

CLASS 261, GAS AND LIQUID CONTACT APPARATUS

SECTION I - CLASS DEFINITION

Apparatus specially adapted to produce an intimate contact between gases and liquids to exchange properties or mutually modify conditions.

- (1) Note. This class includes devices generally known as air and gas washers, air-moisteners, carbonators, carburetors, jet-condensers, coolers, heaters, and the like, operating by direct contact of the two fluids.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

Processes for gas separation by contacting a gaseous fluid mixture with a liquid and processes of degasifying a liquid by stripping with a gas are classified elsewhere, even if gas and liquid contact apparatus is also claimed, which apparatus, if claimed alone, would be classifiable in Class 261. See References to Other Classes, below.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

- 43, Fishing, Trapping, and Vermin Destroying, appropriate subclasses for aerators permanently associated with minnow buckets or in combination with significant minnow bucket structure.
- 62, Refrigeration, subclass 121 for processes specialized to cooling a material involving gas-liquid contact, and subclasses 304+ for apparatus specialized to cooling a material out of contact with the fluids undergoing gas and liquid contact.
- 95, Gas Separation: Processes, see Lines With Other Classes. Processes for gas separation by contacting a gaseous fluid mixture with a liquid and processes of degasifying a liquid by stripping with a gas are classified elsewhere in Class 95, Gas Separation: Processes, subclasses 149+ and 241+, respectively, even though gas and liquid contact apparatus is also claimed, which apparatus, if claimed alone, would be classifiable in Class 261.
- 96, Gas Separation: Apparatus, appropriate subclasses for apparatus used in separation of a gas

from a fluid mixture comprising (i) a gas and solid or liquid particles entrained therein, (ii) a liquid and gas entrained therein, or (iii) a plurality of gases are classified in Class 96, Gas Separation: Apparatus. Class 261 will take apparatus for degasifying liquid (e.g., deaerating feed water heater, etc.) wherein the liquid is merely contacted with a gas in a chamber or space for deaeration thereof; for apparatus wherein a gaseous fluid mixture is contacted with a liquid spray, sheet, stream, or bath to precipitate dust or to sorb a constituent from the gaseous fluid mixture; for apparatus comprising a nonabsorbent element on which a gaseous fluid mixture is contacted with a liquid if the element is continuously supplied with a liquid or is continuously moved into and out of a liquid bath or supply; and for apparatus comprising an absorbent porous sheet or mass on which a gaseous fluid mixture is contacted with a liquid if the sheet or mass is: (a) continuously supplied with liquid, (b) cyclically or periodically moved through a liquid reservoir, (c) maintained wet by liquid applying means, or (d) moistened by maintaining some part of a continuous wick type member immersed in liquid, by following the law of the machine, or during normal operation of a gas contacting function.

- (a) Note that under the provisions of (a) and (b) there must be no affirmative means to dry the sheet or mass, nor means to assure a dry condition of the sheet or mass before gas flow is resumed or the sheet or mass is returned to the gas contacting position. If apparatus for degasifying liquid by contact with a gas has other means to cause gas separation of the liquid with gas entrained therein, of the separated gas, or of the separated liquid, then the apparatus is classified in Class 96. If apparatus in which a gaseous fluid mixture is contacted with a liquid to precipitate dust or to sorb a constituent from the gaseous fluid mixture has other means to cause gas separation or has means to treat the contact liquid, then the apparatus is classified in Class 96.
- (1) Note. Apparatus for separating ammonia (NH₃) or acid anhydrides (CO₂, SO₂, etc.) from a gas by mere contact with a liquid is classified in Class 261.

- 110, Furnaces, appropriate subclasses for gas and liquid contact apparatus in combination with significant furnace structure; particularly subclasses 124, 127 and 128.
- 122, Liquid Heaters and Vaporizers, subclasses 459, 479.1 and 487 for processes of desuperheating steam by gas and liquid contact with or without claimed contact apparatus which, per se, is classifiable in Class 261.
- 202, Distillation: Apparatus, subclasses 182+ for distilling apparatus combined with apparatus for absorbing a gas in a liquid.
- 222, Dispensing, appropriate subclasses, particularly subclasses 394+ for apparatus which, in some cases, is disclosed as gas and liquid contact apparatus but claims dispensing structure to the exclusion of any arrangement to assist a contact operation. For a statement of the line, see Lines With Other Classes, Gas or Vapor Dispensers, of the class definition of Class 222.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 34+ for liquid saturated absorbent masses for slowly diffusing the liquid into a gas atmosphere, and see the class definition of Class 239, Lines With Other Classes and Within This Class, Slow Diffusers, for a statement of the lines between Classes 55, 239, and 261.
- 399, Electrophotography, subclass 250 for liquid carrier condensation of liquid developer material within an electrophotographic device.
- 435, Chemistry: Molecular Biology and Microbiology, appropriate subclasses for processes of contacting gases with liquids in operations that include fermentations or for apparatus for use in such processes.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, appropriate subclasses for means of general utility for separating liquids from solids, particularly subclasses 198.1+, for means to add treating material.

3 In circuit:

This subclass is indented under subclass 2. The liquid-separating means interposed in a circuit between the liquid-outlet and the liquid-inlet.

4 On inlet:

This subclass is indented under subclass 2. The liquid-separating means operating on incoming liquids.

5 Filtering:

This subclass is indented under subclass 2. The separator on the outlet including a filter.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, subclasses 348+ for filters of general utility.

6 Unitary structure:

This subclass is indented under subclass 5. The filter having structural relations with the contact apparatus other than pipe connections.

7 Decanting:

This subclass is indented under subclass 2. The separator on the outlet comprising a decanter.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, subclasses 513+ for gravitational separators of general utility.

8 Unitary structure:

This subclass is indented under subclass 7. The decanter having structural relations with the contact apparatus other than pipe connections.

16 MULTIPLE GAS:

This subclass is indented under the class definition. Two or more gases utilized differing from each other in some essential quality.

SUBCLASSES**1 MISCELLANEOUS:**

This subclass is indented under the class definition. Contact apparatus not specifically provided for below.

2 WITH LIQUID SEPARATIONS:

This subclass is indented under the class definition. Including means for separating liquids or solids from the contact liquid.

- 17 Furnace-gas type:**
This subclass is indented under subclass 16. At least one of the gases comprising products of combustion.
- 18.1 MULTIPLE DIVERSE LIQUIDS:**
This subclass is indented under the class definition. Apparatus providing means for handling plural different liquids.
- 18.2 Water added to charge:**
This subclass is indented under subclass 18.1. Apparatus having means to add water to a charge.
- 18.3 Multiple fuels:**
This subclass is indented under subclass 18.1. Apparatus providing means for handling plural liquid fuels.
- 18.4 Antidetonant:**
This subclass is indented under subclass 18.1. Apparatus having means to add an antidetonant fluid.
- 19 FLUID DISTRIBUTION:**
This subclass is indented under the class definition. Gas and liquid contact apparatus comprising special fluid-distributing means, such as pumps, valves, pipes and receptacles.
- SEE OR SEARCH CLASS:
137, Fluid Handling, for fluid distribution and handling in general.
- 20 Systems:**
This subclass is indented under subclass 19. A plurality of gas and liquid contact apparatuses connected for conjoint operation.
- 21 Series:**
This subclass is indented under subclass 20. With connections permitting gases and liquids to pass successively from one contact apparatus to another.
- 22 Gas connections:**
This subclass is indented under subclass 21. With connections permitting gases only to pass successively from one contact apparatus to another.
- 23.1 Parallel:**
This subclass is indented under subclass 20. Apparatus with connections permitting the fluids to pass through contact apparatuses in parallel.
- 23.2 Carburetors:**
This subclass is indented under subclass 23.1. Apparatus adapted to mix fuel and air.
- 23.3 Stratified charge:**
This subclass is indented under subclass 23.2. Apparatus adapted to form both a rich mixture and a lean mixture to be supplied to different portions of an engine cylinder.
- 23.4 Rotary engine:**
This subclass is indented under subclass 23.2. Apparatus adapted to supply fuel to different portions of a rotary engine cylinder.
- 24 Pumping:**
This subclass is indented under subclass 19. Including use of pumps.
- 25 Liquid operated:**
This subclass is indented under subclass 24. With gas-pumps operated by energy derived from the contact liquids.
- 26 Automatic control:**
This subclass is indented under subclass 24. Operation of pumps automatically controlled.
- 27 Liquid inlet:**
This subclass is indented under subclass 26. Pump on the liquid-inlet.
- 28 Gas and liquid:**
This subclass is indented under subclass 24. Including pumps for both liquids and gases.
- 29 Liquid circuit:**
This subclass is indented under subclass 28. Including a circuit between the liquid outlet and inlet.
- 30 Gas inlet:**
This subclass is indented under subclass 24. Utilizing a pump on the gas-inlet only.

- 31 Churn type:**
This subclass is indented under subclass 30. Specially adapted for churning.
- SEE OR SEARCH CLASS:
366, Agitating, subclasses 164.1+ for an agitator in which air may be drawn in by a suction produced by a stirrer.
- 32 Rotary dasher:**
This subclass is indented under subclass 31. Including a rotary dasher.
- 33 Reciprocating dasher:**
This subclass is indented under subclass 31. Including a reciprocating dasher.
- 34.1 Liquid:**
This subclass is indented under subclass 24. Apparatus comprising a liquid pump.
- 34.2 Accelerator pump:**
This subclass is indented under subclass 34.1. Apparatus adapted to pump fuel in response to operation of accelerator linkage.
- 34.3 With thermostatic control:**
This subclass is indented under subclass 34.2. Apparatus having means to control the quantity of liquid pumped dependent on temperature.
- 35 Gas operated:**
This subclass is indented under subclass 34.1. Pump operated by energy derived from contact-gases.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
25,
- 36.1 In circuit:**
This subclass is indented under subclass 34.1. Apparatus having a pathway (circuit) between the liquid outlet and inlet.
- 36.2 Carburetor:**
This subclass is indented under subclass 36.1. Apparatus wherein a carburetor is provided in the circuit.
- 37 Inlet:**
This subclass is indented under subclass 34.1. Including a pump on liquid-inlet.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
27,
- 38 Valved:**
This subclass is indented under subclass 38. Including use of valves.
- 39.1 Thermostatic:**
This subclass is indented under subclass 38. Apparatus including thermostatic control of valves.
- SEE OR SEARCH CLASS:
236, Automatic Temperature and Humidity Regulation, appropriate subclasses for valve elements.
- 39.2 With carburetor expansible fluid actuating means:**
This subclass is indented under subclass 39.1. Apparatus wherein the thermostatic actuating means comprises means (e.g., chamber, etc.) filled with an expansible fluid in a carburetor.
- 39.3 With carburetor bimetallic actuating means:**
This subclass is indented under subclass 39.1. Apparatus wherein a carburetor thermostatic actuating means is bimetallic.
- 39.4 Carburetor spring linkage with temperature element:**
This subclass is indented under subclass 39.1. Apparatus having spring means linkage between the thermostatic actuating means and a carburetor valve.
- 39.5 Without carburetor choke means:**
This subclass is indented under subclass 39.1. Apparatus wherein the thermostatic actuating means controls a carburetor valve other than, or in addition to, a choke valve on the inlet.
- 39.6 With carburetor electrical heater:**
This subclass is indented under subclass 39.1. Apparatus involving a carburetor including electrical heating means for supplying heat to the thermostatic actuating means.

- 40 Multiple jet:**
This subclass is indented under subclass 38. Adapted for controlling contact apparatus including a plurality of liquid-jets.
- 41.1 Progressive:**
This subclass is indented under subclass 40. Apparatus wherein the jets are operated successively.
- 41.2 With parallel carbureting passages:**
This subclass is indented under subclass 41.1. Apparatus with connectors permitting fluids to pass through contact apparatuses in parallel passages.
- 41.3 With control of plural passages:**
This subclass is indented under subclass 41.2. Apparatus with control of gas or mixture flow through at least two of the carbureting passages (e.g., includes carburetors with linkage connecting throttle valves in two or more barrels for progressive operation, etc.).
- 41.4 Multiple jet manual control:**
This subclass is indented under subclass 41.1. Apparatus with manual control of liquid flow through at least one of the jets.
- 41.5 By-pass opening beyond throttle:**
This subclass is indented under subclass 41.1. Apparatus wherein flow from at least one liquid jet discharges into gas or mixture flow downstream of a gas or mixture throttle valve (e.g., includes carburetor idle systems, etc.).
- 42 Multiple valves:**
This subclass is indented under subclass 38. Comprising a plurality of valves controlling the fluids at different points, such as the gas inlet and outlet, the liquid inlet and outlet, gas and liquid by-pass, and at the place of contact.
- (1) Note. Gas and liquid contact apparatus having a plurality of valves at one point are not included.
- 43 Connected:**
This subclass is indented under subclass 42. The two or more valves connected for simultaneous operation.
- 44.1 Contact space:**
This subclass is indented under subclass 43. Apparatus including a valve at the place of connected with gas by-pass, gas-inlet, gas-outlet, or liquid-inlet valve.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
44.2, through 44.8, for carburetor gas-liquid contact apparatus.
- 44.2 Contact valve with hollow shaft supplying liquid:**
This subclass is indented under subclass 44.1. Apparatus which includes a valve at the place of gas-liquid contact having a hollow shaft through which the liquid is supplied.
- 44.3 Transversely reciprocating air or mixture valve:**
This subclass is indented under subclass 44.1. Apparatus which includes an air or mixture valve that reciprocates transversely to the direction of the air or mixture flow.
- 44.4 Suction operated:**
This subclass is indented under subclass 44.3. Apparatus wherein the air or mixture valve is moved by suction usually engine, e.g., variable venturi type carburetor, etc.
- 44.5 Longitudinally movable air or mixture valve:**
This subclass is indented under subclass 44.1. Apparatus having an air or mixture valve that moves in a direction substantially parallel to the direction of mixture or air flow.
- 44.6 Rotating air or mixture valve:**
This subclass is indented under subclass 44.1. Apparatus having air or mixture valve movable in a rotatable motion.
- 44.7 Off-center pivoted:**
This subclass is indented under subclass 44.6. Apparatus wherein the air or mixture valve is pivoted off-center.
- 44.8 Cylinder or plug-valve type:**
This subclass is indented under subclass 44.6. Apparatus wherein the air or mixture valve is either of the plug valve type or forms part of a cylinder.

- 44.9 Variable-shape passage:**
This subclass is indented under subclass 44.1. Apparatus having means capable of changing the shape of the air intake conduit.
- 45 Gas by-pass:**
This subclass is indented under subclass 43. Including a gas by-pass valve connected with gas-inlet, gas-outlet, or liquid-inlet valve.
- 46 With gas inlet:**
This subclass is indented under subclass 45. Including a gas by-pass connected with gas-inlet valve.
- 47 With gas outlet:**
This subclass is indented under subclass 45. Including a gas by-pass connected with gas-outlet valve.
- 48 With liquid inlet:**
This subclass is indented under subclass 45. Including a gas by-pass connected with liquid-inlet valve.
- 49 Liquid inlet:**
This subclass is indented under subclass 43. Including a liquid-inlet valve connected with gas-inlet or gas-outlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
48,
- 50.1 With gas inlet:**
This subclass is indented under subclass 49. Apparatus with gas inlet valve means connected with the liquid inlet valve.
- 50.2 Suction operated gas inlet valve:**
This subclass is indented under subclass 50.1. Apparatus wherein the gas inlet valve is suction operated.
- 50.3 Noncarburetor:**
This subclass is indented under subclass 50.1. Apparatus not disclosed for mixing fuel and air.
- 51 With gas outlet:**
This subclass is indented under subclass 49. Including a liquid-inlet connected with gas-outlet valve.
- 52 Gas inlet and outlet:**
This subclass is indented under subclass 43. Including gas inlet and outlet valves.
- 53 Contact space:**
This subclass is indented under subclass 42. Including a valve at the place of contact with gas by-pass, gas-inlet, gas-outlet, or liquid-inlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
44.1,
- 54 Gas by-pass:**
This subclass is indented under subclass 42. Including a gas by-pass valve with gas-inlet, gas-outlet, or liquid-inlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
45,
- 55 With gas inlet:**
This subclass is indented under subclass 54. Including a gas by-pass and gas-inlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
46,
- 56 With gas outlet:**
This subclass is indented under subclass 54. Including a gas by-pass and gas-outlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
47,
- 57 With liquid inlet:**
This subclass is indented under subclass 54. Including a gas by-pass and liquid-inlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
48,
- 58 Liquid inlet:**
This subclass is indented under subclass 42. Including a liquid-inlet valve and gas inlet or outlet valves.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
49, and 57.
- 59 With gas inlet:**
This subclass is indented under subclass 58. Including a liquid-inlet and gas-inlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
50,
- 60 With gas outlet:**
This subclass is indented under subclass 58. Including a liquid-inlet and gas-outlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
51,
- 61 Gas inlet and outlet:**
This subclass is indented under subclass 42. Including gas inlet and outlet valves.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
52,
- 62 Contact space:**
This subclass is indented under subclass 38. Including a valve at the place of contact.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
44.1, and 53.
- 63 Gas by-pass:**
This subclass is indented under subclass 38. Including a gas by-pass valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
45, 46, 47, 48, 54, 55, 56, and 57.
- 64.1 Gas inlet:**
This subclass is indented under subclass 38. Apparatus including an inlet valve for gas.
- 64.2 Anterior throttle:**
This subclass is indented under subclass 64.1. Apparatus wherein the gas inlet valve is an anterior throttle.
- 64.3 Pressure control:**
This subclass is indented under subclass 64.1. Apparatus wherein the gas inlet valve is controlled by pressure responsive means.
- 64.4 Suction operated:**
This subclass is indented under subclass 64.1. Apparatus wherein the inlet valve is operated by suction means.
- 64.5 Float control:**
This subclass is indented under subclass 64.1. Apparatus wherein the gas inlet valve is controlled by float means.
- 64.6 Starting choke:**
This subclass is indented under subclass 64.1. Apparatus wherein the gas inlet valve comprised choke means for starting.
- 65 Gas outlet:**
This subclass is indented under subclass 38. Including a gas-outlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
47, 51, 52, 56, 60, and 61.
- 66 Liquid inlet:**
This subclass is indented under subclass 38. Including a liquid-inlet valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
48, 49, 50, 51, 53, 57, 58, 59, and 60.
- 67 Plural:**
This subclass is indented under subclass 66. Including a plurality of valves on the liquid-inlet.
- 68 Float and manual:**
This subclass is indented under subclass 67. Including both float and manually controlled valves.
- 69.1 Gas pressure controlled:**
This subclass is indented under subclass 66. Apparatus which is regulated by pressure of the contact gas.

69.2 Wet diaphragm:

This subclass is indented under subclass 69.1. Apparatus wherein a diaphragm motor is utilized having liquid contacting one side of the diaphragm.

70 Float controlled:

This subclass is indented under subclass 66. Valve controlled by variations in liquid-level by means of a float.

71 Manual:

This subclass is indented under subclass 66. Valve manually operated.

72.1 Liquid supply tank:

This subclass is indented under subclass 19. Device having a tank for holding a supply of liquid.

72.2 Aviation carburetor:

This subclass is indented under subclass 72.1. Device wherein the tank comprises a fuel bowl of a carburetor supply fuel to an airplane engine.

73 Barometric:

This subclass is indented under subclass 72.1. Liquid-flow controlled by gas pressures.

74 Contact receptacle:

This subclass is indented under subclass 19. Receptacles specially adapted for gas and liquid contact apparatus.

75 CONTACT DEVICES:

This subclass is indented under the class definition. Devices specially adapted to produce an intimate contact between gases and liquids.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 1+ for continuous gas or vapor phase colloid system (e.g., smoke, fog, aerosol, cloud, mist, etc.) or agents for such systems or making or stabilizing such systems or agents, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

76 Injector type:

This subclass is indented under subclass 75. Including an injector or two fluid concentric jet nozzle for the contact fluids, with baffles, screens, or other mingling or agitating devices.

(1) Note. See the class definition of Class 239, Fluid Sprinkling, Spraying, and Diffusing, Lines With Other Classes, Lather Makers and Slow Diffusers, for the line between the two classes.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 338, 340+ and 398+ for similar concentric jet nozzles for mixing a plurality of fluids (one of which may be a gas, the other a liquid) combined with a terminal element to spray the mixture.
417, Pumps, subclasses 151+, for jet pumps.

77 Submerged blast:

This subclass is indented under subclass 76. The injector located in a tank through which the contact liquid is circulated by the injector.

78.1 Atomizer type:

This subclass is indented under subclass 75. Devices including an atomizer or two-fluid intersecting jet nozzle with baffles, screens, or other mingling or agitating devices.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 338, 340+ and 398+ for similar intersecting jet nozzles combined with a means to project the mixture. See Class 239 definition, Lines With Other Classes, Lather Makers and Slow Diffusers, for line between the subject matter of the subclasses.
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 1+ for continuous gas or vapor phase colloid system (e.g., smoke, fog, aerosol, cloud, mist, etc.) or agents for such systems or making or stabilizing such systems or agents, when generically claimed or

when there is no hierarchically superior provision in the USPC for the specifically claimed art.

78.2 Noncarburetor:

This subclass is indented under subclass 78.1. Devices which are not carburetors for mixing fuel and air.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 1+ for continuous gas or vapor phase colloid system (e.g., smoke, fog, aerosol, cloud, mist, etc.) or agents for such systems or making or stabilizing such systems or agents, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

79.1 Rotating gases:

This subclass is indented under subclass 75. Apparatus wherein gases are rotated or deflected into a vortex during contact.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclasses following subclass 461 for whirler structures applicable in gas conduits.

79.2 Noncarburetor:

This subclass is indented under subclass 79.1. Apparatus other than a carburetor for mixing fuel and air.

80 Traveling strip:

This subclass is indented under subclass 75. Strips of flexible material or endless webs movable in contact with gases and liquids.

SEE OR SEARCH CLASS:

226, Advancing Material of Indeterminate Length, subclasses 97.1+ for fluid means to advance material of indeterminate length.
242, Winding, Tensioning, or Guiding, appropriate subclasses for more than a nominal supply or take-up coil structure (e.g., a support for such a coil, a cooperative relationship between a

tension or exhaust detector, and reel driving or reel stopping means, etc.), and subclasses 615.11+ for a residual locus for a material fluid suspension guide or guard.

81 Reciprocating:

This subclass is indented under subclass 75. Contact devices having a to-and-fro movement.

SEE OR SEARCH THIS CLASS, SUBCLASS:

33,

82 Piston:

This subclass is indented under subclass 81. Including a reciprocating piston impelling the gases and liquids into contact with baffles, screens or other mingling or agitating devices.

83 Rotating:

This subclass is indented under subclass 75. Contact devices having a rotary movement. Including rotatable contact receptacles.

SEE OR SEARCH CLASS:

366, Agitating, subclasses 219+ for movable mixing chambers.

84 Impeller:

This subclass is indented under subclass 83. Contact devices comprising rotary impellers in a fixed receptacle.

SEE OR SEARCH THIS CLASS, SUBCLASS:

32,

85 Hollow shaft:

This subclass is indented under subclass 84. The impeller-shaft adapted to conduct fluids.

86 Gas trapping:

This subclass is indented under subclass 85. The hollow shaft discharging gases from the receptacle, the gases being trapped by the impellers.

87 Gas delivering:

This subclass is indented under subclass 85. The hollow shaft delivering gases to the receptacle.

- 88 Liquid spraying:**
This subclass is indented under subclass 85. The hollow shaft delivering liquid to the impellers.
- 89 Sprayed:**
This subclass is indented under subclass 84. Liquid delivered in the form of spray upon the impellers.
- 90 Horizontal axis:**
This subclass is indented under subclass 89. The impellers rotating on a horizontal axis.
- 91 Dipping:**
This subclass is indented under subclass 84. The impellers arranged to dip in a body of liquid in the receptacle.
- 92 Horizontal axis:**
This subclass is indented under subclass 91. The impellers rotating on a horizontal axis.
- 93 Submerged blast:**
This subclass is indented under subclass 84. The impellers arranged to agitate a body of liquid into which gases are discharged below the surface.
- 94 Porous mass:**
This subclass is indented under subclass 75. Including a stationary porous mass of material (not a sheet) in contact with liquids and gases.

SEE OR SEARCH CLASS:
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 34+ for slow diffusers, per se.
312, Supports: Cabinet Structure, subclasses 31+, particularly subclass 31.04.
- 95 Surface contact:**
This subclass is indented under subclass 94. The gases flowing only in contact with the surface of the mass.
- 96 Gas-flow control:**
This subclass is indented under subclass 94. Including auxiliary devices for directing the flow of gases.
- 97 Liquid-flow control:**
This subclass is indented under subclass 94. Including auxiliary devices for directing the flow of liquids.
- 98 Spray:**
This subclass is indented under subclass 97. The liquids sprayed on the porous mass.
- 99 Capillary feed:**
This subclass is indented under subclass 97. Liquids fed to porous mass by capillary attraction.
- 100 Porous sheet:**
This subclass is indented under subclass 75. Including a stationary sheet of porous material moistened with liquids in contact with gases.

SEE OR SEARCH THIS CLASS, SUBCLASS:
80,

SEE OR SEARCH CLASS:
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 34+ for slow diffusers, per se.
312, Supports: Cabinet Structure, subclasses 31+, particularly subclasses 31.05+.
- 101 Surface contact:**
This subclass is indented under subclass 100. The gas coming only in contact with the sheet surface, i.e., does not necessarily pass through the same.
- 102 Gas-flow control:**
This subclass is indented under subclass 101. Including auxiliary devices for directing the flow of gases.
- 103 Liquid downflow:**
This subclass is indented under subclass 101. Including auxiliary devices for directing liquids downward to the porous sheet.

SEE OR SEARCH CLASS:
312, Supports: Cabinet Structure, subclasses 31.05 through 31.06 for liquid downflow porous sheet devices which form a material holding chamber and which are associated with sig-

- nificant chamber structure, such as shelves, racks, or doors.
- 104 Capillary feed:**
This subclass is indented under subclass 101. Liquids fed upward to porous sheets by capillary attraction.
- SEE OR SEARCH CLASS:
312, Supports: Cabinet Structure, subclass 31.05 for capillary upfeed porous sheet devices which form a material holding chamber and which are associated with significant chamber structure, such as shelves, racks, or doors.
- 105 Gas-flow control:**
This subclass is indented under subclass 100. Including auxiliary devices for directing the flow of gases.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
102,
- 106 Liquid downflow:**
This subclass is indented under subclass 100. Including auxiliary devices for directing liquids downward to the porous sheet.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
103, and see the note thereunder.
- 107 Capillary feed:**
This subclass is indented under subclass 100. Liquids fed upward to porous sheets by capillary attraction.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
104, and see the note thereunder.
- 108 Wet baffle:**
This subclass is indented under subclass 75. Including stationary baffles over which the liquids flow in contact with gases.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
95, 101, 102, 103, and 104.
- 109 Gas-flow control:**
This subclass is indented under subclass 108. Including auxiliary devices for directing the flow of gases.
- 110 Liquid-flow control:**
This subclass is indented under subclass 108. Including auxiliary devices for directing the flow of liquids.
- 111 Spray:**
This subclass is indented under subclass 110. Liquids sprayed upon the baffles.
- 112.1 Film:**
This subclass is indented under subclass 110. Apparatus wherein liquids are directed over baffles in a thin layer or film.
- 112.2 Corrugated plates:**
This subclass is indented under subclass 112.1. Apparatus having corrugated plates.
- 113 Perforated baffles:**
This subclass is indented under subclass 108. The baffles perforated to permit flow of liquids from one to another.
- 114.1 Overflow baffles:**
This subclass is indented under subclass 108. Apparatus wherein the baffles allow the liquid to overflow from one baffle to another.
- 114.2 Bubble caps:**
This subclass is indented under subclass 114.1. Apparatus utilizing bubble caps.
- 114.3 Jet plates:**
This subclass is indented under subclass 114.1. Apparatus utilizing jet plates (e.g., having inclined gas flow passage through through the plates, etc.).
- 114.4 Valve tray:**
This subclass is indented under subclass 114.1. Apparatus utilizing trays having gas flow control valves.
- 114.5 Tray construction:**
This subclass is indented under subclass 114.1. Apparatus having special tray construction or mounting features.

- 115 Liquid spray:**
This subclass is indented under subclass 75. Liquids sprayed in a conduit or casing in contact with gases.
- 116 Aspirating:**
This subclass is indented under subclass 115. The spray directed in the same direction as the flow of gases.
- 117 Opposed:**
This subclass is indented under subclass 115. The spray directed against the flow of gases.
- 118 Transverse:**
This subclass is indented under subclass 115. The spray directed across the flow of gases.
- 119.1 Liquid tank:**
This subclass is indented under subclass 75. Apparatus having liquid contained in a receptacle.
- 119.2 Carburetor:**
This subclass is indented under subclass 119.1. Apparatus adapted to mix fuel and air.
- 120 Floating distributor:**
This subclass is indented under subclass 119.1. Gases distributed in contact with liquids through a floating distributor.
- 121.1 Submerged blast:**
This subclass is indented under subclass 119.1. Apparatus having means to discharge gas beneath the surface of the liquid.
- 121.2 Minnow bucket:**
This subclass is indented under subclass 121.1. Apparatus adapted to aerate minnows in holding container.
- 121.3 Carburetor vented nozzle:**
This subclass is indented under subclass 121.1. Apparatus adapted to supply mixing air to fuel in carburetor nozzle, wells, or fuel passages.
- 121.4 Air inlet valve:**
This subclass is indented under subclass 121.3. Apparatus including valve means controlling flow of the mixing air.
- 122.1 Submerged screen:**
This subclass is indented under subclass 121.1. Apparatus including a screen through which gases pass and wherein the screen is positioned such that all of or a portion of the screen is below the surface of the liquid.
- 122.2 With closable apertures:**
This subclass is indented under subclass 121.1. Apparatus wherein the screen has an aperture which closes when gas flow stops, so that liquid flow through the aperture is prevented or retarded.
- 123 Submerged baffle:**
This subclass is indented under subclass 121.1. Including submerged baffles which deflect the liquids.
- 124 Multiple jet:**
This subclass is indented under subclass 121.1. The submerged gas-delivery pipe provided with a plurality of openings.
- 125 Multiple receptacle:**
This subclass is indented under subclass 119.1. Including a tank containing a plurality of liquid receptacles and means to direct gases over the liquid surface.
- 126 Upflowing gases:**
This subclass is indented under subclass 119.1. The gases adapted to flow in and out in an upward direction.
- 127 WITH EXTERNAL SUPPLY OR REMOVAL OF HEAT:**
This subclass is indented under the class definition. Subject matter wherein the contact fluids have heat supplied to or removed from them before, after or during contact by a fluid or means other than the unreacted contact fluids themselves.
- SEE OR SEARCH CLASS:
48, Gas: Heating and Illuminating, subclass 107 for apparatus preparing heating or illuminating gas from fuel oil involving a chemical reaction or for apparatus in which oil is completely vaporized and subsequently mixed with air.

- 62, Refrigeration, subclasses 304+ for apparatus specialized to cooling a material out of contact with the fluids undergoing gas and liquid contact and for gas and liquid contact devices specialized by structure to refrigeration.
- 165, Heat Exchange, subclass 60 for a combined heating and cooling arrangement having a gas-liquid contact device as an element; and subclass 110 for heat exchange structure in which gas and liquid are in contact having heat exchange elements additional to those perfecting the gas liquid contact operation.
- 237, Heating Systems, subclass 78 for a radiator of a heating system with a humidifying means.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, appropriate subclasses for means for generating fumes.
- 128 Processes:**
This subclass is indented under subclass 127. Processes.
- SEE OR SEARCH CLASS:
- 48, Gas: Heating and Illuminating, subclasses 211+ for processes of preparing heating or illuminating gas including heating and mixing oil and air.
- 62, Refrigeration, subclasses 91+ for processes in which moisture is added to air coiled by a refrigeration producer, and subclass 121 for processes of cooling by gas and liquid contact.
- 95, Gas Separation: Processes, for processes of gas separation involving gas and liquid contact. See Lines With Other Classes in the Class 261 class definition for an amplification of the line.
- 165, Heat Exchange, subclasses 222+ for a heating and cooling process with humidity control.
- 129 Temperature or humidity sensor:**
This subclass is indented under subclass 127. Apparatus including a temperature or humidity sensing means.
- SEE OR SEARCH CLASS:
- 165, Heat Exchange, subclass 226 for an automatically controlled heating and cooling device with a gas liquid contactor.
- 236, Automatic Temperature and Humidity Regulation, appropriate subclasses, for automatically operating temperature or humidity controlling mechanisms of more general utility.
- 130 Heat supply or removal control:**
This subclass is indented under subclass 129. Apparatus wherein the sensor exerts a control on a heat supply or removal means.
- 131 Automatic control of heat supply or heat effect:**
This subclass is indented under subclass 127. Apparatus wherein a control is exerted or a heat supply or removal means or on a condition directly resulting from the operation of such means in response to a means sensing an operating condition or a change of operating condition.
- 133 With mixer for supplementary gas and gaseous contactor product:**
This subclass is indented under subclass 127. Apparatus including structure downstream of a contactor by which additional gas is mingled with gaseous material from the contactor.
- 134 Pressure responsive supplementary gas supply means:**
This subclass is indented under subclass 133. Apparatus in which the admittance of the additional gas is controlled by pressure.
- 135 With indicator or tester:**
This subclass is indented under subclass 127. Apparatus provided with an indicating or testing means.
- 136 Combined:**
This subclass is indented under subclass 127. Apparatus comprising a device in addition to a gas-liquid contactor and its heating or cooling means having a function other than heat exchanging or contacting, or serving to perfect such apparatus for its intended primary purpose.

- 137 Interconnected heat supply and contact fluid flow controllers:**
This subclass is indented under subclass 127. Apparatus wherein there is a means by which a movement of a fluid flow controller actuates a heat supply or removal controller or vice versa.
- 138 Diverse heat supply or removal means:**
This subclass is indented under subclass 127. Apparatus wherein provision is made for at least two different kinds of heat transferences.
- 139 Electric heater:**
This subclass is indented under subclass 138. Apparatus including an electric heating means.
- 140.1 Refrigeration producer:**
This subclass is indented under subclass 127. Apparatus wherein the heat removal means includes apparatus to cause a cooling effect by producing a change in condition of a material, e.g., change of phase, etc.
- SEE OR SEARCH CLASS:
62, Refrigeration, subclasses 304+ for a conventional gas-liquid contactor combined with specific refrigerant handling means or having features peculiar to the manufacture of a congealed product.
- 140.2 Absorption means:**
This subclass is indented under subclass 140.1. Apparatus having structure for providing refrigeration utilizing the principle of absorption.
- SEE OR SEARCH CLASS:
62, Refrigeration, subclass 271 for dehumidification of a gas with refrigeration.
- 141 Heat producer:**
This subclass is indented under subclass 127. Apparatus including a device by which the external heat is produced by transformation of energy.
- SEE OR SEARCH CLASS:
48, Gas: Heating and Illuminating, subclass 107 for a heated oil retort into which air is injected.
- 142 Electric heater:**
This subclass is indented under subclass 141. Apparatus wherein the device is an electric heater.
- SEE OR SEARCH CLASS:
219, Electric Heating, subclasses 280+ for electric heaters for fluids.
- 143 Means burning contact product:**
This subclass is indented under subclass 141. Apparatus wherein the heat supply device is a combustion means connected to receive its fuel from the contactor.
- 144 Internal combustion engine:**
This subclass is indented under subclass 143. Apparatus wherein the combustion device is an internal combustion engine.
- SEE OR SEARCH CLASS:
123, Internal-Combustion Engines, subclasses 434+ for charge forming devices designed and adapted only for use in connection with an internal combustion engine.
- 145 Engine fuel supply means heated by exhaust manifold:**
This subclass is indented under subclass 144. Apparatus wherein the means preparing a gas-liquid mixture for burning in the engine is in heat exchanging relationship with the manifold that collects the products of combustion from the engine cylinders.
- 146 Plural distinct contact zones:**
This subclass is indented under subclass 127. Apparatus including two or more spaced interconnected zones where gas and liquid are brought into contact.
- 147 Serially arranged in flow path:**
This subclass is indented under subclass 146. Apparatus in which one of the distinct contact zones is downstream of another.
- 148 Counter flowing gas and liquid (e.g., absorption or rectification column):**
This subclass is indented under subclass 147. Apparatus wherein spaced serially connected contact zones are arranged so that gas flows

- through them successively in one direction and liquid successively in the other direction.
- SEE OR SEARCH CLASS:
62, Refrigeration, subclass 638 and 641 for a gas separation rectification process in which heat is supplied to or removed from the intermediate sections of the column.
- 149 Heat exchanger in flow path spaced from contact zones:**
This subclass is indented under subclass 147. Apparatus wherein there is a heat exchanger in the flow path spaced from the contact devices.
- 150 Heat exchange means in one of plural liquid feed paths:**
This subclass is indented under subclass 127. Apparatus wherein liquid is fed into gas through converging paths one of which includes a heat exchanger.
- 151 Recirculating fluid:**
This subclass is indented under subclass 127. Apparatus wherein a heat exchanger is located within a recirculatory circuit of one of the contact fluids.
- 152 Heat exchange means at or downstream of contact zone:**
This subclass is indented under subclass 127. Apparatus including a heat exchanger means by which the contact fluids are heated or cooled during or after contact.
- 153 Gas exposed liquid body or sheet contacting heat exchanger:**
This subclass is indented under subclass 152. Apparatus including means exposing a mass or sheet of liquid to gas and to a heat exchanger.
- SEE OR SEARCH CLASS:
237, Heating Systems, subclass 78 for radiators combined with means for moistening the air.
- 154 Porous type gas-liquid contactor exposed to heat exchanger:**
This subclass is indented under subclass 152. Apparatus including a porous body holding liquid by capillary action exposed to gas and to heat exchange.
- 155 Contact fluid passage surrounds external fluid flow passage:**
This subclass is indented under subclass 152. Apparatus wherein a passage of the heat exchanger forming a flow path for external fluid is within a chamber forming a part of the contact fluid flow path.
- 156 Fins or deflectors in contact fluid passage of heat exchanger:**
This subclass is indented under subclass 152. Apparatus wherein the contact fluid passage of the heat exchanger has flow directing structure such as fins or deflectors.
- 157 With heat exchange means for feed fluid:**
This subclass is indented under subclass 152. Apparatus combined with a heat exchanger upstream of the contactor.
- 158 INDIRECT INTERCHANGE OR HEAT BETWEEN CONTACT FLUIDS:**
This subclass is indented under the class definition. Subject matter wherein heat is interchanged between contact fluids out of contact before, after or during contact.
- 159 Incoming fluid exchanges heat:**
This subclass is indented under subclass 158. Subject matter in which one of the contact fluids exchanges heat prior to contact.
- 160 With fluid at or downstream of contact zone:**
This subclass is indented under subclass 159. Subject matter wherein the exchange is between a contact zone feed fluid and a fluid in or flowing from such zone.
- 161 Incoming exchanging fluid is feed gas:**
This subclass is indented under subclass 160. Subject matter wherein the feed fluid is a gas.
- END