460. Apparatus comprising means forming a part of or attached to a filter element, which means is inserted into the open end of a pipe.

SEE OR SEARCH CLASS:
52, Static Structures (e.g., Buildings), subclass 12 for a cover with an eave or valley gutter and a separator.
222, Dispensing, subclasses 189.06+ for dispensers having a filter.

464 Portable receptacle draining type:
This subclass is indented under subclass 348. Apparatus mounted at the top of or on the spout of a portable receptacle functioning when the receptacle is tipped.

SEE OR SEARCH THIS CLASS, SUBCLASS:

473+, for a filter mounted at the inlet to a receptacle.

465 Cooperating handles on receptacle and drainer:

This subclass is indented under subclass 464. Apparatus comprising a handle on the receptacle and on the filter positioned for cooperation with each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:

470 for a filter with a handle and see the Notes thereto.

466 Receptacle spout:

This subclass is indented under subclass 464. Apparatus in which the filter is mounted on or adjacent the receptacle spout.

SEE OR SEARCH THIS CLASS, SUBCLASS:

316 for spaced filters, one adjacent an inlet or outlet conduit.

460+, for a filter attached to an open end of a pipe.

467 Within receptacle proper:

This subclass is indented under subclass 466. Apparatus in which the filter is within the receptacle so as to block flow of solids to the spout inlet.

468 Spaced from spout discharge:

This subclass is indented under subclass 466. Apparatus in which the filter is mounted at the discharge end of the spout spaced from such end.

SEE OR SEARCH THIS CLASS, SUBCLASS:

248 for a device having drip catching features or means.

469 On or adjacent receptacle upper edge:

This subclass is indented under subclass 464. Apparatus in which the filter is mounted on or adjacent the upper edge of the receptacle.

SEE OR SEARCH THIS CLASS, SUBCLASS:

245 for a similar device including a valve or flow restrictor.

474+, for a similar device mounted on a filtrate receiver.

479+, for a filter mounted on the upper edge of a filtrate receiver.

470 Handled:

This subclass is indented under subclass 348. Apparatus provided with handle means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

237+, for repair and disassembly means having a handle.

244 for a portable receptacle with a hood or closure which may include a handle.

465 for a handled portable receptacle and handled drainer.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclasses 417+ for a sifter provided with manual manipulating means.

222, Dispensing, subclass 465.1 for a dispensing container having a handle.

471 Ring type:

This subclass is indented under subclass 470. Apparatus comprising a ring member fixedly attached to the filter.

SEE OR SEARCH THIS CLASS, SUBCLASS:

495 for a ring and screen type filter element.

472 Vented:

This subclass is indented under subclass 348. Apparatus including means to vent the filter or filtrate receiver.

SEE OR SEARCH THIS CLASS, SUBCLASS:

120 for flow, fluid pressure or material level responsive vent control.

180 for vapor or gas removal in a treatment device with heating means.

436 for a vented filter within a flow line.

473 Resting on supporting receiver, e.g., portable:
This subclass is indented under subclass 348. Apparatus including structure to support the filter on or readily attach the filter to a liquid receiver or container.

SEE OR SEARCH THIS CLASS, SUBCLASS:
419 for a portable prefilt receiver with a flow controller.
451+, for a filter in a flow line or closed casing supported on an internal shoulder.
464 for a portable receptacle draining type filter.

474 At upper edge of filtrate receiver:
This subclass is indented under subclass 473. Apparatus supported at the upper edge of the receiver.

SEE OR SEARCH THIS CLASS, SUBCLASS:
471 for a device having a ring and handle which may rest on the upper edge of receptacle.

475 Filter offset in cover:
This subclass is indented under subclass 474. Apparatus in which the filter is offset from the center of a cover of the filtrate receiver.

476 Telescoped receivers or receiver sections:
This subclass is indented under subclass 474. Apparatus in which two or more liquid receivers are telescoped within each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
445 for a filter element clamped between means providing a joint in a pipe or casing.
446 for a filter medium attached to a telescopic pipe section.

477 Resting on internal stop or surface:
This subclass is indented under subclass 473. Apparatus in which the filter medium or its support rests on an internal stop or surface of the receptacle wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
455 for a filter on a modified spacing surface of a casing.

SEE OR SEARCH CLASS:
99, Foods and Beverages: Apparatus, subclasses 279+ for beverage infusors including more than a filter medium or such medium and a supporting receptacle.
222, Dispensing, subclasses 189.06+ for dispensers having a filter.

478 Unitary filter medium and radially expandable retainer:
This subclass is indented under subclass 477. Apparatus in which a radially expansible retainer, such as a resilient ring or downwardly projecting spring arms, and the filter form an integral unit.

(1) Note. The term “integral unit” means a filter medium and a retainer so connected that the unit cannot be disassembled without destroying the unit or can be disassembled only be removing mechanical connectors, such as a bolt or rivet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
463 for a filter element which may be expandable in a pipe.

479 Inner separate retainer:
This subclass is indented under subclass 477. Apparatus in which there is a member within the prefilt receiver usually a ring or cylinder, which clamps or retains the filter medium and/or its supporting structure against the inner wall of the prefilt receiver or against the stop member.

480 With contractor for expandable retainer:
This subclass is indented under subclass 479. Apparatus in which the retainer is expandable and has means for contracting the retainer to effect release of the filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

238 for a filter element and a handle for removing the element from a casing.

481 Longitudinal retainer or guide, (e.g., reflex coffee maker):

This subclass is indented under subclass 477. Apparatus extending longitudinally of the prefilt receiver, e.g., reflux type coffee makers or funnels having means extending into the funnel neck to hold the filter unit in place.

SEE OR SEARCH CLASS:

99, Foods and Beverages: Apparatus, subclass 292 for pressure-vacuum or reflux type beverage infusors having more than filter and its support.

482 At lower end or prefilt receiver:

This subclass is indented under subclass 473. Apparatus attached or supported at the lower end of a prefilt receiver.

SEE OR SEARCH THIS CLASS, SUBCLASS:

449 for a filter medium within a closed casing attached to a pipe end.

459+, for a filter element attached to a fixed pipe or plate.

483 Supported, shaped or superimposed formed mediums:

This subclass is indented under subclass 348. Apparatus comprising: (1) a filter medium and supporting means therefore, (2) a filter medium having a defined significant gross structure or shape, or (3) super-imposed or abutted members forming a single filter element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

500+, for filter material, per se.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclasses 363+, especially subclasses 409+, for filter elements for separating solids.

413, Sheet Metal Container Making, subclasses 1+ for sheet-metal ware making processes which may include processes of making filter elements.

484 Medium within foraminous supporting container or sheath:

This subclass is indented under subclass 483. Apparatus in which the filtering medium is retained within a foraminous supporting container or sheath, e.g., removable cartridges.

SEE OR SEARCH THIS CLASS, SUBCLASS:

317 for similar structures with plural spaced filters.

485 External cage-type support:

This subclass is indented under subclass 483. Apparatus comprising supporting structure outside of the filter medium formed of spaced bars supporting a nonplanar filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

455 for similar structure in which the supporting structure spaces the filter medium from a receptacle wall.

497 for a cylindrical filter having external reinforcing means.

486 Spaced wall type, e.g., hollow leaf:

This subclass is indented under subclass 483. Apparatus in which the medium comprises spaced walls.

SEE OR SEARCH THIS CLASS, SUBCLASS:

461 for similar structure attached to the open end of a pipe.

487 Concentric, convolute or pleated:

This subclass is indented under subclass 486. Apparatus comprising (1) concentric walls, (2) spirally arranged, or (3) pleated.

488 Abutted or superimposed members:

This subclass is indented under subclass 483. Apparatus comprising separable members which abut on their surfaces of greatest dimension or which are arranged in superposed relation.

489 For series flow:

This subclass is indented under subclass 488. Apparatus so arranged that the liquid passes through them in succession.

SEE OR SEARCH THIS CLASS, SUBCLASS:

335+, for plural distinct filters arranged for series flow.

SEE OR SEARCH CLASS:

55, Gas Separation, subclasses 482, 485, and 486+ for layered or serially arranged gas filters.

490 Integral or coated layers:

This subclass is indented under subclass 489. Apparatus in which (1) the layers are integrally united as by an adhesive or one material is partially diffused into another, or (2) each layer comprises a coated or impregnated material.

491 All fibrous:

This subclass is indented under subclass 490. Apparatus in which all of the layers are fibrous.

492 Alternating dissimilar:

This subclass is indented under subclass 488. Apparatus comprising alternating members dissimilar in shape, size openings within them or similar shaped members arranged in different relative positions.

493.1 Pleated:

This subclass is indented under subclass 483. Apparatus in which the filter medium is folded back and forth upon itself.

SEE OR SEARCH CLASS:

55, Gas Separation, subclasses 497+, 500, and 521 for gas filters of zig-zag form.

493.2 Bonded end caps:

This subclass is indented under subclass 493.1. Apparatus wherein the filter medium is permanently attached to the end caps.

493.3 Rectangulary shaped:

This subclass is indented under subclass 493.1. Apparatus in the form of a rectangle.

493.4 Spirally formed:

This subclass is indented under subclass 493.1. Apparatus having a helically shaped filter medium.

493.5 Filter element:

This subclass is indented under subclass 493.1. Apparatus consisting of a single component of the pleated filter apparatus.

494.1 Convolute:

This subclass is indented under subclass 483. Apparatus in which the filter medium is arranged so that it is coiled upon itself and recedes or approaches a center axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

493.4 and 497.1, for pleated spirally formed and helically wound filters, respectively.

494.2 Metal:

This subclass is indented under subclass 494.1. Apparatus made from metal.

494.3 With edge spacer:

This subclass is indented under subclass 494.1. Apparatus having means at the edge of the filter medium to space consecutive convolutions.

495 Single ring or closed frame type:

This subclass is indented under subclass 483. Apparatus in which the supporting means comprises a ring or noncircular frame.

SEE OR SEARCH THIS CLASS, SUBCLASS:

471 for a filter having a handled ring frame.

485 for a filter enclosed in a cage support.

496 Bound, fused or matted, e.g., porous shapes, sponges, etc.:

This subclass is indented under subclass 483. Apparatus in which the medium is composed of particles or fibers bound together into a single integral unit, by fusing, an adhesive or the intertwining of fibers.

497.01 Cylindrical, conical, or trough shaped:

This subclass is indented under subclass 483. Apparatus in which the filter medium is shaped to form a cylinder, cone, or open trough.

SEE OR SEARCH THIS CLASS, SUBCLASS:

380.1+, for a centrifuge basket.

433.1+, for a through flow tubular type filter.

SEE OR SEARCH CLASS:
55, Gas Separation, subclasses 498, 500, and 521 for gas filters of cylindrical or conical form.

497.1 Helically wound:
This subclass is indented under subclass 497.01. Apparatus which comprises a filter formed from indefinite length material coiled in such a manner as to generate convolutions about an axis with each convolution displaced along said axis from the previous convolutions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
494.1+, for convolute wound filters.

497.2 Filter blank:
This subclass is indented under subclass 497.01. Apparatus in an unassembled form capable of being formed in a cylindrical, conical, or trough shape.

497.3 Conical:
This subclass is indented under subclass 497.01. Apparatus in the form of a cone.

498 Perforated or grooved plates:
This subclass is indented under subclass 483. Apparatus comprising a perforated plate or a plate having grooves in its surface to form liquid flow passages.

SEE OR SEARCH CLASS:
209, Classifying, Separating, and Assorting Solids, subclasses 397+ for perforated sheet sifter elements.

499 Screens, e.g., woven:
This subclass is indented under subclass 483. Apparatus, comprising meshed fabric.

SEE OR SEARCH CLASS:
139, Textiles: Weaving, subclasses 383+ for fabrics having no particular shape or specific structure peculiar to filtering.
166, Wells, subclasses 277+ for well screens, particularly subclass 230 for woven mesh well screens, and subclass 234 for well screens comprising spaced strips or bars.
209, Classifying, Separating, and Assorting Solids, subclasses 392+ for sifter elements there provided for.
245, Wire Fabrics and Structure, appropriate subclasses, for such structure of general utility.

500.1 Material:
This subclass is indented under subclass 348. Compositions comprising materials to be used in filter apparatus.

(1) Note. Materials consisting of fibers (e.g., paper) comprising a homogeneous mass of fibers, with or without binders or randomly dispersed fillers made by a Class 162 method are in Class 162 even though defined as a filter material. Such material having additional features peculiar to filtration are in Class 210, subclasses, 500.1+ e.g., perforations, fibers on a perforated backing, strata of fibers of different kinds, etc.

(2) Note. A patent for stock material which may have filtering properties but in which there is no claimed internal or external structure particularly adapting the material for use as a filter will be placed in the appropriate stock material class. See, especially, Class 428, Stock Material or Miscellaneous Articles, and the search notes thereunder.

(3) Note. A composition claimed or disclosed solely as a sorbent or claimed as a filter aid and disclosed to aid filtering solely as a sorbent is classifiable in Class 502. A composition claimed as filtering material i.e., by presenting apertures or interstices of a size functioning to retain solid matter by a screening or sieving action with or without a sorbing action is classifiable in Class 210, subclasses 500.1+. Class 210, subclass 500.1 filter material is superior to Class 502. A copy of a patent properly classified in 210, subclasses 500.1+ will be crossed to Class 502 only on the basis of a novel sorbent material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

483+, for supported, shaped, or superimposed filter mediums.

SEE OR SEARCH CLASS:

106, Compositions: Coating or Plastic, appropriate subclasses for plastic compositions in general, and see (2) Note of that class definition.

139, Textiles: Weaving, subclasses 383+ for fabrics having no particular shape or specific structure peculiar to filtering.

162, Paper Making and Fiber Liberation, (see (1) Note).

204, Chemistry: Electrical and Wave Energy, subclasses 295+ for diaphragms or membranes to be used in electrolytic apparatus.

252, Compositions, subclasses 175+ for water softening or purifying compositions; subclasses 182.11+ for filter materials which exert a chemical action.

428, Stock Material or Miscellaneous Articles, subclasses 304.4+ for a product of composite form in which one component is either porous or cellular and subclasses 357+ for a mass or layer of structurally defined or coated elements (e.g., fibers, filaments, particles).

429, Chemistry: Electrical Current Producing Apparatus, Product and Process, subclasses 129+ and 247+ for separators (diaphram) specialized for that class.

442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, etc.), subclasses 409+ for an autogenously bonded nonwoven fabric.

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a composition comprising a catalyst or sorbent, per se.

500.21 Semipermeable membrane:

This subclass is indented under subclass 500.1. Subject matter directed to semipermeable membrane specified primarily in terms of the nature of the composition or compositions of which it is made.

(1) Note. See “membrane” and the reference therein to “semipermeable membrane” in the Glossary of the main class definition of this class.

(2) Note. For a membrane having structure (said structure may, for example, be described in terms of, being semipermeable or selective or permselective, defining pore dimension or shape, flux or permeation rate, retention characteristics, porosity, overall membrane shape (e.g., tube or hollow fiber), pore configuration (for example, symmetric (e.g., isotropic or unskinned) or asymmetric (e.g., anisotropic or skinned), bubble point, birefringence, etc.), which is disclosed to be solely or primarily useful in a Class 210, Liquid Purification or Separation process (e.g., dialysis, reverse osmosis, ultrafiltration, hyperfiltration, microfiltration) classification in Class 210 is proper. For a membrane which is a stock material disclosed to be of more general utility (e.g. not primarily useful for such a Class 210 process) and for which no such structure is claimed, classification in the appropriate stock material class is proper. A membrane of only nominally recited structure, i.e., simply characterized as a membrane or film without any other significant structure such as that referred to above, of a specific chemical composition, is properly classifiable in the appropriate chemical composition class. Class 210 is superior to Class 96. Consequently, membranes claimed for use in Class 96, Gas Separation: Apparatus (including membranes for removal of a gas from a liquid) and claimed for use in Class 210, Liquid Purification or Separation apparatus (or membranes for “fluid” separation) are classified in Class 210 as originals and cross-referenced to Class 96. For membranes or diaphragms useful for: (a) processes of electrical, radiant, wave energy or magnetic separation or purification of liquids (including more than the mere application of a magnetic field to liquid to separate magnetic particles therefrom) classification in Class 204 is proper; (b) processes of use as a battery separator, classification in

Class 429 is proper: however, in regard to membranes useful in processes of both Classes 210 and 204 and/or 429, Class 210 subclasses 500.1+ has superiority over both Classes 204 and 429, based upon 210 subclasses 500.1+ occurring first in the Patent Office classes of the Manual of Classification.

SEE OR SEARCH THIS CLASS, SUBCLASS:
321.6+, for membrane containing apparatus and see the search notes thereunder.

500.22 Isotropically pored:
This subclass is indented under subclass 500.21. Subject matter comprising a membrane structure, defining two major surfaces, and which includes pores which extend between the major surfaces, the pores having a substantially uniform cross section throughout.

500.23 Hollow fiber or cylinder:
This subclass is indented under subclass 500.21. Subject matter in the shape of either an annulus or of a cylindrical hollow structure which is relatively elongated compared with its diameter.

(1) Note. Such a structure maybe described as, e.g., a tube, a capillary, or a hollow fiber.

500.24 Antithrombogenic coating on membrane:
This subclass is indented under subclass 500.21. Subject matter wherein the membrane comprises a surface coating of a material specialized to prevent the formation of blood clots.

500.25 Metal containing:
This subclass is indented under subclass 500.21. Subject matter wherein the membrane comprises a metal present in either elemental form or in a compound of that metal.

500.26 Glass:
This subclass is indented under subclass 500.21. Subject matter wherein the membrane comprises a glass.

(1) Note. Glasses are inorganic compositions which solidify from the molten state without crystallizing, to have that molecular disorder characteristic of the glassy state, which have no definite melting point, are incapable in the solid state of permanent deformation, which fracture when subjected to deformation tension and include as components at least one “glass former” material.

(2) Note. Typical glass formers are, e.g., oxides of silicon, beryllium, boron, germanium, phosphorus, vanadium, lead, tin, zinc, zirconium, and titanium, as well as such nonoxide compounds as GeS, metal fluorides, or iodides, and some metallic selenides, tellurides, arsenides, and phosphides. These compositions may also include other oxides devoid of glass forming tendencies, e.g., oxides of alkali metals, alkaline earth metals, and magnesium.

(3) Note. Many ceramic compositions contain primarily slag, the byproduct of metal refining and smelting, which are considered to be glasses.

(4) Note. Neither transparency to light nor the absence of color are necessary for a composition to be considered as a glass for the purpose of this subclass.

(5) Note. Water glass, clear, synthetic resin compounds and isinglass are not considered to be glass for the purpose of classification in this subclass.

(6) Note. Organic, noncrystalline solid materials, such as synthetic resins which may be referred to as organic glasses, are not considered to be glass for the purpose of classification in this subclass.

(7) Note. The so-callled metallic glasses or glassy metals, which are amorphous solid forms of metals ar not included herein.

500.27 Organic:
This subclass is indented under subclass 500.21. Subject matter comprising an organic substance.

(1) Note. Organic is intended to include substances which have a carbon atom bonded to another carbon atom, or to a

halogen atom, or to a hydrogen atom, or to a nitrogen atom by a single or a double bond.

500.28 Cyclic:
This subclass is indented under subclass 500.27. Subject matter comprising an organic substance which includes a ring structute, i.e., a series of atoms bonded one to another in such a fashion that the chain closes upon itself.

500.29 Cellulosic:
This subclass is indented under subclass 500.28. Subject matter comprising the structure known as cellulose, or derivatives thereof in which the basic cellulose structure remains intact.

500.3 Cellulose acetate:
This subclass is indented under subclass 500.29. Subject matter comprising esters of cellulose with acetic acid, i.e., containing at least one -O-C(=O)-CH_3 group.

500.31 Cellulose diacetate:
This subclass is indented under subclass 500.3. Subject matter comprising a cellulose acetate in which the cellulose ester includes two and only two-O-C(=O)-CH_3 groups.

500.32 Cellulose triacetate:
This subclass is indented under subclass 500.3. Subject matter comprising a cellulose acetate in which the cellulose ester includes three -O-C(=O)-CH_3 groups.

500.33 Homocyclic:
This subclass is indented under subclass 500.28. Subject matter comprising at least one ring wherein all the ring atoms are carbon atoms.

500.34 Styrene:
This subclass is indented under subclass 500.33. Subject matter comprising a six membered carbon ring having attached thereto a -CH=CH_2 groups.

500.35 Acrylate:
This subclass is indented under subclass 500.27. Subject matter comprising a O-C-C=C group.

500.36 Alkene other than vinyl:
This subclass is indented under subclass 500.27. Subject matter comprising an aliphatic unsaturated hydrocarbon containing a nonterminal carbon to carbon double bond.

500.37 Amine:
This subclass is indented under subclass 500.27. Subject matter comprising an atom of carbon bonded to an atom of nitrogen, which structures are the equivalent of a structure formed from ammonia (NH_3) by replacement of one, two, or three of the hydrogens with carbon atoms.

500.38 Amide:
This subclass is indented under subclass 500.37. Subject matter comprising a -C(=O)-NH_2 group or similar groups derived from acid other than a carboxylic acid by replacing the acidic hydrogen with an NH_2 Group.

(1) Note. Such materials may be identified as, e.g., Nylon.

500.39 Imide:
This subclass is indented under subclass 500.38. Subject matter including the group: R-C-N-C-R.

500.4 Carbonate:
This subclass is indented under subclass 500.27. Subject matter comprising a -CO_3 group.

(1) Note. Such materials may typically be, e.g., polycarbonate resins.

500.41 Sulfone:
This subclass is indented under subclass 500.27. Subject matter comprising an R-S-R group.

500.42 Vinyl:
This subclass is indented under subclass 500.27. Subject matter comprising a CH_2=CH_2 group.

(1) Note. When polyvinyl synthetic resins are present, various of the hydrogens may be replaced by other atoms.

500.43 Acrylonitrile:
This subclass is indented under subclass 500.42. Subject matter comprisiang a CH_2 = CH-C=N group.

(1) Note. When polyacrylonitrile resins are present, various of the hydrogen atoms may be replaced by other atoms.

501 Sterilizing or neutralizing agent containing:
This subclass is indented under subclass 500. Compositions including a sterilizing component.

SEE OR SEARCH CLASS:
252, Compositions, subclasses 175+ for a water softening or purifying or scale inhibiting composition.
424, Drug, Bio-Affecting and Body Treating Compositions, appropriate subclass for a composition which is biocidal to a micro-organism (other than algae), e.g., bacterium, fungus, etc.
504, Plant Protecting and Regulating Compositions, subclasses 150+ for an algicidal composition.

502.1 Sorptive component containing:
This subclass is indented under subclass 500. Compositions including a component having the property of removing at least one constituent from a liquid mixture by surface attraction or allowing said constituent to penetrate within the component.

SEE OR SEARCH THIS CLASS, SUBCLASS:
660+, especially 679, for processes which use such compositions.

SEE OR SEARCH CLASS:
502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a composition comprising a catalyst or sorbent, per se, and see especially subclasses 60+ and 400+ for a sorbent.

503 Diverse granular or fibrous:
This subclass is indented under subclass 500. Subject matter comprising (1) granules differing in shape or composition, (2) fibers differing in shape or composition, or (3) combined granules and fibers.

(1) Note. The materials may be laminated, imbedded in each other or be of one layer having differing sections, e.g., precoated elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:
488+, for formed laminated members forming a unitary filter element.
510 for fused or sintered porous material.

SEE OR SEARCH CLASS:
428, Stock Material or miscellaneous Articles, subclasses 292.1+ for a stock material product in the form of a composite sheet or web embodying a component having structurally defined fibers, subclasses 323+ for such a product embodying a component having structurally defined particles, and subclasses 357+ for a mass or layer of structurally defined or coated element (e.g., fibers, filaments, particles).

504 With adhered coating or impregnant:
This subclass is indented under subclass 503. Compositions having a coating or impregnant, permanently adhered thereto.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclasses 323+ for stock material product in the form of a composite web or sheet embodying a component having structurally defined fibers or particles, respectively, which product may be coated or impregnated, subclasses 357+ for a mass or layer of structurally defined or coated elements (e.g., fibers filaments or particles, etc.), which may be coated or impregnated in addition to the defined structure.
442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, etc.), subclasses 59+ for a coated or impregnated fabric.

505 Including fibers:
This subclass is indented under subclass 503. Compositions in which at least one component is fibrous.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclasses 292.1+ for a fiber-containing web or sheet subclasses 375+ for a mass or layer of structurally defined or coated fibers or filaments.

506 Coated or impregnated, e.g., adhesively bound:
This subclass is indented under subclass 500. Compositions in which the material is coated or impregnated or held together by a binder.

SEE OR SEARCH THIS CLASS, SUBCLASS:
504 for coated or impregnated diverse granules or fibrous materials.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, appropriate subclasses, especially subclasses 175+, 190, 193, and 196+ for fabrics or textiles in general, which may be coated or impregnated.
442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, etc.), subclasses 59+ for a coated or impregnated fabric.

507 Fabrics:
This subclass is indented under subclass 506. Compositions comprising a woven or knitted fabric.

SEE OR SEARCH CLASS:
442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, etc.), subclasses 59+ for a coated or impregnated woven or knitted fabric.

508 Fibrous:
This subclass is indented under subclass 506. Compositions which include fibers.

SEE OR SEARCH THIS CLASS, SUBCLASS:
489+, for abutted fibrous members.
496 for bound, fused or matted fibrous structures.

SEE OR SEARCH CLASS:
106, Compositions: Coating or Plastic, subclasses 242, 282, 699+, and 711 for coating or plastic compositions containing fibers.
428, Stock Material or Miscellaneous Articles, subclasses 105+ and 114 for a stock mate rial product in the form of a composite web or sheet in which filamentary or fibrous elements in respective layers or components are in angular or parallel relationship, respectively; subclasses 357+ for a layer or mass of structurally defined or coated fibers or filaments.
442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, etc.), subclasses 59+ for a coated or impregnated fabric.
501, Compositions: Ceramic, subclasses 35+ for glass compositions containing fibers; and subclass 95 for refractory composition containing fibers.

509 Inorganic:
This subclass is indented under subclass 508. Compositions in which the fibers are inorganic, e.g., asbestos or glass wool.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclasses 210, 317.9, 325, 426+, and 443+ for a stock material form of a single or plural layer web or sheet which may include glass or asbestos fibers or filaments.
442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, etc.), subclasses 20+, 54+, 172+, 266, 331, 348, and 367 for a fabric which may include glass or inorganic fibers or filaments.

510.1 Porous unitary mass:
This subclass is indented under subclass 500. Compositions in which the material is held together by fusing or sintering.

SEE OR SEARCH CLASS:
75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Composi-

tions, and Loose Metal Particulate Mixtures, subclass .5 for metal powders.

106, Compositions: Coating or Plastic, subclasses 122, 601+ and 672+ for coating or plastic pore forming compositions.

166, Wells, subclass 228 for porous material well screens.

419, Powder Metallurgy Processes, subclass 2 for processes of making sintered porous articles from metal.

428, Stock Material or Miscellaneous Articles, subclass 566 for metal particle-containing stock material distinguished by an interconnected void structure.

521, Synthetic Resins or Natural Rubbers, subclasses 50+ for pore forming, per se in a synthetic resin or natural rubber composition.

511 LIQUID AS SEPARATING MEDIUM:

This subclass is indented under the class definition. Apparatus in which a separating medium comprises a liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

634+, for processes of solvent extraction.

SEE OR SEARCH CLASS:

196, Mineral Oils: Apparatus, subclass 14.52 for apparatus for separating mineral oil by solvents.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 256+ for apparatus for extracting a liquid with a liquid.

512.1 TANGENTIAL FLOW OR CENTRIFUGAL FLUID ACTION:

This subclass is indented under the class definition. Apparatus wherein fluid flows tangentially of a container in a manner to produce a whirling motion or there is driven means to rotate the fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

304 for a tangential inlet, or spiral or convolute baffle in combination with a filter.

SEE OR SEARCH CLASS:

55, Gas Separation, subclasses 400+ and 447+ for similar type gas separators.

209, Classifying, Separating, and Assorting Solids, subclasses 725+ for methods and apparatus for removing plural grades or classes of solids from a liquid suspension and subclasses 710+ for analogous treatment of a gaseous suspension.

512.2 Multiple cyclone:

This subclass is indented under subclass 512.1. Apparatus in the form of plural cyclone separators.

512.3 With movable means affecting flow:

This subclass is indented under subclass 512.1. Apparatus having means which is movable, e.g., rotatable, etc., by either an external source or a fluid within the apparatus. The means functions to impart a whirling or rotary motion to the fluid.

513 GRAVITATIONAL SEPARATOR:

This subclass is indented under the class definition. Apparatus comprising a container or tank in which a mixture of liquids or liquids and solids are separated from one another by forming constituent layers in accordance with their respective sepcific gravities.

SEE OR SEARCH THIS CLASS, SUBCLASS:

187+, for a heat exchanger within a gravitational separator.

207+, for a distinct reactor tank within a gravitational separator.

265 for a particulate material separator with a gravitational separator.

299+, for a filter and a constituent trap.

800+, for a process of gravitational separation.

SEE OR SEARCH CLASS:

55, Gas Separation, subclasses 434+ for gas separators in which the gas current is deflected to effect separation.

99, Foods and Beverages: Apparatus, subclass 456 for separation of a dairy food one of which is a liquid.

127, Sugar, Starch, and Carbohydrates, subclasses 13 and 27 for sugar or amylaceous material separating and purifying settling tanks.

137, Fluid Handling, subclass 172 for fluid handling apparatus including means to separate two liquids from each other.

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclass 110 for ladles usable with gravitational separators.

166, Wells, subclasses 105.1+ for well pumps having sediment traps or deflectors and subclasses 105.5+ for liquid-gas separators; i.e., gas anchors.

209, Classifying, Separating, and Assorting Solids, subclasses 155+ for separating solids by suspending them in a liquid.

514 Portable invertible, e.g., milk and cream separator:
This subclass is indented under subclass 513. Apparatus comprising means which cooperates with an invertible, portable container to isolate one constituent after inversion of the container; or after isolation with a single opening of the container extending upwardly, one constituent is withdrawn by inversion of the container.

515 Selective withdrawal of constituents:
This subclass is indented under subclass 514. Apparatus in which an isolating means and an inverting position of the container determines which constituent will be withdrawn.

516 Resilient deformable isolator:
This subclass is indented under subclass 514. Apparatus in which the isolating means is resilient and deformable to permit insertion into the container.

517 Hinged to handle:
This subclass is indented under subclass 516. Apparatus in which the isolator is hinged to a handle.

518 Sectional isolator:
This subclass is indented under subclass 514. Apparatus in which the isolator is formed of parts to permit angular rearrangement for insertion in the container.

519 Material supply distributor:
This subclass is indented under subclass 513. Apparatus having a distributor at an inlet for supplying the material to the container.

SEE OR SEARCH THIS CLASS, SUBCLASS:

273 for a moving distributor to a particulate material separator.

343 and 417, for alternately opening distributors.

377 for a centrifugal extractor having a prefilt distributor.

520 Rotatable:
This subclass is indented under subclass 519. Apparatus which is rotatable.

521 Superposed compartments or baffles, e.g., parallel plate type:
This subclass is indented under subclass 513. Apparatus having baffle or partition means arranged above the bottom and laterally of the side of the container forming compartments and heavier constituent receiving surfaces.

522 Each with lighter constituent discharge:
This subclass is indented under subclass 521. Apparatus with means to withdraw the lighter constituent from at least two compartments.

523 Mechanical constituent mover:
This subclass is indented under subclass 513. Apparatus including mechanical means for moving a constituent.

SEE OR SEARCH THIS CLASS, SUBCLASS:

221 for froth flotation with a scum remover.

298 for a sediment mover in a diverse operation separator.

407 for residue removing means for a filter.

SEE OR SEARCH CLASS:

30, Cutlery, subclasses 324+ for spoons.

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclasses 110+ for ladles.

524 Diverse serial:
This subclass is indented under subclass 523. Apparatus comprising different serially associated movers.

525 Scum sediment removal:
This subclass is indented under subclass 523. Apparatus which removes sediment from the tank bottom and scum at the surface.

526 Endless belt or chain:
This subclass is indented under subclass 523. Apparatus comprising an endless belt or chain.

527 Rectilinearly movable supporting means:
This subclass is indented under subclass 523. Apparatus comprising a carriage which moves rectilinearly.

528 Horizontally rotating scraper:
This subclass is indented under subclass 523. Apparatus comprising a scraper which rotates horizontally.

529 Polygonal container and correlating mover:
This subclass is indented under subclass 528. Apparatus wherein the scraper is so constructed that in its movement it conforms with the outline of a polygonal tank.

530 Tank rim-supported carriage:
This subclass is indented under subclass 528. Apparatus wherein the scraper is supported by a carriage moving on the rim of the tank.

531 Elevatable scrapers:
This subclass is indented under subclass 528. Apparatus in which the scraper is elevatable.

532.1 Heavier constituent trap, chamber, or recess:
This subclass is indented under subclass 513. Apparatus providing a trap, chamber, or recess for receiving the heavier constituent.

SEE OR SEARCH CLASS:
166, Wells, subclasses 105.1+ for well pumps having sediment traps or deflectors; and subclasses 105.5+ for liquid-gas separators; i.e., gas anchors.

532.2 Septic tank:
This subclass is indented under subclass 532.1. Apparatus in the form of a septic tank.

SEE OR SEARCH THIS CLASS, SUBCLASS:
170.08, for a septic tank installed in a geographic feature.

533 Closure or valve controlled discharge:
This subclass is indented under subclass 532. Apparatus wherein the heavier constituent is discharged through a closure or valve controlled port.

SEE OR SEARCH THIS CLASS, SUBCLASS:
112+, for control by flow material level or fluid pressure responsive means.
312+, for similar structure in diverse separators.

SEE OR SEARCH CLASS:
251, Valves and Valve Actuation, subclass 144 for a valve mounted on a tank of general utility.

534 In sloping recess:
This subclass is indented under subclass 533. Apparatus in which the bottom wall of the separator has a portion with at least one sloping wall into which the heavier constituent drains.

535 Downstream of separator:
This subclass is indented under subclass 534. Apparatus in which the valve is spaced in a flow line for the heavier constituent and is downstream from the separator.

536 In side wall of separator:
This subclass is indented under subclass 533. Apparatus in which the closure or valve is in the side wall of the separator.

537 With discharge means for two or more lighter constituents:
This subclass is indented under subclass 533. Apparatus wherein the container has discharge means for two or more lighter constituents.

538 Lighter constituent trap:
This subclass is indented under subclass 513. Apparatus in which a lighter constituent is prevented from escaping from an outlet for a heavier constituent.

539 Gas vent or bypass:
This subclass is indented under subclass 538. Apparatus having a gas vent or bypass from the separating compartment of the tank.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 587+ for a tank with a gas vent and inlet and outlet.

540 With discharge port:
This subclass is indented under subclass 538. Apparatus with a discharge port for a lighter constituent.

SEE OR SEARCH THIS CLASS, SUBCLASS:
522 for a superposed compartments each with a lighter constituent discharge.
537 for discharge means for heavier and lighter constituents.

541 ADJUNCTS:
This subclass is indented under the class definition. Apparatus which aids a device of this class to perform a separating function.

542 MISCELLANEOUS:
This subclass is indented under the class definition. Subject matter not provided for elsewhere.

600 PROCESSES:
This subclass is indented under the class definition. Process by which a liquid (a) of no specific utility, (b) of general utility, or (c) water (either for use or discharge) is treated by mechanical, physical, or chemical means to perfect it for an intended use or render it less noxious.

(1) Note. A process of treating a specific liquid material, other than water, is provided for on the basis of the classification of that material. See section III, B, 2 of the main class definition. A process of treating a liquid for which there is no other classification, e.g., blood, per se, is provided for in this class. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

(2) Note. This subclass provides for a chemical treatment of a liquid if no chemical is added but constituents already in the liquid react as by heating. See subclasses 749+ for a process including addition of a chemical agent.

(3) Note. The processes provided for in subclasses 633, 634+, 656+, and 660+ utilize similar functions based on relative attraction or repellancy of materials and an explanation of the distinction between the concepts of subclasses 633 and 634+ on the one hand and of subclasses 656+ and 660+ on the other hand, is given in the definition of subclass 634.

601 Treatment by living organism:
This subclass is indented under subclass 600. Process in which the treatment is effected by an agent which has the ability to reproduce itself.

(1) Note. For purposes of this subclass, living organism includes animals, plants, (e.g., algae, etc.) and micro-organisms (e.g., bacteria, fungus, etc.) but not enzymes. The organism may reproduce either sexually, asexually, or by mechanical division (caused by external agents) and regeneration (e.g., layering or cloning, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

167.22, for a closed circulating system for an aquarium using a living organism.

922 for an oil spill clean up process which may use micro-organisms.

SEE OR SEARCH CLASS:

119, Animal Husbandry, subclass 260 for an aquarium having a biological-type liquid filter.

435, Chemistry: Molecular Biology and Microbiology, for a process of culturing micro-organisms and methods in general, using such micro-organisms.

588, Hazardous or Toxic Waste Destruction or Containment, subclass 158 for the containment of hazardous or toxic micro-organisms.

602 Including plant or animal of higher order:

This subclass is indented under subclass 601. Process in which the living organism is chlorophyl-bearing and vegetative or is sentient, i.e., fish, fowl, insect or mammal.

(1) Note. This subclass provides for processes in which the active agent is what is generally referred to as a higher animal or plant, normally visible to the naked eye and is distinguished from micro-organisms such as bacteria, fungi, and viruses and includes worms and algae. In general, the living organisms of this subclass are the same as those provided for in Classes 47, Plant Husbandry; and 119, Animal Husbandry, while the living organisms of Class 435 are excluded.

SEE OR SEARCH CLASS:

47, Plant Husbandry, for a process of culturing or growing plants in which a sludge or effluent of water treatment may be used.

119, Animal Husbandry, for a process of raising fish or worms in which a sludge or effluent of water treatment may be used.

603 Including collecting or storing gas (e.g., fuel, carbon monoxide, etc.):

This subclass is indented under subclass 601. Process in which a gas, either added or generated, is collected.

SEE OR SEARCH CLASS:

48, Gas: Heating and Illuminating, subclasses 197+ for a process for the manufacture of gas from sewage.

604 And reusing oxidant:

This subclass is indented under subclass 603. Process wherein the collected gas is an oxidizing agent which is reused or recirculated in the treatment.

605 Anaerobically, with subsequently aerobically treating liquid:

This subclass is indented under subclass 601. Process in which the mainstream is acted upon by living organisms which thrive in the absence of oxygen followed by a treatment of that stream with living organisms which thrive on oxygen.

(1) Note. Processes which include the sequential steps of aerobic treatment, anaerobic treatment and aerobic treatment of the mainstream belong in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

630 for an aerobic treatment, followed by an anaerobic treatment.

606 Adding enzyme or releasing same by treating micro-organism:

This subclass is indented under subclass 601. Process wherein an enzyme is added directly or released (through rupture of the living organism cells) to enhance treatment of the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

632 for process which treats liquid with an enzyme.

SEE OR SEARCH CLASS:

435, Chemistry: Molecular Biology and Microbiology, subclasses 41+ for a general chemical process using an enzyme; and subclasses 183+ for an enzyme, per se.

607 Dividing, treating, and recombining liquid:
This subclass is indented under subclass 601. Process in which the main process stream is divided into plural flow paths, at least one of which receives some treatment prior to subsequently being recombined.

SEE OR SEARCH THIS CLASS, SUBCLASS:

790 for a physical liquid separation process in which the liquid is divided and later recombined.

608 Regulating floating constituent:
This subclass is indented under subclass 601. Process in which solid constituents are separated by discriminating flotation, or floating constituents are treated or prevented from collecting, or flotation is prevented.

SEE OR SEARCH THIS CLASS, SUBCLASS:

703+, for a process of precipitation and flotation.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclasses 12.1+ for processes of that class including flotation.

241, Solid Material Comminution or Disintegration, especially subclasses 16 and 39 for processes and apparatus for breaking up solid accumulations.

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 98+ for colloid systems of continuous or semicontinuous solid phase with discontinuous liquid phase (flocs, coagulates) or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating); in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

609 Including dewatering sludge:
This subclass is indented under subclass 601. Process including a step of drying or compression of solids to lower the liquid content.

(1) Note. For placement in this subclass, a treatment by living organism step must be positively recited.

SEE OR SEARCH THIS CLASS, SUBCLASS:

702+, for dewatering of sludge by addition of a precipitant.

767+, for dewatering of sludge, per se, which sludge may have been derived by treatment by living organism.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses for processes and apparatus for drying sewage sludge which do not include decomposition of the sewage.

71, Chemistry: Fertilizers, subclasses 12+ for processes of making fertilizer from sewage which go beyond mere drying of the sludge.

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 98+ for colloid systems of continuous or semicontinuous solid phase with discontinuous liquid phase (flocs, coagulates) or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating); in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

610 Including adding ancillary growth medium for micro-organism:

This subclass is indented under subclass 601. Process in which a nutrient is added to promote multiplication of the living organism.

(1) Note. For purposes of this subclass, and addition of growth medium by mere recirculation of sludge is not considered ancillary.

SEE OR SEARCH CLASS:

435, Chemistry: Molecular Biology and Microbiology, particularly subclasses 243+ and 822+ for specific classes of micro-organisms and methods of culturing.

611 For or with specific micro-organism:

This subclass is indented under subclass 610. Process wherein a specific strain of micro-organism is named.

SEE OR SEARCH CLASS:

435, Chemistry: Molecular Biology and Microbiology, subclasses 822+ for specific micro-organisms and method of culturing them.

612 And regulating temperature during biological steps:

This subclass is indented under subclass 601. Process including a step of temperature control.

SEE OR SEARCH THIS CLASS, SUBCLASS:

603 for a process in which a generated gas is collected and which may include temperature regulation.

609 for a process of sludge dewatering including temperature regulation.

SEE OR SEARCH CLASS:

700, Data Processing: Generic Control Systems or Specific Applications, appropriate subclasses, especially subclasses 266 through 274 for chemical process control or monitoring system and subclasses 299-300 for temperature control.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 19+ for data processing in biological or biochemical applications, subclasses 22+ for data processing in chemical analysis, and subclasses 130+ for data processing in a generic temperature measuring system.

613 Digesting sludge:

This subclass is indented under subclass 612. Process in which fermentation of sludge is effected.

614 Controlling process in response to stream constituent or reactant concentration:

This subclass is indented under subclass 601. Process in which a probe or sensor conveys to an actuating means a change in or the existence of a predetermined parameter, of a condition in the liquid being treated and the actuating means varies, ceases, or initiates at least one element of a treatment.

(1) Note. The sensing of the condition may be prior to or sequent to the treatment and includes the condition of either influent or effluent.

(2) Note. The operation is “automatic” and requires action by the apparatus and does not include use of for example an overflow standpipe or a human attendant.

SEE OR SEARCH CLASS:

700, Data Processing: Generic Control Systems or Specific Applications, especially subclasses 266 through 274 for computerized control of a chemical process.

615 Utilizing contact surfaces supporting microorganism (e.g., trickling, filter, etc.):

This subclass is indented under subclass 601. Process wherein the liquid is treated with solid surfaces which support the living organisms.

SEE OR SEARCH THIS CLASS, SUBCLASS:

150+, for gas-liquid contact means of the trickling-filter type; see the search notes thereunder.

616 Particulate media:

This subclass is indented under subclass 615. Process wherein the contact surfaces are granular, or comprise a mass of small particles, e.g., sand, powder, etc.

617 In bed form:

This subclass is indented under subclass 616. Process wherein the particulate media is relatively closely packed in a dense mass rather than being dispersed through the liquid.

618 And rehabilitating or regenerating same:

This subclass is indented under subclass 617. Process wherein the particulate media is restored to the condition in which it was before the treatment process.

SEE OR SEARCH THIS CLASS, SUBCLASS:

791+, for a process of rehabilitating or regenerating a similar particulate bed used for filtering.

619 Rotating contactor:

This subclass is indented under subclass 615. Process wherein the contact surfaces are rotating contactors such as discs, drums, cylinders, brushes, etc.

620 Aerobic treatment:

This subclass is indented under subclass 601. Process wherein the liquid is acted upon by living organisms which thrive on oxygen.

SEE OR SEARCH THIS CLASS, SUBCLASS:

602 for aerobic treatment processes utilizing plants or animals.

604 for aerobic treatment processes wherein the gaseous oxidant employed or generated is collected and reused in the treatment.

606 for aerobic treatment processes by living organisms in conjuction with enzymes.

615 for aerobic treatment processes which utilize a contact surface.

621 Recirculating to prior step:

This subclass is indented under subclass 620. Process wherein a portion of the stream is withdrawn subsequent to the aerobic treatment step and returned thereto.

(1) Note. This subclass provides for recirculation of a portion of the stream without a separation of the constituents. Recirculation of a constituent after separation is provided for in an indented subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

194+, for apparatus including recirculating means.

603+, for collection and recirculation of a gaseous component to an aerobic treatment step.

622 Of separated liquid:

This subclass is indented under subclass 621. Process and wherein supernatant or filtrate is recirculated.

623 Of sludge or separated solid:

This subclass is indented under subclass 621. Process wherein sediment is recirculated.

(1) Note. Sludge includes solids separated by various methods and which retain considereable liquid, having a muddy or gelatinous texture.

SEE OR SEARCH THIS CLASS, SUBCLASS:

713 for a precipitation process including recirculation of separated solids.

624 And returning to or withdrawing from diverse treating zones:

This subclass is indented under subclass 623. Process including plural steps of sediment recirculation from or to different treating areas.

625 Treating outside mainstream:

This subclass is indented under subclass 623. Process wherein the sediment being recirculated is treated after removal from the process stream and prior to reintroduction into the process stream.

SEE OR SEARCH THIS CLASS, SUBCLASS:

710+, for a process of treating separated solids in a precipitating method.

626 To mainstream oxygenation (e.g., activated sludge, etc.):

This subclass is indented under subclass 623. Process in which the prior step comprises treatment with oxygen.

627 Utilizing specific oxidant other than air alone (e.g., oxygen-enriched air, ozone, peroxide, etc.):

This subclass is indented under subclass 626. Process wherein the oxygen-containing agent is a particulate oxidant (e.g., oxygen-enriched air, oxygen, ozone, hydrogen peroxide, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

721+, for a process involving oxidation in combination with precipitation.

758+, for a process involving chemical oxidation.

628 Utilizing mechanical aeration means (e.g., stirring):

This subclass is indented under subclass 626. Process wherein the oxygen is introduced into the liquid by disturging or agitating the liquid to more effectively expose its surface to the atmosphere.

(1) Note. This subclass provides for processes other than diffusing air under the surface of the liquid and includes methods of stirring the surface, pouring or squirting liquid into the air, among oth-

ers, to increase solution of air into the surface of the liquid.

(2) Note. A process utilizing a rotating surface such as a rotating contactor, disc, brush, drum, cylinder, etc., which supports the living organisms, and which obviously circulates and stirs the liquid, will not ordinarily be placed in this subclass, but will be provided for in subclass 619.

SEE OR SEARCH THIS CLASS, SUBCLASS:

619 for a process utilizing a rotating contact surface which may also stir the liquid.

926 for a collection of art disclosing the use of an oxidation ditch, sometimes called a carousel.

629 An internally circulating the liquid:

This subclass is indented under subclass 620. Process which includes a step of agitating or imparting movement of material within a vessel, other than mere flow through from inlet to outlet.

630 And anaerobic treatment:

This subclass is indented under subclass 620. Process wherein additionally the liquid is acted upon by living organisms which thrive in the absence of oxygen.

SEE OR SEARCH THIS CLASS, SUBCLASS:

605 for a liquid being acted upon by living organisms in any of the following sequences:

(a) aerobic - anaerobic - aerobic

(b) (2) anaerobic - aerobic - anaerobic

(c) (3) anaerobic - aerobic

631 And additional treating agent other than mere mechanical manipulation (e.g., chemical, sorption, etc.):

This subclass is indented under subclass 601. Process including a step of treating with an additional agent (e.g., chemical).

SEE OR SEARCH THIS CLASS, SUBCLASS:

606 for a process wherein the additional agent is an enzyme.

632 for a process of using an enzyme without a living organism.

749+, for a chemical treatment process.

632 Treating by enzyme:

This subclass is indented under subclass 600. Process in which the liquid is treated with a proteinaceous catalyst derived from a living organism.

(1) Note. An enzyme is generally specific in the chemical reaction it causes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

606 for a process wherein the liquid is treated with a living organism and an enzyme is added thereto or released from the organism to aid in the treatment.

SEE OR SEARCH CLASS:

588, Hazardous or Toxic Waste Destruction or Containment, subclasses 249 through 260 for the containment of hazardous or toxic micro-organisms.

633 Extracting utilizing solid solute:

This subclass is indented under subclass 600. Process in which a solid material is added to a liquid into a constituent of which it preferentially dissolves and in which the resulting solution is readily separable from other constituents of the original liquid.

(1) Note. Adding a solid inorganic salt to a water alcohol mixture with formation of a brine phase and an alcohol phase is exemplary of this process.

634 Liquid/liquid solvent or colloidal extraction or diffusing or passing through septum selective as to material of a component of liquid; such diffusing or passing being effected by other than only an ion exchange or sorption process:

This subclass is indented under subclass 600. Process in which either (a) a dissolved or suspended constituent of the liquid is preferen-

tially dissolved or dispersed into a second liquid, or (b) a constituent of the liquid is selectively allowed to migrate through a barrier.

(1) Note. The liquid/liquid extraction may be by direct contact of the liquids or through a permeable barrier (dialysis). While in the second situation (b of this definition) the barrier allows selective migration (is semipermeable), in liquid/liquid extraction, the barrier, per se, need not be semipermeable.

(2) Note. The constituent which transfers must be dissolved or colloidally suspended in the second liquid and not merely removed as a floated or precipitated solid.

(3) Note. No distinction is made as to the nature of the constituent which is removed; it may be considered a solute, solvent, or both, or additive, etc.

(4) Note. The mechanism by which the constituent is separated from the liquid through the membrane is more than mere microfiltration, being based on the materials of the liquid and the membrane, and is discussed in Kirk-Othmer Encyclopedia of Chemistry-Dialysis-Vol. 7; and Osmosis, Osmotic Pressure - Vol. 14.

(5) Note. The processes provided for in different subclasses of this class utilize similar functions based on relative attraction or repellancy of materials. See the notes below and the Search This Class, Subclass references for the distinction between the concepts. Processes of other subclasses require solid material as an agent (often granular or in divided form) which tends to trap or capture on its surface or within its cavities, a constituent to be removed from a liquid. See Search This Class, Subclass, below In this subclass (634) and that above it, processes which are directed to extraction utilize a liquid (or a solid which becomes liquid-the solute). In processes which are directed to diffusing through a septum, a constituent appears to become incorporated temporarily into the material of the septum (not merely at the surface or in cavities, but throughout) and is not retained but exudes from the downstream side of the septum. During the diffusion the material passed and the material of the septum appear to form a solid solution with a concentration gradiant along the path of diffusion. See the Search This Class, Subclass notes for provision for liquid/liquid chromatography. Filtration to an extremely fine degree, e.g., ultra- or hyper-filtration, where separation is achieved by using an element with interstices so small that it prevents passage of very small particles (even down to colloidal size) is provided for elsewhere see Search This Class, Subclass, below. Some documents refer to dialysis and osmosis (reverse) as ultrafiltration or hyperfiltration. When there is confusion or doubt whether hyperfiltration or ultrafiltration is due to pore or interstices size or attraction-repulsion due to chemical nature of a membrane or septum, placement of the document should be in the appropriate first appearing subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

635 for liquid/liquid chromatography, because a liquid/liquid solvent or colloidal extraction function is performed and this appears before chromatography in the schedule.

656+, 660+ require solid material as an agent (often granular or in divided form) which tends to trap or capture on its surface or within its cavities, a constituent to be removed from a liquid. The method of subclasses 656+ is a species of the art of subclass 660 and in both situations the agent utilized remains a solid and retains the constituent which is removed.

767 for filtration to an extremely fine degree, e.g., ultra- or hyper-filtration, where separation is achieved by using an element with interstices so small that it prevents passage of very small particles (even down to colloidal size).

635 Liquid/liquid or gel type (i.e., jelly like) chromatography:

This subclass is indented under subclass 634. Process in which the extracting liquid is relatively immobile and an equilibrium of the dissolution or suspension of a constituent between the two liquids is set up such that the constituent moves through the extracting liquid at a slower rate than the movement of the treated liquid and said constituent tends to concentrate in a specific volume of the extracting liquid.

(1) Note. See subclasses 656+ for chromatography using a solid sorbent and note the distinction between gel-type chromatography of this subclass and chromatography using a solid, e.g., silica gel found in subclasses 656+. For the purpose of this subclass, gel type includes only those suspensions which have a liquid or jellylike texture or property and does not include material of a solid character as silica gel. The gel or liquid stationary phase may be (and generally is) associated with a solid which tends to immobilize it, usually being coated on small particles of such a solid to increase surface area.

636 Including cleaning or sterilizing of apparatus:

This subclass is indented under subclass 634. Process which includes a positive step of either removing accumulated undesired material from the apparatus or destroying a pathogenic micro-organism.

(1) Note. The continuous removal of a more concentrated feed stream apart from the processed effluent is not considered cleaning for purposes of this class.

(2) Note. An example of undesired material may be a buildup of retentate on the upstream side of a membrane serving to pass desired constituents.

637 Including regulating pressure to control constituent gradient at membrane or to prevent rupture of membrane:

This subclass is indented under subclass 634. Process in which the force driving the liquid to be treated or a counter force of an effluent is controlled or varied such that (a) the concentration of a constituent in adjacent layers is maintained at a desirable level, or (b) the burst strength of a septum is not exceeded.

(1) Note. Some examples of the art classifiable in this subclass are pulsating or oscillating the feed in a dialysis method to prevent buildup of a rejected constituent on the upstream side and partially equalizing of the pressure on the downstream side of a reverse osmosis membrane.

SEE OR SEARCH CLASS:

700, Data Processing: Generic Control Systems or Specific Applications, subclasses 266 through 274 for a computerized monitoring of a chemical process.

638 Including ion exchange or other chemical reaction:

This subclass is indented under subclass 634. Process in which a constituent of the liquid takes up, gives away, or replaces a chemical moiety such that a different compound is formed.

(1) Note. A process in which a dissolved constituent, after having migrated into an extracting liquid or through a septum, is precipitated is classifiable here but a process in which precipitation is caused by addition of a second liquid without extractive solution, e.g., adding a halide solution to a silver salt solution to cause precipitation, is classifiable in subclass 702.

(2) Note. Adding a pH or surfactant agent is not considered to cause a chemical reaction and such a process is classifiable in subclass 639 infra.

SEE OR SEARCH THIS CLASS, SUBCLASS:

660 for an ion exchange process, per se.

639 Including prior use of additive (e.g., changing ph, etc.):
This subclass is indented under subclass 634. Process in which a nonreactive material is added to the liquid before the extraction or diffusion.

(1) Note. The additive generally aids or perfects the extraction or diffusion, and may include as an example, a flocculant to prevent fouling of a membrane.

SEE OR SEARCH THIS CLASS, SUBCLASS:
638 for a process in which the additive chemically reacts with a component of the liquid.

640 Passing through membrane in vapor phase:
This subclass is indented under subclass 634. Process in which a constituent of the liquid diffuses through a septum and exists in the gaseous state.

SEE OR SEARCH CLASS:
95, Gas Separation: Processes, subclass 46 for degasification of a liquid by selective diffusion of gases through a substantially solid barrier, in which the constituent that is removed is initially present as a gas in the liquid. Class 210 takes processes of separating a constituent through a membrane or septum wherein the constituent is not initially present as a gas in the liquid and passes through the membrane or septum in vapor phase.
203, Distillation: Processes, Separatory, for a process in which a constituent of a liquid is vaporized and condensed to separate it from the liquid mixture. If the phase change occurs during diffusion through a septum, the process is classifiable here.

641 Utilizing plural diverse membranes:
This subclass is indented under subclass 634. Process in which at least two membranes of differing constitution are used.

(1) Note. The differing constitution may be different materials or the same material with identified different internal structure (e.g., different permeability, degrees of cross-linking, specified methods of making, etc.).

642 Extracting water from brine utilizing liquid/liquid solvent or colloidal extraction:
This subclass is indented under subclass 634. Process in which a liquid selectively dissolves water from a salt-water mixture, resulting in (a) a salt-water mixture, more concentrated in salt, and (b) a water-liquid mixture allowing the two mixtures to be separated.

SEE OR SEARCH CLASS:
62, Refrigeration, subclasses 532+ for a process of desalinating water by freezing.

643 Utilizing liquid membrane (e.g., emulsion) in liquid/liquid solvent or colloidal extraction:
This subclass is indented under subclass 634. Process in which a liquid serves as a selective septum through which a constituent diffuses, thereby being separated from the liquid being treated.

(1) Note. In many of the processes of this subclass the septum is a thin film, sometimes the dispersand of an emulsion and the diffused constituent collects in fine droplets of the dispersed phase.

(2) Note. A common use of this technique is to extract water from brine and such a process is classifiable in subclass 642.

644 Diffusing or passing through septum selective as to material of a component in liquid/liquid solvent or colloidal extraction:
This subclass is indented under subclass 634. Process in which a constituent of the liquid being treated diffuses through a material which acts as a barrier to other constituents of the liquid and a constituent is preferentially dissolved in a second liquid usually contacting the other side of the barrier material.

(1) Note. The selectivity of the diffusion and extraction of constituents may be due to the combination of the septum and extracting (dialysing) liquid.

(2) Note. The septum is referred to as a membrane and is generally a thin film or skinlike material and may swell or soften but not dissolve in certain liquids.

(3) Note. The mechanism by which the constituent is separated from the liquid through the membrane is more than mere microfiltration, being based on the materials of the liquid and the membrane and is discussed in Kirk-Othmer Encyclopedia of Chemistry-dialysis-Vol. 7; and Osmosis, Osmotic Pressure and Reverse Osmosis-Vol. 14.

(4) Note. While most of the disclosures in this subclass are directed to process in which the same constituent passes through the barrier into the second liquid, a claim to a two-step process which includes liquid/liquid extraction and selective diffusion through a membrane will be placed here.

645 Biological fluid (e.g., blood, urine, etc.):
This subclass is indented under subclass 644. Process in which the liquid treated is from an animal or contains living organisms (e.g., ferment).

SEE OR SEARCH CLASS:
128, Surgery, for a method of treating a biological fluid and a significant step of withdrawing from, or returning to, the body such a fluid.
260, Chemistry of Carbon Compounds, appropriate subclass for a method of obtaining an organic compound from a biological fluid.
424, Drug, Bio-Affecting and Body Treating Compositions, for a composition comprising a biological fluid for treating a body and a process of making such a composition.
436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for a method of testing or analysing a biological fluid.

646 Hemodialysis:
This subclass is indented under subclass 645. Process in which blood is treated or purified.

(1) Note. The process generally duplicates the function of the kidney.

SEE OR SEARCH CLASS:
128, Surgery, for a method of treating blood and a significant step of withdrawing from or returning to a living body the blood being treated.
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 44+ for blood oxygenating apparatus; however, combined blood purifying and oxygenating apparatus is in this class (210).
435, Chemistry: Molecular Biology and Microbiology, subclass 2 for a process of oxygenating blood, but the combined process of purifying and oxygenating blood is classifiable in this class (210).

647 Maintaining critical concentration(s):
This subclass is indented under subclass 646. Process in which the amount of at least one constituent of the treated fluid is kept at or between predetermined limits.

(1) Note. The concentration of either the constituent it is desired to remove or of some other constituent is included, e.g., maintaining the potassium level in an artificial kidney process.

648 Including regenerating or rehabilitating the extracting liquid in liquid/liquid solvent or colloidal extraction:
This subclass is indented under subclass 644. Process in which the liquid into which a constituent has migrated from the treated liquid is itself treated to remove such constituent and thereby placed in condition for reuse.

(1) Note. The extracting liquid is sometimes referred to as the dialysizing liquid and usually is recycled.

649 Diffusing or passing through septum selective as to material of a component of liquid:
This subclass is indented under subclass 634. Process in which a constituent of a liquid migrates through a skinlike partition as set

forth in the Glossary under Semipermeable membrane.

(1) Note. The process provided for in this subclass is more than filtration or screening to a very fine stage, but includes diffusion of usually a solvent through a material based on the chemical potential of the various materials of the liquid and membrane. A rather complete treatment of the process is given in Kirk-Othmer Encyclopedia of Chemical Technology-Dialysis-Vol. 7 pp. 1-21; and Osmosis, Osmotic Pressure and Reverse Osmosis-Vol. 14, pp. 345-355.

650 Filtering through membrane (e.g., ultrafiltration):
This subclass is indented under subclass 649. Process in which a liquid is passed through a skinlike barrier which serves to retain dissolved or colloidally suspended matter, passing only those constituents which are, per se, fluid, e.g., solvent.

(1) Note. For placement in this subclass, some, but not all, dissolved matter must be retained, e.g., a solute such as protein, soluble synthetic resins or starch may be retained while ionized salts may pass through the membrane. Retention of ionized material is provided for in indented subclasses 652+.

651 Removing specified material:
This subclass is indented under subclass 650. Process in which a constituent removed from the liquid is positively identified.

(1) Note. The material itself rather than a characteristic must be identified. For example, oily material, and food waste, or organic are not considered to be identified material; however, protein and named bacteria are considered to be specified material.

652 Hyperfiltration (e.g., reverse osmosis, etc.):
This subclass is indented under subclass 650. Process in which dissolved material (i.e., including ionic) is removed from a liquid.

(1) Note. Reverse osmosis is the usual process for which this subclass provides. See OSMOSIS under the GLOSSARY.

653 Utilizing specified membrane material:
This subclass is indented under subclass 652. Process reciting named membrane material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
641 for a process using diverse membranes.

654 Synthetic resin:
This subclass is indented under subclass 653. Process in which the membrane is constructed of a manufactured polymeric material exhibiting properties similar to those of a natural resin (e.g., film forming).

(1) Note. Synthetic resins, per se, are classified in Class 260, Chemistry of Carbon Compounds, subclasses 201+ (including the 520 series of classes).

655 Cellulosic:
This subclass is indented under subclass 653. Process in which the membrane is constituted of a naturally occurring polymeric carbohydrate, usually derived from wood, cotton, or flax.

656 Chromatography:
This subclass is indented under subclass 600. Process in which a solid sorbent competes in affinity with a relatively moving carrier liquid or solvent for a constituent such that the constituent is moved through the sorbent at a rate slower than the liquid and determined by the equilibrium or partition coefficient of the liquid-sorbent combination.

(1) Note. The process may separate more than one constituent with different partition coefficients, selectively spacing said constituents in consequence of the differing equilibria in the constituent liquid-sorbent combinations.

(2) Note. The processes provided for in subclasses 633, 634+, 656+, and 660+ utilize similar functions based on relative attraction or repellancy of materials and

an explanation of the distinction between the concepts of subclasses 633 and 634+ on the one hand and subclasses 656+ and 660+ on the other hand, is given in the definition of subclass 634.

(3) Note. A process in which a liquid or organic gel acts as a sorbent is a liquid/liquid solvent extraction process and a patent to such a process will be placed in subclass 635. The organic gels exhibit a resilient or plastic property indicative of the underlying liquid nature. Silica gel (inorganic) which has the characteristic of a solid granular mass is not a gel-type sorbent for that subclass (635) and a process using silica gel is classifiable in this or an indented subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

635 for a liquid/liquid or gel-type chromatography, such as partition chromatography process, and see (2) Note supra.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 19.02, 23.35+ and 61.43 for a test involving chromatography.

95, Gas Separation: Processes, subclasses 82+ for processes of gas separation using chromatography.

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a composition comprising a catalyst or sorbent, per se.

657 Utilizing rotating column:

This subclass is indented under subclass 656. Process in which the sorbent is contained in a tube or column which is revolved about a point.

(1) Note. The point about which the column rotates may lie on or be remote from an axis of the column.

658 Utilizing paper or thin layer plate:

This subclass is indented under subclass 656. Process in which the sorbent comprises a fibrous web or a thin coating or sorptive material on a flat substrate and wherein separation occurs along the plane of the web or coating.

659 Including liquid flow diversion:

This subclass is indented under subclass 656. Process in which the liquid being treated follows different flow paths, exteriorly of a column, in either a simultaneous or alternative manner.

660 Ion exchange or selective sorption:

This subclass is indented under subclass 600. Process in which the liquid is contacted with a solid insoluble material which (a) captures from the liquid a dissociated charged chemical moiety and releases to the liquid a different charged moiety of the same polarity by dissociation thereby effecting a chemical replacement reaction, (b) holds by attraction on its surface or within its pores a constituent dissolved or colloidally dispersed in the liquid, or (c) preferentially attracts one of two or more liquids in contact with each other.

(1) Note. The processes provided for in subclasses 633, 634+, 656+, and 660+ utilize similar functions based on relative attraction or repellancy of materials and an explanation of the distinction between the concepts of subclasses 633 and 634+ on the one hand and of subclasses 656+ and 660+ on the other hand, is given in the definition of subclass 634.

(2) Note. The ion exchanger or sorbent (separatory material) is usually granular or porous for more surface contact and the preferential attraction may be exhibited by sorption of the entire liquid with preferential release of the constituents.

(3) Note. Processes directed to the production of a particular compound or composition (including solutions of either the compound or composition in water), or directed to the purification thereof are classified with the particular compound or composition. Processes wherein all claims are limited to the deposition of specific materials on ion exchangers or sorbents with subsequent recovery of the specific materials are classified with the materials so operated upon.

(4) Note. The line between this class (210) and Class 521, Synthetic Resins or Natu-

ral Rubbers is as follows: Where a patent contains a claim to an ion exchange synthetic resin and also a claim to a process involving the mere treatment of a liquid, which process is classifiable in Class 210 [see (2) Note], the patent is classifiable in Class 521 and cross-referenced to this class (210). If all the claims are drawn to a process of treating liquids with ion exchange resins or any claim includes a significant liquid treating step the patent is classified in this class (210) and cross-referenced to Class 521 when necessary. The presence or absence of a significant step of regenerating the resin in a process of treating a liquid does not effect this line.

SEE OR SEARCH THIS CLASS, SUBCLASS:

189 for separatory apparatus including plural chambers with movement of granules therebetween.

190 for separatory apparatus with external means to supply regenerating medium thereto.

263+, for a particulate material-type separator.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, subclasses 90+ for processes of gas separation using solid sorbents.

134, Cleaning and Liquid Contact With Solids, subclass 25 for processes of treating solids in bulk.

252, Compositions, subclass 179 for a water insoluble base exchange agent containing water treating compositions.

423, Chemistry of Inorganic Compounds, appropriate subclasses for a process employing a chemical reaction to produce inorganic compounds which may be useful in ion exchange.

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for composition comprising a catalyst or sorbent, per se, and see especially subclasses 60+ and 400+ for a sorbent which may be used in purifying liquid.

521, Synthetic Resins or Natural Rubbers, for a resinous ion exchanger composition, and especially subclass 26 for a regeneration process, per se.

554, Organic Compounds, subclasses 191+ and 708 for adsorption processes involving organic materials, see (3) Note.

661 By passing through suspended bed:

This subclass is indented under subclass 660. Process wherein the liquid being treated is passed through a mass of particulate separatory material suspended within a definite zone by the velocity of the liquid in a direction opposite to the force of gravity (e.g., a fluidized bed).

SEE OR SEARCH THIS CLASS, SUBCLASS:

715 for passing a liquid through a sludge or floc blanket.

662 And liquid testing or volume measuring:

This subclass is indented under subclass 660. Process including testing a liquid to determine its chemical composition or measuring its volume.

SEE OR SEARCH THIS CLASS, SUBCLASS:

88+, for meter controlled cyclic separatory systems.

96+, for constituent mixture variation responsive separatory apparatus.

98+, for fluid current controlled cyclic separatory systems.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 194+ for volume or rate-of-flow meters.

436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for chemical analytical methods.

663 Including diverse separating or treating of liquid:

This subclass is indented under subclass 660. Process in which the liquid being treated is subjected to an additional operation other than ion exchange or sorption, which operation (a) removes constituents from the liquid, or (b) neutralizes or inhibits the effects of constituents in the liquid.

(1) Note. The additional treatment may be prior to, or subsequent to the ion exchange or sorption treatment.

(2) Note. Plural ion exchange or sorption treatments, or ion exchange in combination with sorption treatments, are not classified in this subclass unless additional other treatments are also provided.

(3) Note. A process of retaining exchange or sorbent material by screening subsequent to agitation of loose such material in a liquid is not considered to be a separate treating.

SEE OR SEARCH THIS CLASS, SUBCLASS:

638 for an ion exchange process combined with liquid/liquid separation or with use of a semipermeable membrane.

664 By distilling or degassing:

This subclass is indented under subclass 663. Process in which a constituent is removed from the liquid by converting part of the liquid to a gaseous or vapor phase in which the gas or vapor is not sorbed nor chemically changed to a nongaseous element or compound.

(1) Note. Included are processes in which an initially dissolved gas in evolved or liquid is vaporized, leaving behind a nonvapor constituent and the vapor is then condensed.

(2) Note. The distillation or degassing treatment must be applied to the liquid undergoing treatment, not to an additional liquid (e.g., a regenerant) which may come in contact with the ion exchanger or sorbent.

SEE OR SEARCH THIS CLASS, SUBCLASS:

188 for apparatus of this class (210) combined with means to separate a gas evolved during a treating operation.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, subclasses 241+ for processes to remove gas initially present in a liquid mixture.

203, Distillation: Processes, Separatory, for liquid purification involving distillation, per se.

665 By making an insoluable substance or accreting suspended constituents:

This subclass is indented under subclass 663. Process in which a liquid is treated by a chemical or physical agent to cause a dissolved constituent to separate from the solvent or to cause a constituent, dispersed in such a finely divided state that it is not filterable or settleable, to agglomerate, coagulate, coalesce, or flocculate.

(1) Note. This subclass requires a positive step to cause the precipitation or accretion, and merely allowing suspended material to settle will not warrant classification here, but is provided for in subclass 663.

(2) Note. Precipitation may be either by chemical reaction, (e.g., of silver by addition of sodium chloride, by salting out or addition of alcohol to sugar solution, etc.) or by physical means as agitation, heat, etc.

(3) Note. A process using a single inorganic flocculant or precipitant is classified in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

601 especially 626 and 631, for a process utilizing a living organism and in which flocculation may occur.

695 for a process utilizing magnetic energy and which may precipitate or flocculate material in a liquid.

702 for a liquid purification or separation process using precipitation or flocculation, per se.

800+, for a process of separation including only settling of suspended material.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclasses 295+ and 313+ for physical processes of crystallizing or agglomerating a specific nonmetallic element or an inorganic compound.

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.

260, Chemistry of Carbon Compounds, appropriate subclasses, and subclasses 701+ and 704+ for a process of obtaining or purifying a specific organic compound.

423, Chemistry of Inorganic Compounds, appropriate subclasses for a chemical process of crystallizing a specific nonmetallic element or an inorganic compound.

666 Utilizing organic agent:

This subclass is indented under subclass 665. Process in which a carbon compound is added to the liquid to cause precipitation or accretion of a dissolved or suspended material.

(1) Note. The carbon compound is one that is classifiable in Class 260, Chemistry of Carbon Compounds, and does not include metal carbonates or cyanides.

667 Utilizing aluminum, calcium, or iron containing agent:

This subclass is indented under subclass 665. Process in which an element of atomic number 13, 20, or 26 or an inorganic compound of such an element is added to the liquid to cause precipitation or accretion of a dissolved or suspended material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

666 for a similar process using an organic compound of aluminum, calcium, or iron.

668 By chemically modifying or inhibiting dispersed constituent:

This subclass is indented under subclass 663. Process in which the additional treatment includes rendering constituents of the liquid unobnoxious in a comtemplated use of the liquid, by chemical destruction or neutralization of the component or by chemical inhibition of the effects of the component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

673 for a process of regeneration which includes application of a destructive agent to the ion exchanger or sorbent.

749 for a process including destruction or inhibition as a chemical treatment, especially subclass 764 for destruction of micro-organisms.

SEE OR SEARCH CLASS:

588, Hazardous or Toxic Waste Destruction or Containment, appropriate subclasses for the destruction or containment of hazardous or toxic waste by way or chemically modifying or inhibiting dispersed constituent(s). Class 210 provides for the purification of water (liquids) as useful product even though hazardous or toxic waste may be removed from or destroyed in the water (liquids).

669 Prior to ion exchange or sorption:

This subclass is indented under subclass 663. Process in which the additional separation or treatment is carried out before contact with an ion exchanger or sorbent.

670 Including rehabilitating or regenerating exchange material or sorbent:

This subclass is indented under subclass 660. Process including restoring the separatory material to the condition in which it was before the separatory process.

SEE OR SEARCH CLASS:

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Composi-

tions, and Loose Metal Particulate Mixtures, subclasses 101+ for processes of chemical leaching peculiar to hydrometallurgy.

134, Cleaning and Liquid Contact With Solids, subclasses 10+ for a process of regeneration or purification of the agent used in a process there provided for.

252, Compositions, subclasses 411+ for a process of regenerating solid adsorbents.

423, Chemistry of Inorganic Compounds, appropriate subclasses for extracting, leaching, or dissolving processes therein provided for; and subclass 658.5 for extracting, leaching, or dissolving processes not otherwise provided for.

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, subclasses 20+ for processes of regenerating or rehabilitating catalyst or sorbent.

521, Synthetic Resins or Natural Rubbers, subclass 26 for a process of regenerating ion exchange polymers.

671 Of oil sorbent material:

This subclass is indented under subclass 670. Process wherein the separatory material is a sorbent having oil deposited thereon or therein as a result of contact between the sorbent and the liquid undergoing treatment.

SEE OR SEARCH THIS CLASS, SUBCLASS:

680 for removal of oil from a liquid with a sorbent material which is associated with an inert material.

693 for removal of oil from an aqueous stream using a synthetic resin.

672 Fractional, selective, or partial type:

This subclass is indented under subclass 670. Process in which only a portion of a static body of ion exchange or sorbent material is regenerated, or parts of the body are regenerated to different levels of activity; in which two or more components of the original liquid, deposited on the ion exchanger or sorbent, are removed separately from the insoluble material by an eluant and collected in fractions containing varying proportions of the components; or in which two or more components are removed separately by the use of an eluant specific for the removal of each, e.g., selective elution.

SEE OR SEARCH THIS CLASS, SUBCLASS:

656 for a process involving chromatography.

676 for a process in which the separatory material is regenerated in a continuous cyclic process; i.e., portions are sequentially regenerated.

SEE OR SEARCH CLASS:

23, Chemistry of Physical Processes, subclasses 296+ for selective crystallization.

73, Measuring and Testing, subclasses 23.35+ for gas analysis by chromatography; and subclasses 863+ for gas samplers.

673 Utilizing gas, water or chemical oxidizing or reducing agent:

This subclass is indented under subclass 670. Process wherein the separatory material is restored to use by contact by a gas (including drying) except to merely loosen a bed, or by water, or by a chemical agent which oxidizes or reduces the sorbed constituent.

(1) Note. Mere backwashing with water, without the water causing a regeneration of the separatory material, is not intended to be included in this subclass. Elution by a solvent, except water, is not proper for this subclass, see subclass 674.

SEE OR SEARCH THIS CLASS, SUBCLASS:

668 for destruction or inhibition of a dispersed constituent.

764 for a chemical treatment involving destruction of micro-organisms.

SEE OR SEARCH CLASS:

208, Mineral Oils: Processes and Products, subclass 310 for distillation of mineral oils from adsorbents.

674 Utilizing organic regenerant:
This subclass is indented under subclass 670. Process in which the separatory material is contacted with a carbon compound which serves to restore it by elution or exchange.

(1) Note. The carbon compound is one that is classifiable in Class 260, Chemistry of Carbon Compounds, and does not include metal carbonates or cyanides.

675 Rehabilitating or regenerating in diverse zone or chamber:
This subclass is indented under subclass 670. Process wherein the ion exchange or sorbent material is conveyed out of a liquid treating zone into a rehabilitation zone.

SEE OR SEARCH THIS CLASS, SUBCLASS:
31 for processes of fractional or selective rehabilitation of static beds.
189 for apparatus having means for moving granules between plural chambers.

676 Continuous cyclic process:
This subclass is indented under subclass 675. Process in which portions of the separatory material are sequentially conveyed from, restored and returned to the treating zone in a repetitive mode, with some part of the separatory material treating liquid while another part is concurrently being regenerated.

677 Using conserved or recirculated fluid:
This subclass is indented under subclass 670. Process in which a liquid which has once been contacted with the separatory material is again contacted with the same or a different separatory material at a different step in the treating-regenerating cycle.

(1) Note. The second contacting must perform the restoration of separatory material and not further treat the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
194+, for separatory apparatus including means to recirculate a constituent.

678 Including liquid flow direction change:
This subclass is indented under subclass 670. Process including a flow of fluid through the separatory material in a direction different from the flow of liquid during the separating treatment.

SEE OR SEARCH THIS CLASS, SUBCLASS:
275+, for backwash or blowback means combined with a particular material-type separator.
420+, for a filter with valve means providing selective directive flow relative to the filter.

679 Utilizing exchange or sorbent material associated with inert material:
This subclass is indented under subclass 660. Process including passing a liquid through ion exchange or sorbent material which is mixed with, coated on, or impregnated into inert material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
504 for a coated or impregnated filter material having diverse constituents.
506 for coated or impregnated filter materials.

680 Including oil sorbent:
This subclass is indented under subclass 679. Process wherein the separatory material comprises a sorbent which has an affinity for oil.

SEE OR SEARCH THIS CLASS, SUBCLASS:
671 for rehabilitating an oil sorbent material.
693 for removing an oil from an aqueous stream with a synthetic resin.

681 Removing ions:
This subclass is indented under subclass 660. Process in which a constituent removed comprises a dissociated charged chemical moiety.

682 Radioactive:
This subclass is indented under subclass 681. Process in which the ion removed contains an atom the nucleus of which emits subatomic

particles or rays and changes in either atomic weight or number.

(1) Note. Most of the radioactive ions comprise the actinide or lanthanide series of elements.

683 Anions:
This subclass is indented under subclass 681. Process wherein the contituent is negatively charged.

684 Metal complexed (e.g., chromate, ferricyanide, chlorplatinate, etc.):
This subclass is indented under subclass 683. Process in which the ion comprises a metal atom chemically bound with nonmetal(s).

685 Including cation:
This subclass is indented under subclass 683. Process including removing a positively charged constituent from the liquid being treated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
681 687, or 688, for a process involving removal of cations.

686 Utilizing mixed bed or amphoteric material:
This subclass is indented under subclass 685. Process wherein the separatory material is (a) a mixture of distinct cation exchanging particles and anion exchanging particles, or (b) a single material exhibiting both cation exchanging and anion exchanging properties.

687 Calcium or magnesium (e.g., hardness, water softening, etc.):
This subclass is indented under subclass 681. Process wherein the ion is of a Group IIA element with atomic number 12 or 20.

688 Heavy metal:
This subclass is indented under subclass 681. Process wherein the constituent is a positively charged ion of a metal whose specific gravity is greater than four.

689 Sorbing water from diverse liquid:
This subclass is indented under subclass 660. Process in which the liquid being treated comprises water in mixture with a second liquid and water is retained by the separatory material.

690 Sorbing organic constituent:
This subclass is indented under subclass 660. Process in which the constituent retained by the separatory material comprises a carbon compound.

(1) Note. The carbon compounds that are considered organic are those classifiable in Class 260, Chemistry of Carbon Compounds, and do not include metal cyanides or carbonates.

691 From aqueous material:
This subclass is indented under subclass 690. Process in which the liquid from which the organic constituent is sorbed comprises water.

(1) Note. The liquid may be considered as a functional or known liquid other than water but contains a substantial amount of water (e.g., blood, sap, concentrated aqueous solution, etc.).

SEE OR SEARCH CLASS:
127, Sugar, Starch, and Carbohydrates, subclasses 49 and 55 for adsorption processes applied to sugar solutions.

692 Utilizing synthetic resin:
This subclass is indented under subclass 691. Process wherein the separatory material comprises a manufactured polymeric material exhibiting properties similar to those of a natural resin (e.g., film forming).

(1) Note. Synthetic resins, per se, are classifiable in the 520 series of classes.

693 Oil removed:
This subclass is indented under subclass 692. Process wherein the organic constituent removed from the liquid is an oil.

SEE OR SEARCH THIS CLASS, SUBCLASS:
671 for rehabilitating an oil sorbent material, combined with a sorbing step.
680 for removal of oil from a liquid with a sorbent material which is associated with an inert material.

694 Utilizing activated carbon:

This subclass is indented under subclass 691. Process in which the sorbent comprises the element of atomic number 6 in a highly porous state.

(1) Note. The sorbent is also known as charcoal and can be produced by pyrolysis, or carbonizing often with subsequent treatment as by steam or carbon dioxide.

695 Using magnetic force:

This subclass is indented under subclass 600. Process which includes the use of a magnetic field or of magnetic material to achieve purification or separation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

222+, for apparatus including magnetic separation means.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, particularly subclasses 155+ for the production of a compound or element by chemical reaction brought about by electrical or wave energy in a magnetic field; subclasses 157.15+ for processes of treating materials involving a chemical reaction brought about by wave energy; and subclasses 554+ for magnetic treatment, per se, when some effect other than mere separation is desired or produced or for simultaneous electrical and magnetic liquid separation which does not result in the production of a compound or element by chemical reaction brought about by electrical or wave energy in a magnetic field.

209, Classifying, Separating, and Assorting Solids, subclass 29 for a process of separating solids while in a fluid suspension.

696 Preventing, decreasing, or delaying precipitation, coagulation or flocculation:

This subclass is indented under subclass 600. Process in which ions or solute are maintained in solution or their separation is impeded, or in which the gathering together of suspended solids (including colloids) is impeded.

(1) Note. A claim to a process for preventing scale formation by precipitation or flocculation, etc., in a prior step or up stream in a system is not proper for this subclass and should be searched in subclass 702 infra.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclass 5 for flocculation or deflocculation there provided for.

252, Compositions, subclasses 175+ for a scale inhibiting composition; subclasses 189+ for CO, S, negative element, or acid, bindant containing compositions; subclass 193 for ammonia, alkali or base, bindant containing compositions; and subclass 363.5 for solids with solution or dispersion aid.

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 31+ for colloid systems of colloid-sized solid or semi-solid phase dispersed in primarily organic continuous liquid phase, subclasses 38+ for colloid systems of colloid-sized bituminous, coal, or Carbon phase dispersed in aqueous continuous liquid phase, subclasses 77+ for colloid systems of colloid-sized solid phase dispersed in aqueous continuous liquid phase; or agents for such systems or making or stabilizing such systems or agents; subclasses 113 for compositions for or subcombination compositions for or breaking of or inhibiting of gelling, flocculating, or coagulating colloid systems; in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing

through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

697 Utilizing inorganic phosphorus agent:
This subclass is indented under subclass 696. Process in which the solution or suspension is maintained or the gathering together of particles is impeded by use of an inorganic compound which includes phosphorus.

(1) Note. Search this class subclass for a process using inorganic compounds or compositions including metaphosphate, polyphasphate or P_2O_5 radicals.

698 Utilizing organic agent:
This subclass is indented under subclass 696. Process in which the solution or suspension is maintained or the gathering together of particles is impeded by use of a carbon compound.

(1) Note. The carbon compounds are those classifiable in Class 260, Chemistry of Carbon Compounds, and do not include metal cyanides or carbonates.

699 Phosphorus containing:
This subclass is indented under subclass 698. Process wherein the organic compound contains phosphorus.

700 Nitrogen containing:
This subclass is indented under subclass 699. Process wherein the organic compound also includes nitrogen.

(1) Note. Search this subclass for a process using aminophosphonic acids to prevent precipitation or agglomeration.

701 Acrylic polymer:
This subclass is indented under subclass 698. Process wherein the organic compound contains recurring units formed by the addition reaction of acrylic acid, alpha-substituted acrylic acid or functional deriatives of such acids.

(1) Note. The functional derivatives include the salts, esters, nitriles, amides, acyl halides, and anhydrides of the acids. The compound may include units of other monomers such as, e.g., stryrene or butadiene.

702 Making an insoluable substance or accreting suspended constituents:
This subclass is indented under subclass 600. Process in which a liquid is treated by a chemical or physical agent to cause a dissolved constituent to separate from the solvent or to cause a constituent, dispersed in such a finely divided state that it is not filterable or settleable, to agglomerate, coagulate, coalesce, or flocculate.

(1) Note. This and indented subclasses require a positive step to cause the precipitation or accretion, and merely allowing suspended material to settle will not warrant classification here, but is provided for in subclasses 800+.

(2) Note. Precipitation may be either by chemical reaction (e.g., of silver by addition of sodium chloride, by salting out or addition of alcohol to sugar solution, etc.), or by physical means as agitation, heat, etc.

(3) Note. A process using a single inorganic flocculant or precipitant is classified in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
631 for a process using a living organism and which may include a precipitation or flocculating step.

695 for a process utilizing magnetic energy and which may precipitate or flocculate material in a liquid.

800+, for a process of separation including only settling of suspended material.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclasses 295+ and 313+ for physical processes of crystallizing or agglomerating a specific nonmetallic element or an inorganic compound.

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.

260, Chemistry of Carbon Compounds, appropriate subclasses, and subclasses 701+ and 704+ for a process of obtaining or purifying a specific organic compound.

423, Chemistry of Inorganic Compounds, appropriate subclasses for a chemical process of crystallizing a specific nonmetallic element or an inorganic compound.

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for subject matter relating to: colloid systems (such as sols*, emulsions, dispersions, foams, aerosols, smokes, gels, or pastes) or wetting agents (such as leveling, penetrating, or spreading); subcombination compositions of colloid systems containing at least an agent specialized and designed for or peculiar to use in making or stabilizing colloid systems; compositions and subcombination compositions specialized and designed for or peculiar to use in breaking (resolving) or inhibiting colloid systems; processes of making the compositions or systems of the class; processes of breaking (resolving) or inhibiting colloid systems; in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

703 Effecting flotation:

This subclass is indented under subclass 702. Process in which a dissolved or dispersed constituent in the liquid is caused to rise toward an upper surface by use of an agent which reduces the apparent density of such constituent.

(1) Note. The agent may cause gas bubble which attach themselves to particles or it may be a light liquid which wets and associates with the constituent, causing it to float.

704 Including chemical addition (with or without bouyancy gas):

This subclass is indented under subclass 703. Process which includes the step of adding a material which serves to insolubilize or accrete a constituent or effect a chemical change in the liquid and which is in addition to any bouyancy gas which may be used.

(1) Note. For purposes of this subclass, a gas used merely to float the substance is not considered to be a chemical and would ordinarily be classified in subclass 703.

705 Chemically specified precipitant, coagulant, or flocculant:
This subclass is indented under subclass 704. Process in which an accreting or insolubilizing agent is identified.

706 And significant characteristic of the bouyancy gas, other than mere addition of same:
This subclass is indented under subclass 705. Process wherein the bouyancy gas has a significant characteristic, such as, bubble size, manner of introducing or composition.

707 Generating gas in situ:
This subclass is indented under subclass 706. Process including the formation of the bouyancy gas by a chemical reaction within the liquid being treated.

708 Including emulsion breaking:
This subclass is indented under subclass 702. Process wherein a liquid is finely dispersed within a second liquid, immiscible therewith, and the dispersed droplets are caused to gather or accrete such that each of the liquids tends to concentrate in separate phases.

SEE OR SEARCH THIS CLASS, SUBCLASS:

665+, for a step of emulsion breaking in an ion exchange or sorption process.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

709 Controlling process in response to stream condition:
This subclass is indented under subclass 702. Process in which a probe or sensor conveys to an actuating means a change in or the existence of a predetermined parameter, of a condition in the liquid being treated and the actuating means varies, ceases, or initiates at least one element of a treatment.

(1) Note. The sensing of the condition may be prior to or sequent to the treatment and includes the condition of either influent or effluent.

(2) Note. The operation is “automatic” and requires action by the apparatus and does not include use of, for example, an overflow standpipe or a human attendant.

SEE OR SEARCH CLASS:

700, Data Processing: Generic Control Systems or Specific Applications, especially subclasses 266 through 274 for computerized control of a chemical process.

710 Treating the insoluble substance:
This subclass is indented under subclass 702. Process wherein a constituent is insolubilized and further manipulated other than merely separating from the liquid (e.g., subsequently being dried, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

609 for sludge dewatering combined with a treatment by living organisms.

711 For recovery of a treating agent:
This subclass is indented under subclass 710. Process wherein the insoluble substance is treated to produce the treating agent usually for further use in the same process.

712 Including recycling:
This subclass is indented under subclass 702. Process including the step of externally recirculating all or part of any substance, i.e., gas, liquid, or solids.

713 Of separated solids:
This subclass is indented under subclass 712. Process wherein the recycled substance is a separated solid.

714 Seeding:
This subclass is indented under subclass 702. Process in which the liquid is contacted with solid divided inert material which serves as nucleating sites for accretion of constituent.

(1) Note. The material may be the same as or similar to that being precipitated.

715 Utilizing sludge or floc blanket:
This subclass is indented under subclass 714. Process wherein the contact is effected by passage through a suspended or dense bed of agglomerated material.

716 Including step or manufacturing inorganic treating agent:
This subclass is indented under subclass 702. Process including a positive step of preparing the inorganic treating agent to be used to act upon the constituent.

717 In situ:
This subclass is indented under subclass 716. Process wherein the treating agent is formed in place in the liquid, i.e., by the interaction of two or more materials or by the interaction of one or more materials with one or more constituents in the liquid.

718 Including degassing:
This subclass is indented under subclass 702. Process which include a step of removal of a gaseous constituent.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, for processes of gas separation. See particularly subclasses 241+ for degasification of a liquid. See section III, C, of the Class 210 class definition for an amplification of the line.

719 Including chemical reduction:
This subclass is indented under subclass 702. Process which include a step of chemical reducing a constituent of the liquid.

720 Of chromium material:
This subclass is indented under subclass 719. Process wherein the constituent being reduced is chromium.

721 Including oxidation:
This subclass is indented under subclass 702. Process which include a step of oxidizing a constituent of the liquid.

722 Of iron or manganese material:
This subclass is indented under subclass 721. Process wherein the constituent being oxidized is iron or manganese.

723 Utilizing precipitant, flocculant, or coagulant, each with accelerator or with each

other or plural precipitants, flocculants, or coagulants:
This subclass is indented under subclass 702. Process wherein two or more materials are added to the liquid, at least one of which causes precipitation, flocculation, or coagulation, and the other either acts similarly or promotes the activity of the first material.

SEE OR SEARCH CLASS:
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

724 Regulating pH:
This subclass is indented under subclass 723. Process in which a pH adjusting substance is added in addition to the precipitant.

725 Utilizing organic precipitant:
This subclass is indented under subclass 724. Process wherein the material which acts to insolubilize or agglomerate the constituents is organic containing.

726 Sequential introduction:
This subclass is indented under subclass 723. Process in which a time interval occurs between one addition and another.

727 Including organic agent:
This subclass is indented under subclass 726. Process wherein at least one of the sequentially added precipitants is organic containing.

728 Including organic agent:
This subclass is indented under subclass 723. Process wherein at least one of the precipitants added is organic containing.

729 Utilizing organic precipitant:
This subclass is indented under subclass 702. Process in which an organic compound or composition brings about the precipitation.

SEE OR SEARCH CLASS:
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or

foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

730 From natural source or chemical modification thereof:
This subclass is indented under subclass 729. Process in which the organic compound or composition exist in nature.

(1) Note. This subclass includes organic compositions derived from plants or micro-organisms.

731 Starch:
This subclass is indented under subclass 730. Process in which the organic compound or composition is a starch or a derivative thereof.

(1) Note. This subclass includes synthetically modified starches.

732 Synthetic polymer:
This subclass is indented under subclass 729. Process in which the organic compound or composition is an artifically produced polymer.

(1) Note. This subclass includes organic compositions polyalkylene oxide homopolymers and copolymers.

733 Acrylic:
This subclass is indented under subclass 732. Process wherein the organic compound contains recurring units formed by the addition reaction of acrylic acid, alpha-substituted acrylic acid or functional derivatives of such acids.

(1) Note. The functional derivatives include the salts, esters, nitriles, amides, acyl halides, and anhydrides of the acids. The compound may include units of other monomers such as, e.g., stryrene or butadiene.

734 Nitrogen containing (e.g., amine, azo, etc.):
This subclass is indented under subclass 733. Process in which the polymer includes acrylic units and amino, azo, or N-cyclic units.

(1) Note. This subclass includes acrylic polymers containing aminoalkyl units.

735 Nitrogen containing (e.g., amine, azo, etc.):
This subclass is indented under subclass 732. Process in which the polymer includes amino, azo, or N-cyclic units.

(1) Note. This subclass includes nonacrylic polymers containing nitrogen such as nylon.

736 Derived from alkyl halide or epihalophydrin reactant:
This subclass is indented under subclass 735. Process in which the polymer is prepared using alkyl.

(1) Note. This subclass includes polymers containing amino, azo, and N-cycle units which have been reacted with alkyl or epihalohydrins.

737 Including temperature change:
This subclass is indented under subclass 702. Process including the step of changing the temperature, e.g., by heating or cooling.

SEE OR SEARCH CLASS:
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension set-

tling, gel breaking, smoke suppressing, coagulating, flocculating) (particularly subclasses 194+ for breaking or resolving of emulsions in the absence of added agent by vaporizing, heating, or cooling), when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

738 Including agitation:

This subclass is indented under subclass 702. Process including stirring or inducing turbulence.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension set-

tling, gel breaking, smoke suppressing, coagulating, flocculating) (particularly subclass 197 for breaking or resolving of emulsions in the absence of added agent by centrifuging, mechanical shocking, or specified agitating), when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

739 Including controlling process in response to a sensed condition:

This subclass is indented under subclass 600. Process in which a probe or sensor conveys to an actuating means a change in, or the existence predetermined parameter, a condition in the liquid being treated and the actuating means varies, ceases, or initiates at least one element of a treatment.

(1) Note. The sensing of the condition may be prior to or subsequent to the treatment and includes the condition of either influent or effluent.

(2) Note. The operation is "automatic" and requires action by the apparatus and does not include use of, for example, an overflow standpipe or a human attendant.

SEE OR SEARCH CLASS:
700, Data Processing: Generic Control Systems or Specific Applications, especially subclasses 266 through 274 for a computerized control of a chemical process.

740 Density or specific gravity sensing:
This subclass is indented under subclass 739. Process in which the mass per unit volume (either actual or relative to that of water) is determined by the sensing means.

741 Pressure sensing:
This subclass is indented under subclass 739. Process in which the force per unit area is sensed.

(1) Note. The pressure may be positive (usually expressed in p.s.i., kilogram per cm. or atmospheres) or negative (i.e., vacuum usually expressed in inches, mm or cm of mercury or water or in Torrs).

742 Temperature sensing:
This subclass is indented under subclass 739. Process which the heat content of the liquid is determined and is the basis for response by the actuating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
612+, for a process regulating the temperature in a treatment utilizing a living organism.
737 for a process of precipitation or flocculation including a change in temperature.

743 pH Sensing:
This subclass is indented under subclass 739. Process in which the hydrogen (or hydronium) ion concentration is measured and used as a basis for response by the actuating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
639 for a dialysis or osmosis process including a change in pH.
724 for a precipitating or flocculating process, including regulating pH.

744 Level sensing:
This subclass is indented under subclass 739. Process in which the height of a material, either absolute or relative to the height of another material is determined and used as the basis for response by the actuating means.

(1) Note. The level may be determined (by disclosure) by pressure sensing and if so claimed is classifiable in subclass 742, but if claimed in terms of height (e.g., linear measure) is classifiable here.

745 Turbidity or optically sensing:
This subclass is indented under subclass 739. Process in which the transmission, scattering, polarization, or dispersion of light shined into or through the liquid is sensed and is the basis for response to the actuating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
744 for a process using an optical sensor to determine the level of a material.

746 Electrical property sensing:
This subclass is indented under subclass 739. Process in which the conductivity, impedance, or capacitance of the liquid or constituent is determined and is the basis for response by actuating means.

(1) Note. The use of an electrical property to determine some other property (e.g., pH, temperature) is classifiable in the appropriate subclass above providing for those concepts.

SEE OR SEARCH THIS CLASS, SUBCLASS:
742 and 743, and see (1) Note.

747.1 Including geographic feature:
This subclass is indented under subclass 600. Process in which a relationship to a particular feature of the earth's surface (e.g., ground, a

body of water, etc.) is positively recited, other than mere discharge to the particular feature of the earth's surface.

(1) Note. While septic tanks are normally found to be underground, the term septic tank is not considered to be a geographic feature.

(2) Note. While discharge to the ground or a body of water is not a geographic feature, discharge at a specified depth or in a particular strata or formation, or in a particular location in a body of water is considered to be a geographic feature.

(3) Note. Included in this subclass is in situ purging of flowing or still liquid (e.g., in drainage ditch, pond, etc.) wherein the method of separating or purifying has (a) at least part of a system installed on natural or modified terrain to convey rain, snow melt, a river, sewage, well water or oil, etc. or (b) a relationship to a particular nonland geographic feature, such as a lake, ocean, sea, etc.

SEE OR SEARCH CLASS:
405, Hydraulic and Earth Engineering, subclasses 36 through 51 for drainage devices; subclasses 52-127 for fluid control, treatment, or containment; subclasses 128.1-128.9 for soil remediation; and subclasses 129.1-129.95 for subterranean waste disposal, containment, or treatment.

747.2 Stormwater treatment:
This subclass is indented under subclass 747.1. Process in which fallen precipitation is subjected to a chemical or physical process that improves or alters the fallen precipitation (e.g., rainwater runoff, storm sewer treatment, etc.).

SEE OR SEARCH CLASS:
52, Static Structures (e.g., Buildings), subclass 12 for a roof with a surface water receiver at an eave with a separator.
404, Road Structure, Process, or Apparatus, subclasses 2 through 5 for roadway drain or gutter structure.

747.3 Filtering:
This subclass is indented under subclass 747.2. Process in which the fallen precipitation passes through a foraminous or porous mass which separates solid matter from the fallen precipitation by entrapment and retention while permitting the fallen precipitation to pass through.

747.4 Dredging sediments/water mixture from underwater beds treated:
This subclass is indented under subclass 747.1. Process in which disturbed solids and water at the bottom of a body of water are purified or separated.

SEE OR SEARCH CLASS:
37, Excavating, appropriate subclasses for excavating processes.

747.5 Body of freshwater, surface flowing freshwater, or body of saltwater:
This subclass is indented under subclass 747.1. Process in which the particular feature of the earth's surface that the liquid purification or separation process is related to is a bounded aggregate of still water that is not salty (e.g., pond, lake, reservoir, etc.), a bounded aggregate of nonsalty, running water flowing on the earth's surface (e.g., stream, river, ditch, canal, etc.), or an aggregate of salt water covering most of the earth's surface (e.g., sea, ocean, etc.).

(1) Note. The water may be what is purified or separated or the purification or separation process may include apparatus located in the water for purifying or separating a liquid other than the water itself.

747.6 Utilizing floating treating means:
This subclass is indented under subclass 747.5. Process in which the liquid purification or separation process uses liquid purification or separation means that is buoyed on or in the water.

747.7 Groundwater treatment:
This subclass is indented under subclass 747.1. Process in which water within the earth's surface is purified or separated.

747.8 By chemical treatment:
This subclass is indented under subclass 747.7. Process in which a treating agent chemically reacts with a component in the groundwater.

747.9 Utilizing artificial waste pond or pit (e.g., waste lagoon, wastewater pond, etc.):
This subclass is indented under subclass 747.1. Process in which the particular feature of the earth's surface that the liquid purification or separation process is related to is a man-made body of liquid for processing waste liquids (e.g., waste lagoon, wastewater pond, etc.).

748.01 Utilizing electrical or wave energy directly applied to liquid or material being treated:
This subclass is indented under subclass 600. Process in which the liquid or a material is directly subjected to an electrical field or current or to a regular pulsating source of energy (e.g., irradiation, ultrasonic vibration, etc.) to cause liquid purification or separation or to generate a treating agent that is then used to purify or to separate the liquid.

(1) Note. The process of utilizing electrical or wave energy on the liquid or a material to generate a treating agent used in a process of this class will be classified here. Electrolysis to directly separate a component from a liquid is classified in Class 205. For example, electrolysis of a liquid or a material to produce chlorine that kills bacteria in the liquid would be classified here, but removing mercury salts by plating out mercury would be classified in Class 205.

(2) Note. The electrical or wave energy must be applied to the liquid or to the material being treated. Thus, for example, applying wave energy to apparatus in order to vibrate a filter to clean the filter is not classifiable here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
695, for a process of liquid purification or separation using magnetic force.
785, and 791-798, for a process of liquid purification or separation including vibrating to clean a filter.

SEE OR SEARCH CLASS:
96, Gas Separation: Apparatus, subclass 224 for gas separation apparatus with sterilizing means in which the sterilizing means is a germicidal lamp.
204, Chemistry: Electrical and Wave Energy, subclasses 157.15 through 158.21 for processes of preparing a compound or element involving a chemical reaction induced by wave energy, subclasses 450 through 553 for electrophoresis or electro-osmosis, and subclasses 554 through 573 for electrical or simultaneous electrical and magnetic separation or purification of a liquid or magnetic treatment of a liquid (other than separation). See Class 204, References to Other Classes in the class definition, and Class 210, Lines With Other Classes and Within This Class and References to Other Classes in the class definition for an elaboration of the class line between Class 204 and Class 210.
205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, for electrolysis, in general, particularly subclasses 742 through 761 for electrolytic treatment of water, sewage, or other wastewater. See Lines With Other Classes and Within This Class and Section III-References to Other Classes of the Class 210 definition for an elaboration of the class line between Class 205 and Class 210.
250, Radiant Energy, subclasses 432 through 438 for fluent material containment, support, or transfer means with irradiating source or radiating fluent material.
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 1 through 43 for processes of disinfecting, preserving, deodorizing, or sterilizing an article or material; and subclasses 186-186.3 for a chemical reactor with means for applying electromagnetic wave energy or corpuscular radiation to reactants for initiating or perfecting chemical reaction.

748.02 Sound waves:
This subclass is indented under subclass 748.01. Process in which the wave energy applied is effected by the energy of compressional vibratory waves in a fluid medium, the waves being below, within, or above the audible spectrum.

748.03 Destroying living organisms:
This subclass is indented under subclass 748.02. Process in which an agent that has the ability to reproduce itself is killed.

(1) Note. For purposes of this subclass, living organisms include animals, plants (e.g., algae, etc.), and microorganisms (e.g., bacteria, fungus, etc.), but not enzymes. The organism may reproduce sexually, asexually, or by mechanical division (caused by external agents) and regeneration (e.g., layering or cloning, etc.).

748.04 Destroying/degradation of chemical contaminant:
This subclass is indented under subclass 748.02. Process in which an undesirable component in the liquid is decomposed into a component that is less noxious.

748.05 Separating particles:
This subclass is indented under subclass 748.02. Process in which small pieces of something (e.g., a solid, biological cells, blood cells, etc.) are separated or removed from the liquid being treated.

(1) Note. The sound waves may cause solidification or agglomeration of a component in the liquid.

748.06 Laser:
This subclass is indented under subclass 748.01. Process in which the wave energy applied is generated by a device that converts incident electromagnetic radiation of mixed frequencies to one or more discrete frequencies of highly amplified and coherent electromagnetic radiation (light amplification by stimulated emission of radiation (laser)).

(1) Note. The radiation is usually in the ultraviolet, visible, or infrared regions of the spectrum.

748.07 Microwaves:
This subclass is indented under subclass 748.01. Process in which the wave energy applied has a wavelength between 1 millimeter and 1 meter.

748.08 Infrared radiation:
This subclass is indented under subclass 748.01. Process in which the wave energy applied has a wavelength between 700 nanometers and 1 millimeter.

748.09 Visible light:
This subclass is indented under subclass 748.01. Process in which the wave energy applied has a wavelength between 400 and 700 nanometers (e.g., solar light, daylight, sunlight, etc.).

748.1 Ultraviolet radiation:
This subclass is indented under subclass 748.01. Process in which the wave energy applied has a wavelength between 100 angstroms and 400 nanometers.

748.11 Destroying living organisms:
This subclass is indented under subclass 748.1. Process in which an agent that has the ability to reproduce itself is killed.

(1) Note. For purposes of this subclass, living organism includes animals, plants, (e.g., algae, etc.), and microorganisms (e.g., bacteria, fungus, etc.), but not enzymes. The organism may reproduce sexually, asexually, or by mechanical division (caused by external agents) and regeneration (e.g., layering or cloning, etc.).

748.12 Including generation of treatment chemical:
This subclass is indented under subclass 748.11. Process in which a treating agent is produced, generally by application of ultraviolet light.

748.13 Destroying/degradation of chemical contaminant:
This subclass is indented under subclass 748.1. Process in which an undesirable component in the liquid is decomposed into a component that is less noxious.

748.14 Photocatalytic:
This subclass is indented under subclass 748.13. Process in which the undesirable component in the liquid is decomposed by use of an agent that promotes photochemical reactions.

748.15 Utilizing hydrogen peroxide, ozone, or oxygen:
This subclass is indented under subclass 748.13. Process in which the undesirable component in the liquid is decomposed by use of hydrogen peroxide, ozone, or oxygen as a chemical reactant.

(1) Note. The use of hydrogen peroxide, ozone, or oxygen can include the generation of hydroxyl radicals (OH^-).

748.16 Including chemical treatment:
This subclass is indented under subclass 748.01. Process in which a treating agent chemically reacts with a component in the liquid.

748.17 Generating treatment chemical by electrical energy:
This subclass is indented under subclass 748.16. Process in which the electrical energy (e.g., electrolysis, electrical discharge, etc.) is applied to a material in order to produce the treating agent, which is then used to treat the liquid.

748.18 Metal ion or metal:
This subclass is indented under subclass 748.17. Process in which the treating agent produced is a dissociated charged metal or free metal.

748.19 Ozone:
This subclass is indented under subclass 748.17. Process in which the treating agent produced is ozone.

748.2 Chlorine or chlorine compound:
This subclass is indented under subclass 748.17. Process in which the treating agent produced is chlorine or a chlorine compound.

749 Chemical treatment:
This subclass is indented under subclass 600. Process wherein a material is added which chemically reacts with a constituent in the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

606 and 631, for a chemical treatment combined with a treatment by a living organism.

634+, for a process wherein a solute is removed from a solvent by contacting a solution thereof with a second solvent which has a greater affinity for the solute than the original solvent.

660+, for a process including ion exchange.

696+, for a process wherein a chelating or sequestering agent is added in order to prevent, decrease, or delay precipitation.

702+, for a process in which a chemical is added to cause precipitation or flocculation of a constituent.

SEE OR SEARCH CLASS:

122, Liquid Heaters and Vaporizers, subclasses 379+ for processes and apparatus for cleaning liquid heaters or vaporizers or for purifying the water while the boiler is in operation.

137, Fluid Handling, subclasses 1+ for processes of feeding additives to a mainline flow.

208, Mineral Oils: Processes and Products, subclasses 177+ for purification of mineral oils with chemicals.

252, Compositions, subclasses 175+ for scale inhibitors.

260, Chemistry of Carbon Compounds, subclasses 701+ for chemical purification of carbon compounds.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for processes of corrosion inhibition.

424, Drug, Bio-Affecting and Body Treating Compositions, for a composition to cure or alleviate a disease and for a process involving the mere addition of a compound or composition to water, etc.; for a composition which is biocidal to an animal or a micro-organism (other than algae) or for a process involving the addition of a biocidal compound or composition with no significant or additional water treatment; or for a process of adding a chemical to water as a carrier to form a composition with a utility of Class 424.

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating) (particularly subclass 197 for breaking or resolving of emulsions in the absence of added agent by centrifuging, mechanical shocking, or specified agitating), when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

588, Hazardous or Toxic Waste Destruction or Containment, appropriate subclasses for the destruction of hazardous or toxic waste by way of chemical treatment. Class 210 provides for the purification of water (liquids) as useful product even though hazardous or toxic waste may be removed from or destroyed in the water (liquids).

750 Including degassing:

This subclass is indented under subclass 749. Process in which the addition of the chemical causes the evolution of a constituent as a gas or in which the process includes a step of stripping a dissolved gas from the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

603 for a treatment by a living organism with collection or storage of a gas.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, for processes of gas separation. See particularly subclasses 241+ for degasification of a liquid. See section III, C, of the Class 210 class definition for an amplification of the line.

752 Plural spaced feedings:

This subclass is indented under subclass 749. Process wherein at a specified interval of time or distance from the addition of the chemical the chemical is again added or a second chemical is added.

SEE OR SEARCH THIS CLASS, SUBCLASS:

199 for apparatus to add treating material spaced along a flow path.

726 for a process of sequential chemical addition including precipitation.

753 Utilizing halogen or halogen containing material:
This subclass is indented under subclass 749. Process wherein a material containing an element from group VII A, either free or as a compound, is added.

(1) Note. The halogen or halogen-containing material may be either the reactant or a catalyst. However, when it is a catalyst a reactant must be added.

SEE OR SEARCH CLASS:
424, Drug, Bio-Affecting and Body Treating Compositions, especially subclasses 673+ for a process of fluoridating water to prevent dental caries.

754 Chlorine or bromine containing:
This subclass is indented under subclass 753. Process wherein the material contains element number 17 and 35.

755 Organic:
This subclass is indented under subclass 754. Process wherein the chlorine or bromine-containing material also contains carbon.

(1) Note. The compounds used in this subclass are those classifiable in Class 260.

756 Hypochlorite:
This subclass is indented under subclass 754. Process wherein the material contains the CIO radical.

757 By chemical reduction:
This subclass is indented under subclass 749. Process wherein the positive valence (oxidation state) of a constituent in the liquid is decreased.

SEE OR SEARCH THIS CLASS, SUBCLASS:
719 for a precipitation process involving a chemical reduction.

758 By oxidation:
This subclass is indented under subclass 749. Process wherein the positive valence (oxidation state) of a constituent of a liquid being treated is increased.

SEE OR SEARCH THIS CLASS, SUBCLASS:
198+, for means to aerate, especially subclass 219 for a mechanical aerator.
220 for a submerged fluid inlet.
242.2 for a floating mechanical aerator.

759 Utilizing peroxy compound (e.g., hydrogen peroxide, peracid, etc.):
This subclass is indented under subclass 758. Process wherein the oxidant is hydrogen peroxide or a compound which will release it.

SEE OR SEARCH THIS CLASS, SUBCLASS:
627 for a treatment by a living organism using a specific oxidant.

760 Utilizing ozone:
This subclass is indented under subclass 758. Process wherein the oxidant is ozone.

SEE OR SEARCH THIS CLASS, SUBCLASS:
192 for apparatus for preliminary manufacture of ozone.
748.01, through 748.2, particularly subclasses 748.15 and 748.19, for processes utilizing electrical or wave energy directly applied to liquid or material being treated, including the use or generation of ozone.

SEE OR SEARCH CLASS:
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 186.08+ for an electrical ozonizer with preparatory or product treating means.

761 Liquid phase high temperature and pressure (e.g., "wet air", etc.):
This subclass is indented under subclass 758. Process in which an aqueous fluid is heated to a point below the critical temperature and under such pressure that autogenic oxidation of constituents proceeds in the liquid phase.

762 Catalytic:
This subclass is indented under subclass 761. Process including the use of an agent which promotes the wet air oxidation reaction.

SEE OR SEARCH CLASS:

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a composition comprising a catalyst or sorbent, per se.

763 Catalytic:

This subclass is indented under subclass 758. Process including the use of an agent which promotes the oxidation reaction.

SEE OR SEARCH CLASS:

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a composition comprising a catalyst or sorbent, per se.

764 Destroying micro-organisms:

This subclass is indented under subclass 749. Process in which a living organism is killed or is prevented from normal propagation by the addition of a chemical agent.

(1) Note. The process involving the mere addition of a biocidal algicidal compound or composition with no significant or additional water treatment is classified in Class 424 or Class 504.

SEE OR SEARCH THIS CLASS, SUBCLASS:

753+, for a process including treatment with a halogen containing a compound.

758+, for a process comprising oxidizing.

SEE OR SEARCH CLASS:

424, Drug, Bio-Affecting and Body Treating Compositions, appropriate subclass for a biocidal, e.g., bactericide, fungicide, etc., composition. See (1) Note.

426, Food or Edible Material: Processes, Compositions, and Products, appropriate subclasses for preservation of foods by destruction of micro-organism.

504, Plant Protecting and Regulating Compositions, subclasses 150+ for algicidal compositions. See (1) Note.

765 With liquid recirculation:

This subclass is indented under subclass 749. Process including a step of recirculating all or part of the liquid being treated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

194+, for apparatus including means for recirculating.

621+, for a process by treatment with aerobic living organisms including recirculation.

712+, for a precipitation process including recirculation.

766 Including temperature change:

This subclass is indented under subclass 749. Process including the step of adding or removing heat during the chemical reaction.

SEE OR SEARCH THIS CLASS, SUBCLASS:

737 for a precipitation process including a temperature change.

761+, for a process in which an autogenic oxidation (e.g., wet air) maintains high temperature.

767 Separating:

This subclass is indented under subclass 600. Process for separating one constituent of a liquid-liquid or liquid-solid mixture.

SEE OR SEARCH CLASS:

127, Sugar, Starch, and Carbohydrates, subclass 55 for a filtering process peculiar to sugar solutions.

203, Distillation: Processes, Separatory, subclass 43 for a separatory distillation process combined with a liquid-liquid extraction operation not otherwise provided for.

208, Mineral Oils: Processes and Products, subclasses 179+ for purifying used mineral oils; and subclasses 299+ for treatment of mineral oils with solid adsorbents. See the reference to Class 208 under “SEARCH CLASS”, in the class definition of this class (210).

260, Chemistry of Carbon Compounds, subclasses 704+ for physical treatment of carbon compounds.

406, Conveyors: Fluid Current, for a method of and apparatus for separating a solid or a liquid from a carrier liquid as part of fluid conveying provided for in Class 406.

768 Including treating separated solids:
This subclass is indented under subclass 767. Process with the treatment of solids separated from the mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:
217 for a rotary drum-type filter with means to wash the separated solids.
710 for processes involving precipitation with treatment of separated solids.
791 for processes of merely removing residue from a filter.

SEE OR SEARCH CLASS:
100, Presses, subclass 35 for processes of compressing a filter cake.

769 Destroying cake or solid component:
This subclass is indented under subclass 768. Process in which the cake or its solid constituent is destroyed or removed from the liquid fraction thereof.

(1) Note. Process which recite a nominal step of waste treatment, i.e., dewatering in combination with an incineration step are not proper for this subclass and are provided for in subclass 346 of Class 110. However, processes which provide significant steps of liquid treatment in combination with an incineration step are appropriate for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
656 for a chromatograph process.

SEE OR SEARCH CLASS:
110, Furnaces, subclass 346 for processes of burning of solids which may include a nominal step of separation; and subclasses 219+ for apparatus provided with means for conditioning refuse to be incinerated prior to burning.
208, Mineral Oils: Processes and Products, subclass 8 and 11 for the separation of mineral oils from solid natural sources (rock, shale, etc.).
423, Chemistry of Inorganic Compounds, appropriate subclasses for extracting, leaching, or dissolving processes therein provided for; and subclass 658.5 for extracting, leaching, or dissolving processes not otherwise provided for.

770 Including drying (e.g., by squeezing or heating, etc.):
This subclass is indented under subclass 768. Process in which the solids are dewatered by application of heat or a pressure differential.

SEE OR SEARCH THIS CLASS, SUBCLASS:
766 when the process involves a step of chemical treatment.

771 By gas contact:
This subclass is indented under subclass 770. Process in which the solids are contacted with a gas or a vapor.

SEE OR SEARCH CLASS:
34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses for processes of and apparatus for separating and drying of solids after removal from the separatory medium, and see (3) Note of the class definitions of Class 34.

772 Washing with a fluid other than the prefilt:
This subclass is indented under subclass 768. Process in which the solids are contacted with a fluid different from the prefilt to wash same.

773 Including preliminary conversion to liquid state:
This subclass is indented under subclass 767. Process including treating a normally solid mixture to convert one constituent thereof to a liquid, solution or liquid-solid suspension and then separating the resulting liquid or liquid mixture.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclasses 295+ for crystallization processes involving purification.

62, Refrigeration, subclasses 532+ and 123+ for separating a constituent from a liquid mixture by refrigeration.

126, Stoves and Furnaces, subclass 343.5 for melting furnaces.

554, Organic Compounds, subclasses 8+ for processes of recovery or extraction from residues or organic material; subclasses 175+ for processes of purification of fats, oils, and waxes by physical treatment only; and subclass 707 for purification involving crystallization.

774 Including temperature change:

This subclass is indented under subclass 767. Process in which the temperature of the mixture is modified (during its treatment).

SEE OR SEARCH THIS CLASS, SUBCLASS:

175+, for separatory apparatus with a heater or heat exchanger.

198+, for a separator with means to add a treating material.

612+, for processes of treatment by living organisms including temperature regulation.

737 for processes of precipitating by or with a temperature change.

766 for processes of chemical treatment with temperature change.

770+, for processes of drying separated solids.

773 for processes of separating with preliminary conversion to a liquid state.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclasses 295+ for separation by selective crystallization.

62, Refrigeration, subclasses 532+ and 123+ for separating a constituent from a liquid mixture by refrigeration.

208, Mineral Oils: Processes and Products, subclasses 33+ and 37+ for processes of removing paraffin from mineral oils which include a chilling treatment.

775 Thermal diffusion:

This subclass is indented under subclass 774. Process wherein the temperature modification comprises exposing the mixture to opposed surfaces which have different temperatures whereby stratification occurs.

SEE OR SEARCH THIS CLASS, SUBCLASS:

176 for diffusion apparatus.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, subclass 289 for processes of gas separation involving cold wall-hot wall thermal diffusion.

776 Skimming:

This subclass is indented under subclass 767. Process wherein scum or floating matter is removed from the mixture surface by skimming.

SEE OR SEARCH THIS CLASS, SUBCLASS:

703+, for processes of skimming including flotation.

777 Including precoating filter medium with filter aid:

This subclass is indented under subclass 767. Process in which a basic separating member or retainer is coated with a filter medium or filter aid prior to the purification step.

SEE OR SEARCH THIS CLASS, SUBCLASS:

193 for precoat adding means.

500+, for precoat material or filter aid.

SEE OR SEARCH CLASS:

427, Coating Processes, for coating processes, per se, and note especially subclasses 180+ for coating with particles or fibers.

778 With or by addition or prefilt:

This subclass is indented under subclass 777. Process wherein the filter aid material is added to the influent before or during filtration.

779 Discharging residue to prefilt:
This subclass is indented under subclass 767. Process in which the separated solids or residue is returned to the influent or prefilt.

SEE OR SEARCH THIS CLASS, SUBCLASS:
194+, for separatory apparatus with means to recirculate a constituent.
621+, and 629, for treatment by living organisms with recirculation to a prior step or internal recirculation.
712+, for precipitation processes with external recirculation.
765 for processes of chemical treatment with liquid recirculation.
805 for process with recirculation.

780 Including movement of filter during filtration:
This subclass is indented under subclass 767. Process in which relative motion is imparted to the filter medium with respect to its support or housing during filtration.

SEE OR SEARCH THIS CLASS, SUBCLASS:
359+, for filter apparatus including a movable medium.

781 Centrifugally extracting:
This subclass is indented under subclass 780. Process in which the prefilt is forced through a filter by centrifugal force.

SEE OR SEARCH THIS CLASS, SUBCLASS:
360+, for a centrifugal extractor.
787 wherein the centrifugal force is cyclonic, without filter movement.

SEE OR SEARCH CLASS:
127, Sugar, Starch, and Carbohydrates, subclass 56 for centrifugal separation peculiar to sugar solutions.
494, Imperforate Bowl: Centrifugal Separators, subclass 37 for a process for breaking up a mixutre of fluids or fluent substances into two or more components by centrifuging within a generally solid-walled, receptacle-like member.

782 Blood:
This subclass is indented under subclass 781. Process in which the separated components are those of blood i.e., serum and plasma, wherein the filter medium is caused to pass through the blood by the centrifugal force or the filter medium is passed through the separated blood components after centrifugation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
359 for apparatus in which the filter medium is capable of movement for treatment purposes.
780 for a method in which the filter moves through the blood by other than centrifugal force.

783 Rotating belt:
This subclass is indented under subclass 780. Process in which the movable filter medium is a rotating or endless belt.

SEE OR SEARCH THIS CLASS, SUBCLASS:
400 for filter apparatus made in a closed loop or for filter elements attached to a closed loop carrier.

784 Rotating drum:
This subclass is indented under subclass 780. Process in which the movable filter medium is a rotating drum.

SEE OR SEARCH THIS CLASS, SUBCLASS:
402 for apparatus in which the movable filter medium is in the shape of a drum.

785 Cleaning filter utilizing wave energy (e.g., vibrating, pulsating, etc.):
This subclass is indented under subclass 780. Process in which the filter is oscillated or agitated in a to and from manner, serving to dislodge entrapped material.

786 Of particulate bed (e.g., fluidized or moving bed, etc.):
This subclass is indented under subclass 780. Process in which the movable filter medium is a movable bed or fluidized bed of particulate filter material.

787 Cyclonic, or centrifugal (e.g., whirling or helical motion or by vortex, etc.):
This subclass is indented under subclass 767. Process wherein the influent flows tangentially of a container in a manner to produce a whirling motion or there is an agitator to rotate the influent to form a vacuum at its center.

SEE OR SEARCH THIS CLASS, SUBCLASS:
304 for apparatus including a filter in which there is a spiral or convolute baffle or tangential liquid inlet to give the liquid a whirling motion.
512 for apparatus wherein fluid flows tangentially to produce a whirling motion or there is driven means to rotate the fluid.

SEE OR SEARCH CLASS:
55, Gas Separation, subclasses 345+ and 447+ for apparatus for, separating gases using cyclonic or centrifugal force.
95, Gas Separation: Processes, subclasses 34+ for processes of separating a plurality of gases by the effect of centrifugal force and subclasses 269+ for processes of separating solid or liquid particles from gas by the effect of centrifugal action.
209, Classifying, Separating, and Assorting Solids, especially subclasses 139, 199, and 710 through 734 for a patent directed to fluid suspension classifying of solids using centrifugal force or a vortex.

788 Introducing liquid tangentially:
This subclass is indented under subclass 787. Process wherein the influent is introduced tangentially into the separator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
304 and 512, for the corresponding apparatus.

789 Isolating layer:
This subclass is indented under subclass 787. Process in which an isolating means is positioned between the separated constituent layers.

SEE OR SEARCH THIS CLASS, SUBCLASS:
514+, for gravitational separation apparatus including an isolating means.
782 for processes of blood centrifugation.

790 Dividing and recombining:
This subclass is indented under subclass 767. Process in which the stream of liquid being treated is separated into two distinct steams, which streams are later recombined.

SEE OR SEARCH THIS CLASS, SUBCLASS:
194+, for separating apparatus with means to recirculate a constituent.
253+, for parallel flows including serially connected distinct treating units.
340+, for parallel filters with flow control means.
607 for processes of treatment by living organisms including dividing and recombining.
625 for processes of treatment by living organisms with sludge treatment outside of the mainstream and recirculation of such treated sludge to the mainstream.

791 Rehabilitating or regenerating filter medium:
This subclass is indented under subclass 767. Process in which a residue is removed from or redistributed through a filter medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
269+, for apparatus provided with means to restore the filter medium to the condition it was in before separation.
391+, for a movable separation medium having means for removing residue.
407+, for apparatus having means for removing residue from the filter medium.
420+, for a filter with means to clean by backwashing.
777 for precoat processes many of which remove the precoat and deposit.
779 for processes including discharging residue to prefilt.
780+, in which movement of the filter may prevent clogging of the filter medium.

785 for processes including cleaning the filter medium by electrical or wave energy.

792 Particulate bed:
This subclass is indented under subclass 791. Process in which the filter medium is of the loose particulate material type, e.g., sand bed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
269+, for a particulate material type separator having rehabilitation means.
670 for ion exchange or sorption processes with rehabilitation.
710+, for precipitation processes including reagent recovery.

SEE OR SEARCH CLASS:
55, Gas Separation, subclasses beginning with subclass 474 for gas filter apparatus including loose material, especially subclasses 512+.
95, Gas Separation: Processes, subclasses 274+ for processes of gas separation using particulate solids.
134, Cleaning and Liquid Contact With Solids, appropriate subclasses for processes there provided for including rehabilitation of the agent used.

793 Reverse flow:
This subclass is indented under subclass 792. Process in which a cleaning fluid passes through the particulate bed oppositely to the direction of flow during filtration.

794 Including addition of diverse fluid:
This subclass is indented under subclass 793. Process in which the fluid is other than the prefilt and can be a gas.

(1) Note. For purposes of this subclass, the effluent from the filtration step is not considered to be diverse fluid.

795 Expanded bed:
This subclass is indented under subclass 794. Process wherein the fluid causes the bed to expand or fluidize resulting in scouring of the particulates.

SEE OR SEARCH THIS CLASS, SUBCLASS:
786 for a separation process through a movable particulate bed.

796 Including mechanical agitation:
This subclass is indented under subclass 792. Process wherein mechanical stirring of the particulate bed results or aids in its cleaning.

797 By diverse fluid:
This subclass is indented under subclass 791. Process of cleaning the filter medium by contact with a fluid other than the prefilt.

(1) Note. For purposes of this subclass, the effluent from the filtration step is not considered to be a diverse fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
792+, for processes involving the rehabilitation of loose particulate material type of filter bed.

SEE OR SEARCH CLASS:
8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, especially subclasses 137+ for processes of cleaning textile filter cloths independently of the filtering operation.

798 Reverse flow:
This subclass is indented under subclass 797. Process in which a cleaning fluid passes through the filter medium oppositely to the direction of flow during filtration.

SEE OR SEARCH THIS CLASS, SUBCLASS:
601+, for analogous processes applied to a filter which contains bacterial growths.
777+, for processes including applying a precoat to a filter medium.
779 for processes including discharging the residue to the prefilt.
793+, for processes of rehabilitating a particulate material bed by reversal of flow.

799 Filtering immiscible liquids:
This subclass is indented under subclass 767. Process in which a mixture of mutually insoluble liquids are passed through a sieve or strainer.

800 Utilizing gravitational force:
This subclass is indented under subclass 767. Process in which the liquid and solids contained therein are stratified and selectively removed by utilizing gravitational force.

SEE OR SEARCH THIS CLASS, SUBCLASS:
513+, for gravitational separation apparatus.
781+, for separation processes including centrifugal extraction.
787 for processes including whirling or helical motion.

SEE OR SEARCH CLASS:
127, Sugar, Starch, and Carbohydrates, subclass 57 for settling processes for separating impurities from sugar solutions.
209, Classifying, Separating, and Assorting Solids, subclasses 208+ for grading deposition in a liquid-type separator and related processes.

801 Including change of mainstream flow direction:
This subclass is indented under subclass 800. Process in which the direction of the main flow stream is changed to enhance separation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
311 for apparatus in which entering liquid flows downwardly and then passes through a filter medium in an upward direction.
738 for precipitation processes including agitation.

SEE OR SEARCH CLASS:
95, Gas Separation: Processes, subclasses 267+ for processes of gas separation using deflection.

802 Utilizing parallel separation passages:
This subclass is indented under subclass 801. Process in which the flow direction change is through or by parallel plates or elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:
521+, for apparatus utilizing parallel plates.

803 Including specified feature of settled solids removal:
This subclass is indented under subclass 800. Process in which the settled solids are removed by scraping or some other specific means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
523+, for gravitational separators including mechanical means for moving a constituent.

804 And additional diverse separation:
This subclass is indented under subclass 800. Process in which an addition diverse separation is preformed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
294+, for apparatus including a gravitational separator and an additional diverse separator.

805 And recirculating liquid:
This subclass is indented under subclass 767. Process including a step of recycling all or part of the liquid being treated or the separated constituent.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167.01 through 167.32, for a structural installation with a closed circulating system.
194+, for purifiers or separators with recirculation means.
621+, for process of treatment by living organisms including recirculation.
629 for internal recirculation with treatment by living organisms.
677 for ion exchange or sorption processes with rehabilitation by conserved or recirculated fluid.

712+, for precipitation processes including external recirculation.
765 for chemical treatment processes with liquid recirculation.

806 Plural separating:
This subclass is indented under subclass 767. Process including plural steps of separating.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102 for plural separatory units combined with programming means responsive to flow, fluid pressure or material level.
124 for a float controlled valve between separators.
141 for separating means combined with programming means.
155 for plural screens of the flume stream type.
181 for a flow line connected heat exchanger in series with distinct separators.
182 for diverse separators combined with heat exchange means.
195.1+, for serially connected distinct treating units having means to recirculate.
200+, for plural distinct separators with means to add treating material.
252 for serially connected distinct treating units.
263+, for a particulate material-type separator with plural separatory mediums.
294+, for diverse distinct separators.
322+, for plural distinct separators.

SEE OR SEARCH CLASS:
209, Classifying, Separating, and Assorting Solids, subclasses 12.1+ for combined classifying, separating, and assorting of solids.

807 Utilizing particulate bed:
This subclass is indented under subclass 767. Process in which the filter medium is of the loose particulate material type, e.g., sand bed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
263+, for apparatus utilizing a bed of discrete particles.
616+, where there are living organisms supported on such particulates.
660+, when the particulate material is of the sorption or ion exchange type.
792+, for processes of separation through a particulate bed including rehabilitation of such bed.

808 Including specified pressure change:
This subclass is indented under subclass 767. Process in which a change in pressure causes or aids in the separating of constituents.

(1) Note. Processes which involves the mere squeezing of an already formed filter cake belong in subclasses 770+. Processes which involve the use of vacuum to draw filtrate through a filter medium, utilize pressure to drive the prefilt through the filter medium, or where a mere change in pressure causes the separation, belong in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
703+, for processes in which the pressure change results in flotation.

CROSS-REFERENCE ART COLLECTIONS

The following subclasses are collections of published disclosures pertaining to various specified aspects of the liquid treating art which aspects do not form appropriate bases for subclasses in the foregoing classification (i.e., subclasses superior hereto in the schedule), wherein original copies of patents are placed on the basis of the type of process employed. These subclasses assist a search based on particular the liquid treated, material removed or desired result and may be of further assistance to the searcher, either as a starting point in searching this class or as an indication of further related fields of search inside or outside the class. Thus, there is here provided a further path of access for retrieval of a limited number of types of disclosures.

(1) Note. Disclosures are placed in these subclasses for their value as references and as leads to appropriate main or secondary fields of search, without regard to their original classification of their claimed subject matter.

(2) Note. The disclosures found in the following subclasses are examples, only, of the indicated subject matter, and in no

instance do they represent the entire extent of the prior art.

(3) Note. Where a subclass is directed to a concept, do not cross here. For example, do not cross-reference a subclass 646 patent to subclass 927 or a subclass 688 patent to subclass 912.

900 ULTRA PURE WATER (E.G., CONDUCTIVITY WATER):

Collection of disclosures directed to the production of extremely pure water; the technique may involve "polishing" (an ion exchange process) or combinations of processes.

SEE OR SEARCH CLASS:

203, Distillation: Processes, Separatory, subclasses 10+ for a distillation purification of water.

901 SPECIFIED LAND FILL FEATURE (E.G., PREVENTION OF GROUND WATER FOULING):

Collection of disclosures directed to details of disposal of waste liquid treatment residue upon or into the earth.

SEE OR SEARCH CLASS:

405, Hydraulic and Earth Engineering, subclass 128.1 for soil remediation in situ or soil remediation ex situ wherein there is a step of removing the soil from its existing site, and subclass 129.1 for subterranean waste disposal, containment, or treatment.

902 MATERIALS REMOVED:

Collection of disclosures directed to the removal of a particular constituent from a liquid; these disclosures are primarily concerned with removal of the material from the liquid to perfect the liquid for subsequent use or disposal; however, the same technique could be used where the specific material removed is the desired product.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclasses 230+ for a chemical test for a specific material; and subclasses 293+ for a physical method of recovering a nonmetallic element or an inorganic compound from a mixture.

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, especially subclasses .5+ and 97+ for method of recovering metal from a liquid.

260, Chemistry of Carbon Compounds, appropriate subclasses for the recovery of an organic compound and not the physical process subclasses (704+) in that class.

903 Nitrogenous:

Collection of disclosures under collection 902 in which the material is or contains nitrogen. The material may be organic (e.g, amines) or inorganic (e.g., nitrates).

904 -CN Containing:

Collection of disclosures under collection 903 in which the material is a nitrile or a cyanide.

905 Protein:

Collection of disclosures under collection 903 in which the material includes a chain of N-acylated amino acids.

906 Phosphorus containing:

Collection of disclosures under collection 902 in which the material contains phosphorus.

907 Phosphate slimes:

Collection of disclosures under collection 906 in which the liquid treated is a suspension resulting from processing phosphate rock, usually in making fertilizer.

(1) Note. Mere drying of a phosphate slime is provided for elsewhere (see Search Note below).

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, for mere drying of a phosphate slime

908 Organic:

Collection of disclosures under collection 902 in which the material removed contains a carbon compound, usually with hydrogen and often with oxygen and/or nitrogen and/or sulfur.

(1) Note. The organic materials are those that are classifiable in Class 260, Chemistry of Carbon Compounds, and do not include metal carbonates or cyanides.

909 Aromatic compound (e.g., PCB, phenol, etc.):
Collection of disclosures under collection 908 in which the material contains a benzene radical.

910 Nonbiodegradable surfactant:
Collection of disclosures under collection 908 in which the material resists decomposition and functions as a wetting agent, generally in cleaning processes.

(1) Note. Nonbiodegradable surfactants are also known as hard detergents.

911 Cumulative poison:
Collection of disclosures under collection 902 in which the material removal is one that tends to accumulate in the body and becomes toxic upon repeated or continuous exposure or ingestion.

912 Heavy metal:
Collection of disclosures under collection 911 in which the material removed is a metal with a density greater than four.

913 Chromium:
Collection of disclosures under collection 912 in which the material removed contains the element of atomic number 24.

914 Mercury:
Collection of disclosures under collection 912 in which the material removed contains the element of atomic number 80.

915 Fluorine containing:
Collection of disclosures under collection 902 in which the material removed contains the halogen of atomic number 9.

916 Odor (including control or abatement):
Collection of disclosures under collection 902 in which the smell, usually of an offensive type, is removed or reduced.

SEE OR SEARCH CLASS:
95, Gas Separation: Processes, subclasses 241+ for a process of degassing a liquid in which the gas may be odorous.

917 Color:
Collection of disclosures under collection 902 in which a liquid is at least partially clarified, i.e., tint or hue is reduced and the liquid is made more light transmissive.

SEE OR SEARCH THIS CLASS, SUBCLASS:
745 for a process which is controlled in response to sensed turbidity.

918 MISCELLANEOUS SPECIFIC TECHNIQUES:
Collection of disclosures including a novel manipulative step, not classifiable under collection 600, to which significance is attached in the success of the intended treatment.

(1) Note. As examples, may be noted, process in which point of entry of liquid is deemed critical, particular sequence of operations, orientation of flow of materials (e.g., clockwise, etc.), particular time of year (e.g., spring) or relation to ground water table level, etc.

919 Using combined systems by merging parallel diverse waste systems:
Collection of disclosures under collection 918 in which the output of two independent and different water treatment processes coact to effect a further treatment.

(1) Note. This subclass provides for such processes as (a) the combining of the effluent of two chemical plants one being acidic and the other caustic to produce an overall neutral effluent, (b) combining sludge or solid matter from a slaughter house sewage with the effluent from an electroplating plant whereby soluble heavy metals are removed from the effluent and pathogens are killed in the sludge, or (c) an effluent with a high BOD is merged with an effluent with a high concentration of chlorine and the BOD is thereby reduced.

(2) Note. A disclosure of merely discharging the effluent from several systems into a common stream is not sufficient basis for placement of a document in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

920 for a system in which parallel similar systems may be merged and treated in water steps as a single system.

920 Using combined systems of sequential local and regional or municipal sewage systems:

Collection of disclosures under collection 918 wherein a generally relatively small system for treatment of sewage from a single source has an output combined with the output of similar such systems for further treatment of the combined outputs.

(1) Note. An example of the disclosures of this collection include the collecting and combining of the effluents from domestic septic systems and treating the combined effluent in an activated sludge type plant rather than using individual drain fields.

921 Flow equalization or time controlled stages or cycles:

Collection of disclosures under collection 918 in which a process has provision to even surges and lapses in the flow of liquid being treated, or in which the operation proceeds according to a schedule based on time or demand on the systems.

(1) Note. Among various examples encompassed in this collection are disclosures wherein a holding tank may be utilized to prevent discharge into an over loaded conduit, a rest period for recovery or regeneration of equipment or parts of a system may be set to operate in off-peak periods to reduce demand capacity.

922 Oil spill cleanup (e.g., bacterial, etc.):

Collection of disclosures under collection 918 directed to recovery or removal of petroleum from a body of water or adjacent shore usually as the result of a mishap during transport or handling of crude.

(1) Note. These references are concerned with offshore drilling accidents, discharge of oil from tankers, ship collisions, etc., and are not concerned with oily emulsions in industrial sewage such as removal of cutting oil.

(2) Note. The indented subclasses will provide for the majority of the art on oil spill cleanup, but the use of plants, animals, or micro-organisms is classifiable in this subclass.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art. Class 516 is the locus for the breaking of colloid systems generically claimed and provides for (a) the separation or purification of liquids, generally claimed, when performed by a Class 516 process, such as by breaking an emulsion, dispersion, or foam, and for such processes further including ancillary steps, such as, decanting, or passing through a separatory funnel, etc., or (b) processes in which recovery is intended of both water and another product. Class 210 provides for (a) processes which include a step of colloid system resolution of liquids, generally claimed, when combined with a step of separation of a diverse component, unless that step is also a Class 516 step (i.e., multiple Class 516 steps are proper for placement in Class 516), or (b) a step of colloid system breaking, per se, for the purpose of obtaining water, wherein the water may be intended for use or intended to be made suitable

for disposal, thus, decontaminating of sewage waste water to be dumped into the ocean using an emulsion breaking step is proper for Class 210.

923 Using mechanical means (e.g., skimmers, pump, etc.):
Collection of disclosures under collection 922 in which machinery or devices function primarily based on structure or organization of parts to effect the cleanup.

924 Using physical agent (e.g., sponge, mop, etc.):
Collection of disclosures under collection 922 in which material operates in accordance with a property (e.g., sorption, repellency, etc.) but does not chemically react to effect the cleanup.

925 Using chemical agent:
Collection of disclosures under collection 922 in which a material is used which reacts chemically to effect the cleanup.

(1) Note. The chemical reaction may involve any constituent and includes burning, i.e., oxidation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
924 for an oil spill cleanup using sorption.

926 Using oxidation ditch (e.g., carousel, etc.):
Collection of disclosures directed to treatment of sewage in which the water is run through a circular flume or sluice.

(1) Note. The running water appears to increase the dissolved oxygen and enhance aerobic activity.

928 PAPER MILL WASTE (E.G., WHITE WATER, BLACK LIQUOR, ETC.) TREATED:
Collection of disclosures directed to the treatment of liquid by products or effluents from a paper making operation.

929 HEMOULTRAFILTRATE VOLUME MEASUREMENT OR CONTROL PROCESSES:
Collection of disclosures directed to the measurement or control of the volume of hemoultrafiltrate which migrates from blood through a semipermeable membrane as defined in the Glossary under semipermeable.

930 PAINT DETACKIFYING:
Collection of disclosures directed to the detackification of paint particles dispersed in water.

(1) Note. The disclosures placed herein generally involve detackifying oversprayed paint in paint spray booth waste water to facilitate separation of the paint.

931 ZEBRA MUSSEL MITIGATION OR TREATMENT:
Collection of disclosures directed to apparatus used to remove or kill a freshwater Eurasian lamellibranch mollusk (*Dreissena polymorpha*) or directed to apparatus using a freshwater Eurasian lamellibranch mollusk (*Dreissena polymorpha*) to improve or alter water.

FOREIGN ART COLLECTIONS

The definitions below correspond to abolished subclasses from which these collections were formed. See the Foreign Art Collection Schedule of this Class for specific correspondences. [Note: the titles and definitions for indented art collections include all the details of the one(s) that are hierarchically superior].

FOR 100 Closed circulating systems:
Foreign art collection having apparatus with means to recirculate a liquid there between.

FOR 101 Lubrication:
Foreign art collection having systems designed to lubricate moving parts of a machine.

FOR 102 Aquarium or swimming pool:
Foreign art collections having systems designed to accommodate living animals.

FOR 103 Geographic (e.g., drainage ditch, septic, pond):
Foreign art collection having apparatus in which a separator is part of a system installed in the ground or related to a particular geographic feature, as a lake.

FOR 104 Ancillary to storage tank:
Foreign art collection having apparatus including a supply tank for an apparatus or a

system having a function external to the subject matter of this class and purification is incidental to the storage of the liquid for use in that system or apparatus.

FOR 105 Utilizing electrical or wave energy (directly applied to liquid or material being treated):

Foreign art collection for process in which the liquid is directly subjected to an electric field or current or to a regular pulsating source of energy (e.g., irradiation, ultrasonic vibration, etc.).

(1) Note. The process of electrolysis of liquid to generate a treating agent for a process of this class will be classified here but electrolysis to directly separate a constituent is classified in Class 205. For example, electrolysis of a liquid to produce chlorine which kills bacteria in the liquid would be classified here but removing mercury salts by plating out mercury would be classified in Class 204.

(2) Note. The wave energy must be applied to the liquid and vibrating a filter to clean it is not classifiable here but in subclass 785.

FOR 106 Including geographic feature (e.g., drainage ditch, septic, pond) (210/747):

This foreign art collection is indented under unnumbered placeholder 210/600. Process in which a relationship to or a feature of the terrain is positively recited, other than mere discharge to the earth or to a body of water.

(1) Note. While septic tanks are normally found to be underground, the term septic tank is not considered a geographic feature.

(2) Note. While discharge to the ground is not a geographic feature, discharge at a specified depth or in a particular strata or formation, or in a particular location in a body of water is considered a geographic feature.

(3) Note. Included in this subclass is in situ purging of flowing or still liquid (e.g., drainage ditch, septic system, pond) wherein the method of separating or purifying has (a) at least part of a system installed on natural or modified terrain to convey rain, snow melt, a river, sewage, well water or oil, etc. or (b) a relationship to a particular nonland geographic feature, such as a lake, ocean, sea, etc.

END