

**CLASS 55, GAS SEPARATION****SECTION I - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS**

Class 55 is an integral part of Class 96 and follows subclass 429 in Class 96 in the schedule hierarchy. Class 55 uses the class definition and class lines established in and for Class 96. Class 55 provides for the gas separation apparatus that has not yet been reclassified.

**SUBCLASSES****282 WITH NONLIQUID CLEANING MEANS FOR SEPARATING MEDIA:**

This subclass is indented under the class definition. Apparatus having means (1) to apply a nonliquid cleaning agent (gas or solid) to a separator part, (2) to remove separated constituents adhering to the surfaces or from within the interstices of the separating media, or (3) to prevent (in as far as possible) accumulation of constituents on the separating surfaces by some active means or through the use of materials having special characteristics or properties for such purpose.

**SEE OR SEARCH CLASS:**

96, Gas Separation: Apparatus, subclasses 228+ for gas separation apparatus with means using liquid to clean the separating apparatus and subclasses 425+ for gas separation apparatus having means timing or programming the cleaning mechanism.

**282.1 Having insulation:**

This subclass is indented under subclass 282. Apparatus provided with means to prevent heat exchange between a gaseous fluid mixture or separated constituent and a surrounding atmosphere.

**282.2 With heating or cooling means:**

This subclass is indented under subclass 282. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent.

**282.3 Residue burned:**

This subclass is indented under subclass 282.2. Apparatus having means for removing the separated constituents adhering to the surfaces or from within the interstices of the separating media by combustion.

**282.4 Two confined fluids in indirect contact:**

This subclass is indented under subclass 282.2. Apparatus provided with a conduit or flow conductor for passing a nonsystem fluid proximate to but not in direct contact with at least a portion of a bounded gaseous fluid mixture or separated constituent to effect heat exchange therebetween, the nonsystem fluid being separate and distinct from the bounded gaseous fluid mixture or separated constituent.

**282.5 Heat exchanger is part of separator or is contiguous therewith:**

This subclass is indented under subclass 282.4. Apparatus in which the nonsystem fluid conduit or conductor is structurally associated with the confined gaseous fluid mixture or separated constituent at or proximate to the locus of separation so that the temperature of the confined gaseous fluid mixture or separated constituent is affected at the separator.

**283 With automatic control of cleaning means:**

This subclass is indented under subclass 282. Apparatus comprising a means to sense a condition which may or may not occur, or a lack of such condition, or the result of such condition, the sensing means causing or permitting operation of a separate means for controlling said cleaning agent applying means, said constituent removing means or said accumulation preventing means, without the intervention of a human attendant.

- (1) Note. An example of an automatic means under this definition is a device in which a diaphragm, responding to a differential pressure across the media, an increased pressure upstream of the media or a decreased pressure downstream of the media, moves a stem attached to the diaphragm to open a valve for applying a cleaning agent to the media.

An example of means which is not automatic control under this definition is a motor or clock driven cam which controls the valve for applying a cleaning agent at predetermined times or revolutions.

**284 With sequential cleaning of plural units:**  
This subclass is indented under subclass 282. Apparatus having two or more substantially independently functioning separating media and further including means whereby the media are serially refurbished in some predetermined order defined by the law of the machine.

- (1) Note. For this and the indented subclasses the qualification of independent separating media is considered met by apparatus in which a running length of separating material has been supported or maintained in a manner to form from such length a plurality of separate and distinct media simultaneously used for separation, i.e. some portions at the region of support thereof blocked from gas separating operation.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclasses 426+ for gas separation apparatus having means for sequential cleaning of plural separating units with timing or changeable programming means.

**285 Ferris wheel type filter unit arrangement:**  
This subclass is indented under subclass 284. Apparatus in which the separating media are arranged about a horizontal axis and form a type of circular cylinder or wheel and spoke-like arrangement with the said entities at the periphery or rim.

**286 With gas flow arresting means:**  
This subclass is indented under subclass 284. Apparatus having means to prevent flow of system fluid through selected ones of the media.

**287 Interconnected with cleaning means:**  
This subclass is indented under subclass 286. Apparatus in which the operation of the flow preventing means is controlled simultaneously with or by the refurbishing mechanism or the control therefor.

**288 Interdependent or interoperated gas flow cutoff or apparatus shutdown and media cleaning:**  
This subclass is indented under subclass 282. Apparatus wherein cleaning of the separating media is dependent on and occurs as a direct result of the actuation or operation of (1) means (e.g. valve) for completely preventing the flow of system fluid to the separating media or (2) means (e.g. on-off gas flow switch) for completely closing down the separating operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

286+, for devices for sequentially cleaning a plurality of separating media combined with means for preventing the flow of gas undergoing separation from reaching the media which is being cleaned.

**289 Interdigitated comb and separating media:**  
This subclass is indented under subclass 282. Apparatus comprising a multiple tined member peculiarly adapted to enter spaced interstices, openings or parallel bars or wires of the media to remove accumulated solids either by a motion generally at right angles to the plane of said media or longitudinally of the elements thereof.

**290 For moving indefinite or continuous length separating media:**  
This subclass is indented under subclass 282. Apparatus comprising means for refurbishing media of the endless type (e.g. of cylindrical form) or media which is handled and supported without regard to a leading or trailing edge or end, said media being in motion during use for its separating function.

SEE OR SEARCH THIS CLASS, SUBCLASS:

351+, for similar separating media.

**291 Plural diverse cleaning means:**

This subclass is indented under subclass 282. Apparatus involving the use of two or more cleaning agent applying, constituent removing or accumulation preventing means of different types (e.g. pneumatic nozzle and vibrating means).

**292 Sonic type:**

This subclass is indented under subclass 282. Apparatus having means for producing compressional vibratory wave energy in a fluid medium in relation to or associated with the separating media to cause adhered constituents to be removed from the separating media, said waves being below, within or beyond the audible spectrum.

- (1) Note. Pressure pulses in a fluid generated merely by intermittent discharge of a gas are not considered to be compressional vibratory waves under this definition. However, compressional vibratory waves under this definition may be produced by intermittent discharge of a gas, as in a siren. Devices in which cleaning of the separating media is effected by pressure pulses of a gas will be found in subclasses 293 and 301+.

**SEE OR SEARCH CLASS:**

96, Gas Separation: Apparatus, subclass 389 for gas separation apparatus using sound waves to effect or enhance separation.

**293 With separating media pneumatically vibrated or flexed:**

This subclass is indented under subclass 282. Apparatus comprising means to effect motion of small amplitude and relative high frequency of the media by contact of gasiform fluid therewith to effect the cleaning thereof.

**294 Relatively movable pneumatic nozzle (e.g., scanning nozzle):**

This subclass is indented under subclass 282. Apparatus comprising a gasiform fluid discharging means directed against or along the media and being supported for motion relative to said media to dislodge accumulated constituent material.

**295 Solid agent cleaning member movingly contacts apparatus:**

This subclass is indented under subclass 282. Apparatus in which a nonfluid agent (e.g., brush, rapper, scraper blade) moves relative to the apparatus to effect a physical contact therebetween or to advance across a surface thereof.

**296 Agent has defined traversing motion relative to separating media:**

This subclass is indented under subclass 295. Apparatus comprising an agent which has a prescribed relative movement across, and in contact with, at least a portion of a surface of a separating media.

**297 With motion effecting means interrelated with separating operation:**

This subclass is indented under subclass 296. Apparatus in which the operation of the agent to traverse the media is integrated with the separating apparatus operation such that the two operations function simultaneously.

**298 Gas flow actuates member:**

This subclass is indented under subclass 297. Apparatus in which the agent is caused to move as a result of the flow of system fluid through the apparatus.

**299 With resulting flexing or distortion of resilient or collapsible separating media:**

This subclass is indented under subclass 296. Apparatus wherein the media is of nonrigid form and is flexed or deformed by contact of the agent therewith.

**300 Vibrating, jarring, or rapping means:**

This subclass is indented under subclass 295. Apparatus in which either the separating surface or some portion of the apparatus is struck by the agent with relatively sharp and repeated blows to shake the separating media.

**SEE OR SEARCH CLASS:**

96, Gas Separation: Apparatus, subclasses 32+ for electric field separation apparatus having vibrating, jarring, or rapping means for cleaning parts of the apparatus.

**301 Cohesive filter media cleaning:**

This subclass is indented under subclass 282. Apparatus for renovating or refurbishing a coherent sheet or mass type filter media.

SEE OR SEARCH THIS CLASS, SUBCLASS:

282, for means for cleaning discrete fibrous or particulate material filter media.

351, for continuous type filters with means for advancing or replacing the used filter with a new or cleaned portion thereof.

**302 Pneumatic reverse flushing:**

This subclass is indented under subclass 301. Apparatus in which a gasiform fluid is brought into contact with the media in a direction opposed to system fluid flow during separation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

294, for pneumatic scanning nozzles.

**303 Draft diverted from one side of filter to other:**

This subclass is indented under subclass 302. Apparatus in which the gasiform fluid is bled or taken at one face (upstream or downstream) of the media and directed to the other.

**304 Filter manipulation, shaking or flexing for precluding or removing encrustation:**

This subclass is indented under subclass 301. Apparatus comprising means effecting or enabling filter motion or a relative movement among portions thereof whereby accumulations are removed or prevented.

**305 Attendant actuated manipulating means:**

This subclass is indented under subclass 304. Apparatus wherein the means is arranged for actuation by a human being (e.g. by hand).

**306 AIRCRAFT ANTI-INGESTION MEANS (E.G., AIRCRAFT DEBRIS GUARD):**

This subclass is indented under the class definition. Apparatus associated with an aircraft and related to the air intake means of the power plant (e.g., ram jet engine) of said aircraft to prevent the inflow of ground or air borne

objects or creatures to the said power plant by screen or deflector like means.

(1) Note. Gratings, grids, grilles and foraminous members structurally similar to the devices of this subclass are classifiable in many other classes as partially indicated under Search Class as follows.

SEE OR SEARCH CLASS:

15, Brushing, Scrubbing, and General Cleaning, subclasses 238+ for scrapers comprising wire or pivoted link mats.

52, Static Structures (e.g., Buildings), subclasses 633+ for an openwork-structure not elsewhere provided for and see the notes for other classes having openwork structures.

166, Wells, subclasses 227+ for screens or other filters disclosed for separating solids from the earth fluid flowing into a well conduit.

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 127.1+ and 265.11+ for a reaction motor discharge nozzle which may have a screen or deflector associated with the fluid inlet.

244, Aeronautics and Astronautics, appropriate subclasses for similar means involving modified aircraft structure.

245, Wire Fabrics and Structure, subclasses 2+ for screens or grids comprising wires looped or twisted around each other.

256, Fences, various subclasses for similar devices.

428, Stock Material or Miscellaneous Articles, subclasses 131+ for a single or plural layer stock material product in the form of a web or sheet including an apertured component.

454, Ventilation, appropriate subclasses for gratings, louvers, or screens associated with chimneys, ventilation air inlets, or registers.

**307 FILTER OR APERTURED DEFLECTOR UNIT DISCONTINUOUS ACROSS GAS FLOW WITHIN FLOW CONDUIT:**

This subclass is indented under the class definition. Apparatus comprising a separator means positioned at least in part within a confined

system fluid path, there being an unobstructed space between it and the side wall of the flow path as supported therein and being further comprised of a member or material having (1) multiple openings, pores or passages (2) massed discrete filter particles, or (3) a single opening therethrough.

- (1) Note. A unit is any member or assemblage of members adapted to be handled as a subassembly when being associated with a conduit.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 309, for open separator bypass means provided by discontinuous separator members placed at the terminus of the flow line or there beyond and not relying upon valves or other movable flow controlling means.
- 422, for movably mounted or supported media adjustable to various positions of use or to nonuse.
- 445+, for members which are either perforated and coextensive with the flow path wall or solid and spaced from the wall, so that the mixture has only one path to follow, either around or through the member.

**308 Multiple members serially spaced in flow conduit:**

This subclass is indented under subclass 307. Apparatus comprising at least two of said separator means which are substantially identical and are spaced within the confined flow path in the direction of gas flow.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 442+, for serially spaced deflector surfaces.
- 482+, for serially spaced filter members.

**309 WITH SEPARATING MEDIA BYPASS OR SYSTEM GAS PRESSURE RELIEF (E.G., RUPTURABLE OR DEFORMABLE):**

This subclass is indented under the class definition. Apparatus provided with means (1) to permit total flow of the system fluid directed through the apparatus to avoid the separating means, or at least one stage of serially arranged separating means, (2) to admit ambient air to the apparatus through other than the normal

inflow path of fluid to be separated, or (3) to permit discharge or escape of system fluid to the ambient air through other than the normal gas effluent path.

- (1) Note. Pressure relief is not a matter of mere multiple discharge paths or inlet paths, but some modified arrangement for flow which responds to excessive or back pressures.
- (2) Note. A bypass means under this definition does not include a mere movably or removably mounted separator means, but does include a separating means which, in response to certain gas pressure or flow characteristics, is moved out of its normal use position to provide for a bypass therearound.

SEE OR SEARCH CLASS:

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

**309.1 With heating or cooling means:**

This subclass is indented under subclass 309. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or the separated constituent.

**310 Pressure relief means to or from atmosphere:**

This subclass is indented under subclass 309. Apparatus having means responsive to super or sub-atmospheric pressures within the apparatus either to discharge system fluid therefrom to the surrounding atmosphere or to permit inflow of air from the surrounding atmosphere through other than the normal system fluid inlet.

SEE OR SEARCH CLASS:

- 96, Gas Separation: Apparatus, subclasses 400+ for gas separation apparatus having gas pressure responsive means for gas cutoff or diversion.

**311 Relief means is downstream of media (e.g., ambient air bypasses filter):**

This subclass is indented under subclass 310. Apparatus in which the means is physically situated below the separating means in the path of travel of the system fluid.

**312 Valved bypass means:**

This subclass is indented under subclass 309. Apparatus having valve means to permit flow of system fluid around a separating means to thereby avoid the separating function of at least that one separating means.

- (1) Note. In this subclass are collected patents having an auxiliary inlet which is downstream of the separator and which is hand controlled.
- (2) Note. Flow control of gas for separators in parallel either as distinct units or as separator parts of a single unit is not subject matter for these subclasses.

**313 Gas force responsive:**

This subclass is indented under subclass 312. Apparatus in which the means permitting flow around or by the separating means is responsive to a force exerted thereon by the system fluid.

**SEE OR SEARCH CLASS:**

96, Gas Separation: Apparatus, subclasses 400+ for gas separation apparatus having gas pressure responsive means for gas cutoff or diversion.

**314 Shunt means for total flow:**

This subclass is indented under subclass 312. Apparatus having flow conducting means between the apparatus inlet and outlet permitting all of the inflowing system fluid to pass to the egress means without flowing through the separating means or at least one stage thereof if serially arranged distinct separators are included.

**315 PLURAL SERIAL BASICALLY DIVERSE SEPARATING MEDIA:**

This subclass is indented under the class definition. Apparatus having two or more discrete separators arranged one downstream of the

other, at least two of the separators being of differing basic types.

- (1) Note. Basic types of separators here included are, for example; expansion chambers, deflectors (fixed baffles, whirl chambers and moving members), filters (screens, porous mass or pad, cohesive sheet material), sorbers and the like.
- (2) Note. The patents in these subclasses usually comprise separate and distinct diverse separating members. However, in subclass 335 indented hereunder will be found integral or connected deflectors and filters, usually a conical screen with an upstream deflector surface for the gas to first impinge upon and be deflected by the surface and then be screened or filtered through the foraminous member.
- (3) Note. Concentrate collection receptacles or retainers provided with gas escape means and which serve to permit concentrate to be in part air borne to the said receptacle and therefore act as a secondary separator are not considered as separators for classification with serially arranged diverse separators under this definition, but as proper subject matter for subclass 428.

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

342+, for serially arranged multiple similar separators.

**315.1 With heating or cooling means or having insulation:**

This subclass is indented under subclass 315. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent or having means to prevent heat exchange between a gaseous fluid mixture or a separated constituent and a surrounding atmosphere.

**315.2 Heat exchanger is part of separator or is contiguous therewith:**

This subclass is indented under subclass 315.1. Apparatus in which a conduit or flow conductor, which permits passage of a nonsystem fluid proximate to but not in direct contact with at least a portion of a bounded gaseous fluid mix-

ture or separated constituent to effect heat exchange therebetween, is structurally associated with the bounded gaseous fluid mixture or separated constituent at or proximate the locus of separation so that the temperature of the bounded gaseous fluid mixture or separated constituent is affected at the separator.

- 317 At least one mounted for continuous motion:**  
This subclass is indented under subclass 315. Apparatus comprising at least one separator arranged for continuous movement relative to a fixed point or support and effecting separation of a gas mixture while so moving.

SEE OR SEARCH THIS CLASS, SUBCLASS:

400+, for a separator comprising a continuously moving member, but not in combination with a separator of a diverse type.

- 318 Plural stages in unitary casing:**  
This subclass is indented under subclass 315. Apparatus comprising separators of different basic types arranged in a single housing or flow confining means.

- 319 Including expansion chamber:**  
This subclass is indented under subclass 318. Apparatus comprising an enlarged section of the flow line, the enlarged section being disclosed for retarding the velocity of the gas mixture and allowing the heavier constituents to settle out therefrom.

(1) Note. See the class definition, search class notes, Classes 137 and 261, for placement of patents comprising expansion chambers.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 171+ for fluid separating traps or vents including the expansion chamber type and see (1) Note above.

- 320 Deflector and fibrous, filamentary, particulate solids, or cohesive sheet filter type:**  
This subclass is indented under subclass 318. Apparatus including an impingement or flow redirecting separator means together with a separator means of the type which retains thereon or prevents passage therethrough of

nongaseous particles, the latter being comprised of massed entangled individual strands, massed individual discrete elements, numerous unentangled discrete strands (brush type) or coherent sheet porous or foraminous material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

318, for similar combinations wherein the filter comprises a solid, rigid, porous member (e.g. sintered or ceramic).

- 321 Multiple of one type in series of parallel in flow path:**

This subclass is indented under subclass 320. Apparatus comprising three or more separators, at least two of which are of the same basic type, and at least one of a different basic type, the separators of the same basic type being spaced either transverse across, or serially along the flow line.

SEE OR SEARCH THIS CLASS, SUBCLASS:

342+, for multiple similar separators in series or parallel, but with the discrete flow inlet and outlet paths as defined therein.

442+, for plural impingement or flow redirecting surfaces serially spaced.

482+, for two or more filters of the same type arranged in series or in parallel.

- 322 Serially spaced with at least one of other type intermediately positioned:**

This subclass is indented under subclass 321. Apparatus in which one of the multiple similar or same basic type separators is positioned upstream and another downstream of one or more of a different type separator.

- 323 Filters:**

This subclass is indented under subclass 321. Apparatus in which the multiple, similar separators are of the type which retain thereon or prevent passage therethrough of nongaseous particles.

- 324 In parallel:**

This subclass is indented under subclass 323. Apparatus in which the separators are spaced transversely across the flow line.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
483, and 484, for multiple filters arranged in parallel, but not combined with a diverse separating member.
- 325 Serially spaced deflectors:**  
This subclass is indented under subclass 321. Apparatus in which the multiple similar separators are of the flow impingement or redirecting type and are spaced along the flow path in the direction of gas flow.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
442+, for redirecting or impingement surfaces spaced serially in a flow path.
- 326 With connected trough or channel:**  
This subclass is indented under subclass 325. Apparatus in which at least one of the flow redirecting or impingement means is provided with a basin, box, gutter or other similar member having a closed bottom and open top for receiving and retaining or guiding the separated heavier constituent.
- 327 Filter is most upstream:**  
This subclass is indented under subclass 320. Apparatus in which the member first contacted with the fluid mixture in the housing or flow confining means is of the type which retains thereon or prevents passage therethrough of nongaseous particles.
- 328 Movable or movable mounted for adjustment or nonuse:**  
This subclass is indented under subclass 320. Apparatus in which any one of the diverse separating members is supported for motion to various positions to or from a position wherein the member does not affect the fluid mixture.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
422, for a filter or deflection separator, per se, supported as herein described.
- 329 Filamentary brush type or fibrous mass:**  
This subclass is indented under subclass 320. Apparatus in which the means other than the impingement or flow redirecting means comprises a mass of entangled strands or numerous unentangled discrete strands.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
477, for brush type filters.  
512+, and 527+, for entangled fibrous or strand mass type filters.
- 330 Tubular or annular for radial gas flow:**  
This subclass is indented under subclass 329. Apparatus in which the means is hollow and arranged within the flow line so that the system fluid flow is toward or away from the central axis.
- 331 Conical deflector with curved or parabolic radially extending wide downstream end:**  
This subclass is indented under subclass 320. Apparatus in which the impingement or flow redirecting means comprises a member which increases in diameter in the direction of gas flow and at its maximum diameter is provided with an arched or curved element extending outwardly.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
463, for a similar impingement surface, per se.
- 332 Cohesive sheet-like filter:**  
This subclass is indented under subclass 320. Apparatus in which the means other than the impingement or flow redirecting means comprises a coherent sheet of porous or apertured material (e.g. paper, woven wire or fabric).
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
495+, and 522+, for coherent sheet material filters.
- 333 Multiple contiguous layers or coils with radial gas flow:**  
This subclass is indented under subclass 332. Apparatus in which the means comprises two or more layers each in contact with the next adjacent and either stacked or wound upon the other so as to form a tubular member and so arranged in the flow line that the system fluid flow is toward or away from the tube axis.



**334 Bag type:**

This subclass is indented under subclass 332. Apparatus in which the coherent sheet means comprises one closed and one open end defined by a side wall to encompass a space, the system fluid flow being into or out of the space through the porous or apertured material.

- (1) Note. The bag filter need not be capable of being flexed or distorted while in use position as required for the bag filters provided for in subclass 361 below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

341, and 361+, for other bag type separators and see (1) Note above.

**335 Including imperforate upstream bag end deflector:**

This subclass is indented under subclass 334. Apparatus in which the coherent sheet encompassing the space has included therewith, in use position, an impingement or redirecting surface so fixed or associated with the sheet as to be contacted by the system fluid prior to said fluid coming in contact with the sheet.

- (1) Note. These filtering and deflecting elements may be integral, one with the other. See (2) Note under subclass 315.

SEE OR SEARCH THIS CLASS, SUBCLASS:

368, for flexible or collapsible bag type separators having a spaced interior inflow path or with means modifying air flow in the bag usually to define a trap or collecting chamber for the separated constituent rather than to effectuate the separation of a constituent from the gas stream.

**336 Conical:**

This subclass is indented under subclass 332. Apparatus in which the coherent sheet like filter means tapers towards or from a point.

- (1) Note. There need not be an apex for the cone. The material may be in the form of a frusto cone.

**337 Cyclone or centrifugal whirl type deflector:**

This subclass is indented under subclass 332. Apparatus in which the impingement or flow redirecting means causes the system fluid to assume a spinning or turning motion around an axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

345+, and 447+, for other apparatus in which separation is caused by the gas rotating around an axis.

**338 WITH RECYCLE MEANS:**

This subclass is indented under the class definition. Apparatus having means to direct system fluid which has passed through a stage of separation back through or substantially through the inlet to the apparatus or back through a distinct stage of serially arranged separators.

- (1) Note. Redirecting system fluid substantially back to the inlet is meant to include both internal and external arrangements of flow means wherein the redirected fluid enters upstream of the first apparatus part which influences the separating action.
- (2) Note. Recycle apparatus may never lose control of the system fluid; e.g., effluent may not be discharged to the atmosphere and then sucked back again.
- (3) Note. For these subclasses system fluid may be the partially or totally cleansed effluent, or may be the gas which has escaped to the concentrate or residue chamber.

**338.1 With heating or cooling means:**

This subclass is indented under subclass 338. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent.

**339 For concentrate entrained in effluent gas outlet means:**

This subclass is indented under subclass 338. Apparatus in which the fluid returned to the inlet for recycle is derived from or bled off the effluent making its way through the apparatus cleansed gas outlet means.

- (1) Note. Effluent refers to fluid which has been through a stage of separation and is regarded as at least partially voided of the nongaseous constituent and is departing the system.

**340**

This subclass is indented under subclass 339. Apparatus in which the return path for the effluent comprises a conductor arranged exteriorly of the rest of the separator apparatus.

**341.1 MULTIPLE BAG TYPE FILTERS IN CHAMBER:**

This subclass is indented under the class definition. Apparatus having a plurality of bag type filters (with fluid flow ingress or egress means) located within a chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:  
361+, for flexible or collapsible bags.

**341.2 Gas flow from inside to outside of filter:**

This subclass is indented under subclass 341.1. Apparatus in which the direction of gas flow is from inside to outside of the bag type filters.

**341.3 Modular compartments:**

This subclass is indented under subclass 341.2. Apparatus in which the chamber includes means which divide the chamber into a plurality of compartments in such a manner that each compartment has a wall common to an adjacent compartment and communication between adjacent compartments is inhibited.

**341.4 Horizontally mounted filters:**

This subclass is indented under subclass 341.2. Apparatus in which the bag type filters are horizontally disposed.

**341.5 Modular compartments:**

This subclass is indented under subclass 341.1. Apparatus in which the chamber includes means which divide the chamber into a plurality of compartments in such a manner that each compartment has a wall common to an adjacent compartment and communication between adjacent compartments is inhibited.

**341.6 Partitioned bag filter chamber:**

This subclass is indented under subclass 341.1. Apparatus in which the chamber includes a partition means which divides the chamber into a plurality of compartments, all of the compartments formed by the partition means being in open communication with one another.

**341.7 Horizontally mounted filters:**

This subclass is indented under subclass 341.1. Apparatus in which the bag type filters are horizontally disposed.

**341.11 With heating or cooling means or having insulation:**

This subclass is indented under subclass 341.1. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent or having means to prevent heat exchange between a gaseous fluid mixture or separated constituent and a surrounding atmosphere.

**342 MULTIPLE SEPARATORS, EACH WITH DISCRETE AND LONGITUDINALLY CONFINED GAS INLET OR OUTLET FLOW PATH:**

This subclass is indented under the class definition. Apparatus comprising a plurality of separating devices each having a separate and individual system fluid inlet or outlet conduit of extended length.

- (1) Note. Concentrate collection receptacles provided with gas escape means and which serve to permit concentrate to be in part air borne to the said receptacle and therefore may act as a secondary separator are not considered as separators for classification with a similar serially arranged separator under this definition, but as proper subject matter for subclasses 428+.

- (2) Note. Cyclone or centrifugal whirl separators in parallel are classified under this definition and will be found in subclasses 346+ regardless of the length of the inlet or outlet conduit. Separating devices which have whirl producing stages in series, or other separators in series or parallel must each have a gas inlet or outlet conduit of length sufficient

to be readily identifiable in order to come under this definition. A device in which only the casing wall forms the flow path for a plurality of separators is excluded and will be found in subclasses 442+ or 482+, unless the casing wall between series related separating devices is modified to form a flow path portion of different area than the preceding or following portion.

SEE OR SEARCH THIS CLASS, SUBCLASS:

315+, for serial arrangements of cyclone and other types of separating devices.

428+, for residue handling means and see (1) Note under subclass 428.

**342.1 With heating or cooling means or having insulation:**

This subclass is indented under subclass 342. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent or having means to prevent heat exchange between a gaseous fluid mixture or separated constituent and a surrounding atmosphere.

**342.2 Heat exchanger is part of separator or is contiguous therewith:**

This subclass is indented under subclass 342.1. Apparatus in which a conduit or flow conductor, which permits passage of a nonsystem fluid proximate to but not in direct contact with at least a portion of a bounded gaseous fluid mixture or separated constituent to effect heat exchange therebetween, is structurally associated with the bounded gaseous fluid mixture or separated constituent at or proximate to the locus of separation so that the temperature of the bounded gaseous fluid mixture is affected at the separator.

**343 Combined serial and parallel arrangement:**

This subclass is indented under subclass 342. Apparatus comprising more than one separating device each arranged in or forming a branch of a divided fluid flow conduit to thereby treat a portion of the divided fluid, and not the total flow, preceded or followed by another separating device which treats the total flow of fluid passing to or from at least one of the branched separators.

**344 With flow equalizing, controlling, or distributing means:**

This subclass is indented under subclass 342. Apparatus comprising means which modifies, varies or regulates the fluid flow to, from or among the separating devices, or permits the portion of the fluid passing through one separator to be substantially equal to that passing through any other separator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

410+, and 418+, especially 413, for other devices in which there is control of the gas to or from the separator.

**345 Centrifugal:**

This subclass is indented under subclass 342. Apparatus comprising a plurality of separating devices, each of which have means to spin or rotate the system fluid.

**346 Parallel:**

This subclass is indented under subclass 345. Apparatus in which each separating device is arranged in, or forms a branch of a divided fluid flow conduit to thereby treat a portion of the divided fluid, and not the total flow.

**347 Gas inlet and outlet at linearly opposite ends of separating zone:**

This subclass is indented under subclass 346. Apparatus in which the system fluid after being separated moves in a direction away from the inlet, i.e., is not reversed back towards the inlet, and the axes of the system fluid inlet and outlet of each separating device lie substantially in the same plane.

**348 Plural gas inflow openings, slots, or whirl vanes in each separator:**

This subclass is indented under subclass 346. Apparatus in which each separating device has the system fluid discharged therein through (1) more than one inlet, each such inlet arranged to cause the incoming system fluid to spin or rotate, or (2) a single inlet having a plurality of baffles associated therewith, to cause the system fluid to spin or rotate into or through the separator zone.

**349 Tangential inlet to each separator:**

This subclass is indented under subclass 346. Apparatus wherein each separating device comprises a separator casing having a system fluid inflow conductor which directs the fluid into said casing in a path other than one which intersects or is parallel to the longitudinal axis of the casing.

**350.1 Filters:**

This subclass is indented under subclass 342. Apparatus comprising at least two filters.

SEE OR SEARCH THIS CLASS, SUBCLASS:

482+, for two or more filters not provided with discrete and longitudinally confined gas inlets or outlets.

**351 WITH MEANS FOR ADVANCING CLEAN PORTIONS OF CONTINUOUS OR INDEFINITE LENGTH SEPARATING MEDIA INTO GAS STREAM:**

This subclass is indented under the class definition. Apparatus in which the separator media is endless or of extent greater than the gas flow path with which it is used and including means for moving an unused or new portion of said media to within the flow path.

(1) Note. A crank, handle or the like attached to the media or to a support means for the media for positively moving the media is sufficient to qualify under this definition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

290, for means, exclusive of liquid contact, for cleaning moving, indefinite or continuous length separating media.

474, for separator means comprising a continuous flow of particulate filter material.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclass 42 for electric field separation apparatus with cleaning means in which the electrode is carried on an endless belt or the electrode is belt type.

**352 Advancing means initiated by flow, pressure, or pressure differential of gas:**

This subclass is indented under subclass 351. Apparatus in which the operation of the means causing the removal or advancing of the separator media (1) is directly responsive to an element subjected to the presence or absence of the gas flow, or (2) results ultimately from a device sensing the pressure or pressure differential across a portion of the gas flow path.

SEE OR SEARCH THIS CLASS, SUBCLASS:

283, and 288, for similar apparatus for initiating or controlling the cleaning means of the separating media.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclasses 397+ for gas separation apparatus with automatic control means for gas or nongaseous constituent discharge.

**353 Multiple distinct units:**

This subclass is indented under subclass 351. Apparatus made up of a plurality of continuous or indefinite length separating media arranged in series or parallel relationship relative to the gas flow, or in which the separator is comprised of a plurality of independent separating members arranged relatively one to the other so as to form a continuous or indefinite length separating media.

SEE OR SEARCH THIS CLASS, SUBCLASS:

342+, appropriate subclasses for multiple, similar separators in parallel or series, but each having a separate, defined gas inlet or outlet.

**354 Indefinite or running length:**

This subclass is indented under subclass 351. Apparatus comprising a separating media which is advanced into the gas stream without regard to leading or trailing ends or is fed from or to a roll or wound package, usually outside of the gas flow path.

(1) Note. All these members are generally of sheet form and of nonrigid quality so

that they may be distorted or caused to change shape under normal usage.

- (2) Note. A continuous media (i.e. one which is drum type or has no free ends) is not classified in this subclass, but is found in subclass 351.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

497+, and 500, for sheet form filters which are maintained in nonplanar form, similar to the arrangements of many of the sheet form separators in this subclass.

SEE OR SEARCH CLASS:

242, Winding, Tensioning, or Guiding, subclasses 550+ for unwinding an elongated material and subclasses 570+ for a coil holder of general use.

**355 WITH LIQUID TRAP SEAL OR VALVE:**  
This subclass is indented under the class definition. Apparatus comprising means to maintain a liquid at some desired location to act as a stop, seal or closure between adjacent system parts.

- (1) Note. Fluent material comprised of particulate solids, which act as a stop, seal, or closure, is proper subject matter for this subclass if a means (e.g. a valve) is provided to maintain said material at a desired location.

**356 WITH MEANS FACILITATING TRANSPORTABILITY OR HANDLING OF APPARATUS:**

This subclass is indented under the class definition. Apparatus including (1) means to support the apparatus with respect to a surface comprising wheels, skids, runners or the like for movement across such surface or (2) means such as handles, carrying straps or the like attached to and facilitating the repositioning or transfer of the apparatus or apparatus part during the use or nonuse thereof.

**357 Handle feature for apparatus or part thereof:**

This subclass is indented under subclass 356. Apparatus comprising modified apparatus means grasped or held by the hand and

attached to the apparatus or apparatus part to facilitate the movement thereof.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

369+, 436, 478+, and 503+ and appropriate subclasses for separators with which tools or detached handle means may be useful for changing, replacing or gaining access to filters.

SEE OR SEARCH CLASS:

403, Joints and Connections, appropriate subclasses for a joint between an implement and a handle therefor.

**358 WITH GROUND SUPPORT MEANS (NONFLOW CONDUCTING):**

This subclass is indented under the class definition. Apparatus having means other than mere casing or enclosing structure for sustaining the separating apparatus against gravity, such means being adapted to rest upon the ground or other supporting surface and not including a flow line.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

356+, for other features involving support means.  
490+, for combinations involving supporting means for separating media within or at the extremity of a flow line.

SEE OR SEARCH CLASS:

15, Brushing, Scrubbing, and General Cleaning, subclasses 301+ for installed vacuum cleaners and see the class definition of Class 55 for a statement of the line.

**359 WITH PORTION OF COVER REMOVABLE:**

This subclass is indented under the class definition. Apparatus having a cover provided with means whereby a portion of said cover is easily removable, the cover enclosing, sealing or embracing an apparatus part to render the part nonusable until the portion is mutilated, torn or removed.

- (1) Note. Packaged or encased apparatus requiring total removal of an outer covering or enwrapping means, e.g. remov-

ing filter bags from a box or packing container, is not included.

**SEE OR SEARCH CLASS:**

206, Special Receptacle or Package, appropriate subclasses for packaged articles and see (1) Note above.

**360 WITH ELECTRICAL GROUNDING MEANS:**

This subclass is indented under the class definition. Apparatus having electrical energy conductor means arranged to provide a flow path to discharge an apparatus part or to prevent accumulation of electrical charges in the apparatus.

**361 FLEXIBLE OR COLLAPSIBLE BAG TYPE:**

This subclass is indented under the class definition. Apparatus having a separating member comprised of nonrigid cohesive material of essentially globular, tubular, or cylindrical container configuration which encloses a space and has at least one opening for passing gas into or out of said member, said member comprised in part or entirely of gas permeable filter material.

- (1) Note. In use position the bag is capable of being flexed by reason that the material is not rigidly nor inflexibly supported or sustained against such action as by being held sandwich style.

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

341, for multiple bag type separators in a plenum chamber.

**362 With bag ejecting means:**

This subclass is indented under subclass 361. Apparatus with positive means to remove a separator bag partially or completely from within a separator housing.

**SEE OR SEARCH CLASS:**

96, Gas Separation: Apparatus, subclass 398 for gas separation apparatus having bag ejecting means responsive to a sensed condition.

**363 Toroidal or annular bag:**

This subclass is indented under subclass 361. Apparatus wherein the separating member in use position forms a tube axially directed along an arcuate or circular path (e.g. doughnut-like).

**364 Impervious bag with pervious portion:**

This subclass is indented under subclass 361. Apparatus wherein the separating member is comprised of both gas permeable and impermeable material, said impermeable material comprising the major portion of said member.

**365 Bag carried strain relief means between bag supports:**

This subclass is indented under subclass 361. Apparatus having non-filtering means of greater tensile strength than the filter material of the bag extending substantially the length of the bag and between means for holding the bag in operative position.

- (1) Note. The strain relief means may be a permanent part of the bag or a separate member joinable thereto, and is so related to the bag that any force exerted thereon through the bag support means is taken by the said strain relief means. Mere bag structure reinforcing means is excluded and will be found in subclass 381 below.

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

378+, for bag securing or supporting means.  
381+, for bag structure, per se, and see (1) Note above.

**366 With separable nonfiltering residue container:**

This subclass is indented under subclass 361. Apparatus having a gas impermeable receptacle for collecting solids separated from the gas, said receptacle removably associated with the separating member.

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

429, for other separable or removable collecting receptacles for the heavier constituents.

- 367 Valved, self-closing, or apparatus contained bag closing means:**  
This subclass is indented under subclass 361. Apparatus in which the separating member or apparatus has means which act to shut or seal the gas inlet opening of said member, whereby the member may be removed from the apparatus with the inlet opening in shut or sealed condition.
- (1) Note. The means may be an inherent biasing of the sealing means to closed position resulting from a characteristic or property of the material or of its relation to other parts of the structure.
- 368 Spaced interior inflow path or with means modifying gas flow in bag:**  
This subclass is indented under subclass 361. Apparatus having gas flow conducting means defining a confined flow path within the separating member, or having means associated with the member which affects the direction or pattern of gas flow within said member.
- 369 Closure means other than coupler to flow line for filter or cover bag:**  
This subclass is indented under subclass 361. Apparatus in which a filter member or a nonrigid member enclosing said filter member has an opening separate and distinct from the opening attachable to the gas flow conduit, and means for closing said separate and distinct opening.
- 370 Use position residue removal means:**  
This subclass is indented under subclass 369. Apparatus providing an arrangement which permits or effects the removal of the accumulated separated constituents from the device while at least a portion of the filter member or enclosure therefor remains connected to the gas conduit.
- 371 Inner filter bag removal:**  
This subclass is indented under subclass 370. Apparatus having means which permits the filter member to be substantially or completely removed from within the confines of the enclosing means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
362, for means for ejecting a filter bag from within a housing.
- 372 With additional nonbag type filter:**  
This subclass is indented under subclass 361. Apparatus in which the gas is passed through two or more filters, and in which less than all of said filters are of the flexible or collapsible bag type.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
334, for a bag type filter and a serially arranged basically different type separator.  
482, for two or more filters, none being of the flexible bag type.
- 373 Housing closure secures bag:**  
This subclass is indented under subclass 361. Apparatus in which the filter member in use position is enclosed within a housing and the means which secures the member in the housing is an integral part of or depends on a means which provides admission to the interior of said housing.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
480, for separate flow line access means for securing filters of other than the bag type within a flow line.
- 374 With flow line coupling means:**  
This subclass is indented under subclass 361. Apparatus having means to connect or join the separating member to a gas conduit in gas flow relationship.
- (1) Note. This and indented subclasses will take a direct coupler between a bag and flow line, or a modified bag end means to which a separate flow line coupler is joined, whether or not the flow line is claimed.
- 375 Flexible conduit joins line to bag:**  
This subclass is indented under subclass 374. Apparatus in which the connecting means comprises a pliable or nonrigid gas conveying channel.

**376 Coupling part inseparable from bag:**

This subclass is indented under subclass 374. Apparatus in which an essential part of the connecting means is integrally associated with and modifies the structure of the separating member.

- (1) Note. The means permanently attached to the bag may be static, such as a ring element permanently attached to a bag end, or manipulable, such as a jointed or expandible clamping means permanently attached to a bag end.

**377 Resilient or expandible:**

This subclass is indented under subclass 376. Apparatus in which the connecting means comprises elastic or other deformable material that recovers its original shape when released after being distorted, or is readily capable of being spread apart or enlarged.

**378 With securing or supporting means:**

This subclass is indented under subclass 361. Apparatus wherein (1) a means sustains or bears at least a part of the weight of the separating member against the force of gravity or prevents at least a portion of said member from collapsing, or (2) the separating member is structurally modified to provide a means for connecting the member to a support.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 365, for strain relief type supports.  
374+, for flow line coupling means which are also securing or supporting means.

**379 Bag internally supported:**

This subclass is indented under subclass 378. Apparatus in which said sustaining or connecting means is located within the separating member.

**380 Nested bags or folded wall with spaced or unsecured faces:**

This subclass is indented under subclass 361. Apparatus wherein the separating member comprises (1) a plurality of permeable bags one within the other, in spaced or face-to-face relationship and in which at least one of said bags is a filter, or (2) a single filter bag folded or foldable in such a manner that the lateral wall

thereof is comprised of plural, facially unsecured layers or a chamber is formed between layers.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 382, for a filter bag made of two or more folds or layers substantially facially secured to each other so as to form a single separating surface.

**381 Seaming, reinforcing or bag structure:**

This subclass is indented under subclass 361. Apparatus relating to the arrangement or interrelation of the parts or materials which comprise the permeable separating member.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 361, for bag filter material, per se.  
522+, for separator materials.

**382 Multi-ply, strata, or laminated:**

This subclass is indented under subclass 381. Apparatus in which at least a portion of the member is comprised of two or more sheets, or surface extending masses, in face-to-face relation, or in which the material of the member is comprised of physically interrelated layers of different characteristics.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 380, for a single filter bag with a wall folded upon itself, both folds being facially unsecured so as to form plural separating surfaces, or a chamber therebetween.

**383 WITH REMOTE FAN OR PUMP AND UNCONFINED FLOW TO SEPARATOR:**

This subclass is indented under the class definition. Apparatus having means to effect gas flow through, or relative to, a separator, said gas passing from the flow effecting means to the separator, or vice versa, through an unbounded area.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 437+, and 467+, for gas pumps or fans in a confined flow path combined with a gas separating media.



**385.1 COMBINED OR CONVERTIBLE:**

This subclass is indented under the class definition. Apparatus in combination with features other than flow or residue conducting or handling structure, media retaining or access structure, heating or cooling means, or insulation separating structure and not provided for above; or having means or parts capable of structural rearrangement or modification to selectively provide either a separating organization having some other mode of operation or a device of some other description.

- (1) Note. Examples of patents classified under this definition include those claiming a separator combined with a shield to prevent rain from entering the gas inlet, or with a protective shield to prevent damage to the separator or casing or with a showcase.

**385.2 In environmental air enclosure:**

This subclass is indented under subclass 385.1. Apparatus wherein an enclosure, e.g., clean air room, bomb shelter, incubator, etc., has means to provide air for a desired purpose.

**385.3 In motor vehicle:**

This subclass is indented under subclass 385.1. Apparatus located within a motor vehicle.

SEE OR SEARCH CLASS:

- 15, Brushing, Scrubbing, and General Cleaning, subclass 313 for cleaning apparatus involving air blast or suction means installed within a motor vehicle.

**385.4 In vented container:**

This subclass is indented under subclass 385.1. Apparatus located within a container having a vented opening.

**385.5 Involving mining or metallurgical apparatus:**

This subclass is indented under subclass 385.1. Apparatus associated with mining or metallurgical structure.

**385.6 Involving communication receiving or transmitting apparatus:**

This subclass is indented under subclass 385.1. Apparatus associated with communication receiving or transmitting structure.

**385.7 Involving shielding apparatus:**

This subclass is indented under subclass 385.1. Apparatus associated with structure having shielding means.

**385.8 Involving ash tray:**

This subclass is indented under subclass 385.1. Apparatus associated with an ash tray.

**391 RESTRICTED ANNULAR MIXTURE INLET TO COLLECTOR ZONE AROUND GAS OUTLET CONDUIT ATTACHED BAFFLE:**

This subclass is indented under the class definition. Apparatus comprising a casing with a collecting zone for a separated constituent and a gas outlet conduit leading therefrom, said conduit provided with a radially outwardly extending guide or shield stopping short of the casing to form an annular opening between it and the casing wall for the influent mixture to enter the collecting zone.

**392 WITH GUIDE MEANS EFFECTING REMOVAL OF CONSTITUENT LAYER OUT OF GAS STREAM:**

This subclass is indented under the class definition. Apparatus comprising a separating chamber including static means (e.g. skimmer) so positioned therein as to direct the flow of a layer of one or more of the system fluid constituents in a stratified gas mixture out of the flowing gas stream to an escape from the separating zone or to a collection zone.

- (1) Note. The directing means must be more than an aperture in a deflecting surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 407, for a concentrate flow groove, guide or channel on a moving member.

- 392.1 With heating or cooling means:**  
This subclass is indented under subclass 392. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent.
- 393 Movably mounted for adjustment:**  
This subclass is indented under subclass 392. Apparatus in which the directing means is arranged for movement between fixed positions to vary the effect thereof in use.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
422, for adjustably mounted or supported deflectors and see the search notes thereunder.
- 394 At escape means for heavier constituent:**  
This subclass is indented under subclass 392. Apparatus in which the directing means is at or forms the outlet means through which the heavier constituent layer leaves the separator chamber.
- 395 And separable residue receptacle:**  
This subclass is indented under subclass 394. Apparatus comprising a receptacle, removable from the separator, into which the heavier constituent is discharged.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
429, for other separable or removable collecting receptacles for the heavier constituents.
- 396 Annular outlet around gas outflow path:**  
This subclass is indented under subclass 394. Apparatus wherein the directing means comprises an opening for the heavier constituents defined between the outflow gas conduit and a wall surrounding and spaced therefrom.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
448+, for annular outlets for the concentrate in which there is no guide or directing means for the concentrate.
- 397 Spaced, overlapped walls:**  
This subclass is indented under subclass 394. Apparatus comprising one or more openings for the discharge of the heavier constituents, each opening defined by two walls, one wall being spaced inwardly from the other and both walls being intersected by the same diametric axis of the separator chamber.
- 398 Plural, angularly spaced:**  
This subclass is indented under subclass 394. Apparatus comprising more than one flow directing means for the heavier constituents, each means being spaced circumferentially around the axis of the separator chamber.
- 399 Spiral guide:**  
This subclass is indented under subclass 392. Apparatus in which the directing means is of helical configuration.
- 400 MOUNTED OR SUPPORTED FOR CONTINUOUS MOTION:**  
This subclass is indented under the class definition. Apparatus wherein the separator includes a continuously moving unitary member, other than a mere impeller, so arranged relative to associated structure, or itself so designed, as to perform a separating function.
- (1) Note. To be classified under this definition a nonfilter member must stratify, deflect, or otherwise initiate separation of the system fluid constituents by reason of the member's motion relative thereto.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
317, for continuously moving separating means combined with at least one other separator of a diverse type (e.g. filter).  
351, for continuous or indefinite length separating means movable during use.  
422, for a surface which is removably or adjustably mounted.  
437+, and 467+, for those separating devices in which the moving means is nothing more than a fan or pump.  
474, for particulate solids movable during use.

## SEE OR SEARCH CLASS:

- 95, Gas Separation: Processes, subclasses 107+ for processes of gas separation involving a moving solid sorbent.
- 96, Gas Separation: Apparatus, subclasses 125 and 150 for solid sorbent apparatus having a moving bed.

**401 Plural distinct separating media or stages:**

This subclass is indented under subclass 400. Apparatus comprising two or more separating means, at least one of which is continuously moving, each functioning substantially independently of the other (1) as a separating means for only a portion of the system fluid or (2) as one of a series of separation phases wherein each downstream separating means treats the effluent of the preceding upstream means.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 342+, for plural separators of the type classified in this subclass wherein each is provided with a discrete and longitudinally confined gas inlet or outlet flow path.

**402 Overlapping moving separators:**

This subclass is indented under subclass 401. Apparatus wherein at least two of the separator means are of the continuous motion type, each of the moving means acting on only a portion of the system fluid and the effective areas encompassed by said means overlapping one another.

**403 Plural moving separators serially arranged:**

This subclass is indented under subclass 401. Apparatus wherein at least two of the separator means are of the continuous motion type, the moving separating means being arranged one downstream of the other in the direction of gas flow.

**404 Moved by system fluid in confined flow path:**

This subclass is indented under subclass 400. Apparatus wherein the continuously moving means is so arranged in or in relation to a flow confining means for the system fluid as to be

actuated by the normal flow of said fluid through the separator.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 298, for a member actuated by gas flow to clean a deflector.
- 352, for a means actuated by gas flow to advance a continuous or indefinite length separator e.g. a drum.

**405 Fluid flow normal to axis of moving member:**

This subclass is indented under subclass 404. Apparatus wherein the continuously moving means comprises a member rotatable about a fixed axis, the direction of system fluid inflow to said separator member being at right angles to said axis.

**406 Differentially deflected system fluid constituents:**

This subclass is indented under subclass 400. Apparatus wherein the continuously moving means intercepts the flow of system fluid and deflects one or more constituents thereof to a greater extent than the remainder.

- (1) Note. A rotating member which throws the system fluid outwardly therefrom for separation by impingement of the heavier constituents on a static surface (slinger) is not considered to be a differential deflecting means for this subclass but is considered to be more than just a fan or pump and is classifiable in any of the other preceding subclasses of this group.

**407 Concentrate flow groove, guide, or channel on moving member:**

This subclass is indented under subclass 406. Apparatus wherein the moving means includes one or more grooves, guides or channels as an integral part thereof by means of which a flowing concentrate layer of one of the system fluid constituents is directed to suitable outlet means.

**408 Separated gas conducted axially through rotating member:**

This subclass is indented under subclass 406. Apparatus wherein the continuously moving means comprises a rotating member at least a

- portion of which comprises a confined flow path, coaxial with the axis of rotation, for the separated gas.
- 409 Hollow shaft:**  
This subclass is indented under subclass 408. Apparatus wherein the outlet flow path comprises a tubular shaft which rotatably supports the continuously moving separator means.
- 410 WITH SEPARATED GAS OUTFLOW CONTROL (E.G., APERTURED CONDUIT):**  
This subclass is indented under the class definition. Apparatus having means which acts on the gas flow subsequent to separation to (1) vary the quantity of such gas flow or (2) spread out, render less turbulent, or disperse such gas flowing out of the apparatus.
- (1) Note. Patents are placed in this and indented subclasses rather than in subclass 418 and indented subclasses when the direction of flow is indeterminable or is of no moment.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
418+, for means upstream of the separating media to control the flow of gas thereto.
- 410.1 With heating or cooling means:**  
This subclass is indented under subclass 410. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent.
- 411 Movable gas outlet conduit:**  
This subclass is indented under subclass 410. Apparatus comprising a flow confining means for the gas flowing out of the apparatus, said means arranged for movement relative to the separator casing.
- 412 Longitudinal:**  
This subclass is indented under subclass 411. Apparatus in which the flow confining means is arranged for rectilinear movement along the flow path axis.
- 413 Baffle or flow guide:**  
This subclass is indented under subclass 410. Apparatus having means to deflect or direct the gas flow subsequent to separation.
- 414 Within or downstream of gas outlet conduit:**  
This subclass is indented under subclass 413. Apparatus in which the means is positioned within a flow confining means for the gas flowing out of the apparatus or spaced therefrom in the direction of gas flow.
- 415 Movable baffle of flow guide:**  
This subclass is indented under subclass 414. Apparatus wherein the deflecting or directing means is arranged for movement to vary the effect thereof on the gas flow.
- 416 Flow straightener:**  
This subclass is indented under subclass 414. Apparatus comprising means to reduce or eliminate a whirling, spinning, or turbulent motion of the outlet gas.
- 417 Valve:**  
This subclass is indented under subclass 410. Apparatus having a valve to vary gas flow to control the quantity of separated gas flowing through or out of the apparatus.
- 418 WITH INFLOW GAS CONTROL OR DISTRIBUTION:**  
This subclass is indented under the class definition. Apparatus having means which acts on the gas flow to the separator, prior to separation to (1) vary the quantity of such gas flow or (2) spread out, guide or disperse such gas flow to the separating means.
- (1) Note. Inflow control does not include a mere unmodified gas inlet or means for imparting a whirling or centrifuging motion to the gas which is essential to the operation of the device for the purpose of separating a constituent from the system mixture.
- (2) Note. When the direction of flow is of no moment, see subclass 410 and the notes thereto.
- (3) Note. The guide, distributor or diffuser must be positioned wholly upstream of

the separating means. If any part thereof is within the separated gas outlet conduit, the patent will be found in subclass 414.

SEE OR SEARCH THIS CLASS, SUBCLASS:

417, for gas outflow control valves and see (2) Note above.

447+, for fixed gas whirlers and see (1) Note above.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclasses 397+ for gas separation apparatus with automatic control means for gas or nongaseous constituent discharge.

**418.1 With heating or cooling means or having insulation:**

This subclass is indented under subclass 418. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent or having means to prevent heat exchange between a gaseous fluid mixture or separated constituent and a surrounding atmosphere.

**419 Multiple inlets:**

This subclass is indented under subclass 418. Apparatus in which the means comprises a plurality of apertures, a manifold means or flow paths to distribute flow to the separating means.

(1) Note. Perforated plates, reticulated end members or foraminous containers are not properly herein classified if such member or means comprise mere supporting or retaining means for the filter media.

**420 Check valve:**

This subclass is indented under subclass 418. Apparatus comprising a valve of the direct response type, i.e. the valve moves in one direction in response to change in the flow or pressure of the incoming gas and resumes its normal, neutral or biased position when the original flow or pressure condition is restored.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 511+ for the structure of the valve, per se.

**421 WITH MEANS FOR LIQUID SEPARATION:**

This subclass is indented under the class definition. Apparatus comprising means to separate a plurality of different liquids, or a liquid and a solid, one from another, in order to collect each liquid or solid individually.

(1) Note. A reservoir comprising a plurality of different outlet openings or conduits so arranged that each of a plurality of different liquids, or a liquid and a solid, will be obtained separately at each outlet is included under this definition.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, subclasses 149+ and 253 for processes of gas separation involving separation of two or more liquids from each other.

96, Gas Separation: Apparatus, subclasses 182+ for degasifying means for liquid with a separator for multiple liquids.

137, Fluid Handling, subclasses 171+ for fluid separating traps or vents having separate outflows for diverse liquids or solids, but not combined with a gas separating structure.

209, Classifying, Separating, and Assorting Solids, for gas separation devices combined with means to separately guide or collect each of a plurality of diverse solids (e.g., means to separately collect fine and coarse solid materials).

210, Liquid Purification or Separation, appropriate subclasses for separation of liquids in general.

261, Gas and Liquid Contact Apparatus, subclasses 2+ for gas and liquid contact apparatus involving separating means for two or more liquids.

- 422 SEPARATING MEDIA ADJUSTABLE TO VARIOUS POSITIONS OF USE OR TO NONUSE:**  
This subclass is indented under the class definition. Apparatus wherein the separating media is mounted for movement to various operative positions or to a position of nonuse with respect to the gas mixture acted upon while attached to the separating apparatus.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
306, for movably mounted separators of the aircraft anti-ingestion type.  
328, for movably mounted separators which comprise at least one of the separating elements in a plurality of diverse separators.  
393, for adjustably mounted flowing concentrate layer guide means.
- 423 MEANS WITHIN GAS STREAM FOR CONDUCTING CONCENTRATE TO COLLECTOR:**  
This subclass is indented under the class definition. Apparatus comprising a separating chamber including therein a means within the system fluid gas stream, other than the separating media, for channeling the flow of a separated constituent out of the separation zone to a concentrate collection zone within the separator.
- 424 WITH CONCENTRATE BACKFLOW OR RE-ENTRAINMENT PREVENTING MEANS:**  
This subclass is indented under the class definition. Apparatus comprising means associated with a gas separating device for averting (1) remixing of a system fluid constituent, after substantial separation, with the clean outflow gas or (2) the flowing of a separated system fluid constituent toward the gas outflow path.
- 425 Closure between separating and collecting zones:**  
This subclass is indented under subclass 424. Apparatus having means which in at least one position of use completely shuts off the interflow of gases or concentrate between the separator and a concentrate collector means.
- 426 Baffle intermediate concentrate collector zone and gas outlet conduit:**  
This subclass is indented under subclass 424. Apparatus in which the means comprises a guide or shield (e.g. plate, deflector) positioned in the path the separated constituent, after collection, would tend to follow towards the gas outflow conduit.
- (1) Note. The guide or shield might function in one of two ways: (1) deflect the heavier constituents away from the gas outflow conduit, or (2) restrict the suction effect of the exit gas on the separated constituents in the collector zone.
- 427 Adjustably mounted:**  
This subclass is indented under subclass 426. Apparatus in which the guide or shield is mounted on means which allows it to be selectively positioned relative to the gas outlet or concentrate collector zone.
- 428 RESIDUE ACCESS, HANDLING OR REMOVING MEANS:**  
This subclass is indented under the class definition. Apparatus having means associated with a gas separating device for manipulating, transporting, or providing access to a collected mass of nongaseous residue or concentrate comprising (1) affirmative means to transport or carry away the separated material, (2) means (e.g. a valve) which selectively retains the separated material within an apparatus part or permits the material to escape from said part, (3) removable receptacles for nongaseous material, or (4) movable means (e.g. hinged doors) for permitting admission to the interior of nongaseous material receptacles.
- (1) Note. Concentrate collection receptacles or retainers provided with gas escape means and which serve to permit concentrate to be in part air borne to the said receptacle and therefore may act as a secondary separator are not considered as separators for classification with serially arranged separators or with diverse separators for subclass 428 or subclasses 342+, respectively but as proper subject matter under this definition.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 282+, for means for removing separated constituent from the interstices or surfaces of a separator.  
 466, for means conducting or conditioning a flowing mass of separated materials, said materials having continuous flow and at no stage being collected as a mass or transported by affirmative means.
- 428.1 With heating or cooling means:**  
 This subclass is indented under subclass 428. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent.
- 429 Separable collection container:**  
 This subclass is indented under subclass 428. Apparatus comprising a receptacle or storage bin for the heavier separated constituent arranged to be removed from its normal collecting position relative to the separator.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 366, for separable residue containers combined with flexible or collapsible bag type separators.  
 395, for other removable collection receptacles combined with a separator having a guide means for the heavier constituents at the escape opening.
- 430 With means effecting or assisting discharge of residue (e.g., endless belt):**  
 This subclass is indented under subclass 428. Apparatus comprising a means which positively effects or aids removal of the collected residue rather than merely permitting such removal.
- 431 Gaseous or liquid:**  
 This subclass is indented under subclass 430. Apparatus in which the means is a fluid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 282+, for cleaning a separating media with a nonliquid.  
 466, for treating the residue with a liquid.
- SEE OR SEARCH CLASS:  
 96, Gas Separation: Apparatus, sub-classes 228+ for gas separation apparatus with means using liquid to clean the separating apparatus.
- 432 With movable or manipulable means controlling escape of residue:**  
 This subclass is indented under subclass 428. Apparatus comprising a separated material receiver having means which in one position retains the separated materials therein and in an alternate position allows the materials to issue therefrom (e.g. valved residue outlet).
- 433 Manually actuated:**  
 This subclass is indented under subclass 432. Apparatus in which the means is placed in and out of the position by a motion transmitted by an attendant's hand or foot.
- 434 DEFLECTOR:**  
 This subclass is indented under the class definition. Apparatus comprising a surface means which effects an abrupt change in direction of the system fluid gas flow or guides said gas flow to cause the heavier constituents thereof to (1) drop out and remain behind, while the lighter constituent (e.g. clean gas) flows on, or (2) move to the outer periphery of a rotating gas stream in a concentrated layer to permit such layer to be separated from the mass of lighter constituent.
- SEE OR SEARCH CLASS:  
 95, Gas Separation: Processes, sub-classes 267+ for processes of gas separation by deflection.  
 406, Conveyors: Fluid Current, sub-classes 157+ and 168+ for fluid current conveyors having a material separating deflector at the conveyor outlet.
- 434.1 Having insulation:**  
 This subclass is indented under subclass 434. Apparatus provided with means to prevent heat exchange between a gaseous fluid mixture or separated constituent and a surrounding atmosphere.

- 434.2 With heating or cooling means:**  
This subclass is indented under subclass 434. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent.
- 434.3 Two confined fluids in indirect contact:**  
This subclass is indented under subclass 434.2. Apparatus provided with a conduit or flow conductor for passing a nonsystem fluid proximate to but not in direct contact with at least a portion of a bounded gaseous fluid mixture or separated constituent to effect heat exchange therebetween, the nonsystem fluid being separate and distinct from the bounded gaseous fluid mixture or separated constituent.
- 434.4 Heat exchanger is part of separator or is contiguous therewith:**  
This subclass is indented under subclass 434.3. Apparatus in which the nonsystem fluid conduit or conductor is structurally associated with the confined gaseous fluid mixture or separated constituent at or proximate to the locus of separation so that the temperature of the confined gaseous fluid mixture or separated constituent is affected at the separator.
- 435 Wear liners or surface characteristics (e.g., anti-erosion):**  
This subclass is indented under subclass 434. Apparatus having (1) means in addition to casing walls or mere separating means flow passages especially designed to reduce or prevent erosion or abrading of apparatus parts or (2) separating surfaces of peculiar composition or especially treated as by alloying, coating or hardening to withstand rapid deterioration of such surfaces.
- 436 Removably supported deflector surface:**  
This subclass is indented under subclass 434. Apparatus wherein the deflector surface may be readily withdrawn or detached from its support, the connecting or supporting elements, if any, being reusable.
- 437 With gas pump or fan:**  
This subclass is indented under subclass 434. Apparatus including a means which effects flow of the gas being separated to and through the separator.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
383, for other gas pumps or fans wherein there is no confined flow between the impeller and the separator.  
467+, for other gas pumps or fans in an apparatus for gas separation.
- 438 Within separator:**  
This subclass is indented under subclass 437. Apparatus wherein the means is positioned within the confines of the casing enclosing the separating media.
- 439 Downstream of separator:**  
This subclass is indented under subclass 437. Apparatus in which the means is positioned on the gas egress side of the separating media.
- 440 Parallel and continuous nonplanar members (e.g., crimped, corrugated, curved):**  
This subclass is indented under subclass 434. Apparatus in which the surface means comprises at least two plates between which the gas flows in a tortuous or sinuous path, said plates being bent, deformed or provided with projections, and arranged relatively one to the other so that a bend, deformation or projection of one plate is spaced from the corresponding bend, etc. of the other, so as to provide substantially constant area for the gas flow.
- SEE OR SEARCH CLASS:  
96, Gas Separation: Apparatus, subclasses 392+ for gas separation apparatus comprised of closely spaced parallel plates that do not rely upon change of direction of the gas flow for separation.
- 441 Concentric, nested conduits with closed and open ends for flow reversal:**  
This subclass is indented under subclass 434. Apparatus comprising a plurality of coaxial tubular members having different diameters, each surrounding the next smaller, each coaxial tube having a closed end and an open end, and each except the smallest having one closed end across and spaced from the open end of the surrounded tube.



## SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclass 191 for similar conduits used for eliminating moisture particles from a gas evolved in an apparatus for degassing a liquid.

**442 Plural deflectors overlapped and spaced serially in gas flow:**

This subclass is indented under subclass 434. Apparatus comprising a plurality of said surfaces, at least a portion of each surface being superposed with respect to the next adjacent in the direction of gas flow.

**443 Plural deflectors in row across gas flow:**

This subclass is indented under subclass 442. Apparatus comprising a plurality of surfaces spaced from one another in a general linear disposition and in a direction substantially normal to the gas flow path.

**444 Deflectors in alternate rows aligned (i.e., staggered):**

This subclass is indented under subclass 443. Apparatus comprising at least three linear arrangements normal to the gas flow in which the corresponding surfaces in the first and third arrangements are in a straight line with each other but laterally displaced from the corresponding surfaces in the second or intervening arrangement.

**445 Deflectors apertured or closely spaced from flow path wall:**

This subclass is indented under subclass 442. Apparatus in which the surfaces are either (1) provided with openings for permitting gas flow therethrough or (2) arranged within the flow path to provide a small space for gas flow between edges of said surfaces and the flow path conduit wall.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

307+, for a unit comprising a filter or an apertured deflector, which unit is spaced inwardly from the flow path wall.

**446 Space or aperture opposed by solid deflector surface:**

This subclass is indented under subclass 445. Apparatus in which the openings or spaces are complemented by an imperforate portion of the next adjacent surface in the direction of gas flow.

**447 Fixed gas whirler or rotator means:**

This subclass is indented under subclass 434. Apparatus in which the direction of gas flow is changed by a static member designed to cause the gas to rotate or spin around an axis.

## SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclasses 301+ for a fixed gas whirler or rotator for gas separation combined with gas and liquid contact means.  
406, Conveyors: Fluid Current, subclass 173 for a fluid current conveyor having a cyclone separator at the outlet.

**448 With outlet gas conduit wall common to surrounding gas inlet or concentrate outlet or collector:**

This subclass is indented under subclass 447. Apparatus including an outlet gas flow conduit wall defining (1) a space between it and a surrounding, radially spaced wall for the concentrated nongaseous material to leave the separator, (2) one wall of a closed end, surrounding concentric chamber for collecting the concentrated nongaseous material, or (3) a space between it and another surrounding, radially spaced wall for gas in flow to the separating chamber.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

396, for similar annular outlet means, but having a guide means for the concentrate layer.

**449 Gas inlet and outlet have common wall:**

This subclass is indented under subclass 448. Apparatus wherein the gas outlet wall comprises the inner wall of the surrounding gas inlet.

- 450 With outlet from collector:**  
This subclass is indented under subclass 448. Apparatus including a residue discharge opening from the collection chamber.
- 451 Tangential outlet pipe:**  
This subclass is indented under subclass 450. Apparatus wherein the discharge opening comprises a conductor which discharges the residue in a path other than one which, if extended as a straight line at the chamber wall, would intersect or be parallel to the longitudinal axis of the chamber.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
454, for a tangential outlet pipe from a whirler means.
- 452 With plural concentrate outlets in arcuate, axially extending whirl chamber wall:**  
This subclass is indented under subclass 447. Apparatus provided with a bounding wall extending along the axis of rotation, having a radius of curvature, and more than one opening through which the concentrate escapes.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
398, for similar structure having means to guide the concentrate through the openings.
- 453 With concentrate outlet means in one of parallel plates mounting spaced whirler vanes:**  
This subclass is indented under subclass 447. Apparatus comprising parallel end members supporting between them vanes directed obliquely to a common axis to direct the inflow angularly with respect to the axis, at least one of the end members provided with one or more openings for the escape of the rotating concentrate layer.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
455, for other similar structures for causing gas whirl.
- 454 With tangential concentrate outlet pipe:**  
This subclass is indented under subclass 447. Apparatus comprising an outlet pipe for the heavier constituents arranged to discharge the heavier constituents in a path other than one which, if extended as a straight line at the wall of the whirling chamber, would intersect or be parallel to the axis of the chamber.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
451, for a tangential outlet pipe for heavier constituents from a collector surrounding a gas inlet pipe.
- 455 Plural nonradial gas passages in peripheral wall (e.g., tuyere):**  
This subclass is indented under subclass 447. Apparatus comprising a perimetric wall having multiple inlet means for the gas, each means directed obliquely to a common axis to direct the gas flow angularly with respect to the axis.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
453, for similar gas whirling structure provided with outlet openings for the concentrate layer.
- 456 Helical vane or baffle within flow conduit:**  
This subclass is indented under subclass 447. Apparatus wherein said member is situated within a gas flow passage and is twisted or turned about its axis.
- 457 Between gas flow path wall and central core:**  
This subclass is indented under subclass 456. Apparatus comprising a solid or hollow element positioned interiorly of a portion of the gas flow passage to provide for gas flow in the space between it and the wall of the gas passage, with the twisted member positioned in the space.
- 458 Inflow pipe projects within casing:**  
This subclass is indented under subclass 447. Apparatus wherein an inlet gas conduit extends into a separator casing and is arranged, formed, or has openings to cause the ensuing gas to assume a curved path.
- 459.1 Tangential gas inlet opening in casing:**  
This subclass is indented under subclass 447. Apparatus wherein the gas whirling means comprises a separator casing having an inflow gas conductor which directs the gas into said casing in a path other than one which intersects

- or is parallel to the longitudinal axis of the casing.
- 459.2 Inclined inflow:**  
This subclass is indented under subclass 459.1. Apparatus wherein the gas inflow conductor is sloped.
- 459.3 Scroll:**  
This subclass is indented under subclass 459.1. Apparatus wherein the gas inflow conductor is a scroll means.
- 459.4 Inflow nozzle or vane:**  
This subclass is indented under subclass 459.1. Apparatus wherein the gas inflow conductor is a nozzle or vane structure.
- 459.5 Varying inlet area:**  
This subclass is indented under subclass 459.1. Apparatus wherein the area of the gas inflow changes.
- 460 With tangential gas outlet:**  
This subclass is indented under subclass 459.1. Apparatus having, in addition, a gas outlet flow conduit which conducts the gas out of the separator casing in a path other than one which, if extended as a straight line at the casing wall, would intersect or be parallel to the longitudinal axis of the casing.
- 461 Continuous confined flow path:**  
This subclass is indented under subclass 447. Apparatus comprising a conduit or other gas conducting member, imperforate except for means provided for gas inlet, gas outlet and concentrate outlet, and designed to separate while conveying the gas to be treated in a curved path.
- 462 Impingement baffle:**  
This subclass is indented under subclass 434. Apparatus comprising a surface in the flow path of the gas stream to be contacted by the stream for redirecting or altering the flow path for separation of nongaseous constituents therefrom.
- 463 Conical with apex facing upstream:**  
This subclass is indented under subclass 462. Apparatus in which the surface has circular cross sections of increasing diameter with the smallest diameter section facing upstream.
- 464 Corrugated, ribbed, crimped, or with projections:**  
This subclass is indented under subclass 462. Apparatus wherein the surface has bends, folds, projections or ridges and the like irregularities.
- 465 Planar:**  
This subclass is indented under subclass 462. Apparatus in which the surface is flat.
- 466 WITH SEPARATED NONGASEOUS MATERIAL CONDUCTING OR TREATING MEANS:**  
This subclass is indented under the class definition. Apparatus comprising (1) residue or concentrate flow guide means which permits a continuous flow of separated materials to leave the apparatus or (2) means for changing the physical properties (e.g. temperature, density, viscosity, etc.) of the separated materials for affecting the flow characteristics of said materials.
- (1) Note. This subclass is intended to provide a locus of search for modified outlets (i.e. not mere openings) and accordingly, all patents disclosing significant outlet structure should be cross-referenced hereto.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
282+, for means for removing separated constituent from the interstices or surfaces of a separator.  
428+, for affirmative or permissive means for removing collected separated materials from a gas separating device.
- 467 WITH GAS FLOW EFFECTING MEANS:**  
This subclass is indented under the class definition. Apparatus having means to positively force system fluid gas through, or to pass relative to, a separating media.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
383, for gas pumps or fans to force gas in an unbounded area to move relative to a separating media.

- 437+, for gas pumps or fans in a confined flow path combined with a separating media of the deflector type.
- 467.1 With heating or cooling means:**  
This subclass is indented under subclass 467. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent.
- 468 Injector or jet pump type:**  
This subclass is indented under subclass 467. Apparatus in which flow effecting means is provided for the system fluid gas by an independent flow of motive fluid so related to the flow path for said gas as to induce flow thereof by venturi effect or the like.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
400+, for separators mounted for continuous motion to effect separation.  
437+, for deflector related gas pumps or fans.
- SEE OR SEARCH CLASS:  
96, Gas Separation: Apparatus, subclasses 372+ for gas separation apparatus including inlet means for diverse gas or solid for gas treatment in which the diverse gas for treatment of the gaseous fluid mixture or a separated constituent may also be a motive fluid for the apparatus.
- 469 Manual, weight, or traction operated gas pump:**  
This subclass is indented under subclass 467. Apparatus in which the gas is forced to pass through, or relative to the separating media by hand or foot actuated means, by mechanically actuated means having contact with a surface along which it moves, or by a weight motor means.
- 470 Plurality of impellers arranged in parallel or performing diverse functions:**  
This subclass is indented under subclass 467. Apparatus having a plurality of separate and distinct impelling means, each impelling means acting only on a portion of the total gas flow, or at least one impelling means serving a purpose other than merely forcing the gas to or from the separating media.
- (1) Note. An arrangement of two impelling means, one of which forces system fluid to the motor of the other impelling means for cooling thereof is an example of a diverse function and is proper subject matter under this definition.
- 471 Impeller within or proximate to space encompassed by separating media:**  
This subclass is indented under subclass 467. Apparatus in which the impelling means is wholly or partially within the space defined by a nonplanar separating media or is so close to said space that a definite flow line cannot be distinguished between the impeller and the media.
- 472 Upright or multichambered casing:**  
This subclass is indented under subclass 467. Apparatus having (1) a pump, motor, and gas separating means arranged one above the other, in any order, within an upstanding casing in its normal operative position, or (2) a plurality of chambers having a confined flow path therebetween, and in which at least one material flow effecting means and the gas separating means are in different chambers.
- (1) Note. This is the locus for apparatus of the vertical type in which stability, compactness, maneuverability, access to the filter compartment, etc., is of importance.
- 473 Impeller upstream of separating media:**  
This subclass is indented under subclass 467. Apparatus in which the forcing means is located ahead of the separating media, or of at least one of a plurality of serially arranged separating media, in relation to the direction of gas flow.
- 474 WITH PARTICULATE SOLIDS MOVEMENT DURING USE OR AGITATING MEANS THEREFOR:**  
This subclass is indented under the class definition. Apparatus comprising a separating media of individual portions or bits of solid matter and further provided with means (1) for mixing or causing relative motion among the particles or (2) for rendering the media in a flowing state during use.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 390, for solid sorbent separating media which are moved during use.  
 400+, for apparatus mounted or supported for continuous motion effective to separate gasiform fluid and see the collected search notes thereunder for other moving separating media.
- SEE OR SEARCH CLASS:  
 95, Gas Separation: Processes, subclass 275 for processes for gas separation using a moving bed of particulate solids.
- 475 WITH MEANS ADJUSTABLE TO CONTROL COMPACTNESS OF SEPARATING MEDIA:**  
 This subclass is indented under the class definition. Apparatus having means in addition to mere flow coupling joints, resilient retainers or biasing means to selectively or cyclically cause exertion of different compacting forces on the media.
- 476 WITH MEANS INTRODUCING GAS INTO MIDST OF SEPARATING MEDIA:**  
 This subclass is indented under the class definition. Apparatus having flow inlet means which is substantially surrounded, (i.e. embraced) by the separating media except where the said flow inlet means enters the outer confines of the media securing or retaining means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 418+, for inflow control or distribution means having additional characteristics going beyond a mere inlet flow pipe.  
 484+, for spaced filter means, e.g., upper and lower shelf or grid supported material with gas inlet means in the space between shelves or compartments.
- 477 STRANDS OR BRISTLES WITH UNSUPPORTED OR FREE EXTREMITIES (E.G., BRUSH TYPE):**  
 This subclass is indented under the class definition. Apparatus in which a filter media through which the gas is constrained to pass comprises bristle like or strand like members held so that at least one extremity of each such member is not secured to a holder or support, e.g., a knot or tuft held by a ferrule.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 329, for a brush type filter combined with a serially arranged basically different separator.
- SEE OR SEARCH CLASS:  
 96, Gas Separation: Apparatus, subclasses 390+ for shelf or edge type filter and see (1) Note to that subclass.
- 478 WITH SEPARATE FLOW LINE ACCESS MEANS OR FILTER MEDIA PASSAGE MEANS OFFSET TO FLOW PATH:**  
 This subclass is indented under the class definition. Apparatus having (1) means apart from the flow line walls or (2) modifications, (e.g. openings) in the flow line walls which permit (a) admittance thereto, or (b) filter material or unit replacement without recourse to a separation of the flow line in the direction of normal gas flow.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 369+, for closure means other than a coupler to a flow line for a filter bag or cover therefor.
- 479 For discrete filter particles:**  
 This subclass is indented under subclass 478. Apparatus for filter material of the particulate type.
- (1) Note. Discrete filter particles form a flowable mass, the particles of which are not positively connected one to the other, as opposed to entangled material.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 474, for particulate solids having movement during use.  
 512+, for means securing or retaining discrete massed or particulate materials, and see (1) Note above.

**480 Access means is clamping or coupling means for unit filter media:**

This subclass is indented under subclass 478. Apparatus in which the means for gaining admittance to the flow path is also the means which supports or joins the filter unit in or to the flow path.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

369+, and 373, for similar subject matter pertaining to flexible or collapsible bag type separators.

**481 Unit transversely slidable through flow path:**

This subclass is indented under subclass 478. Apparatus in which the flow line is provided with an opening and associated guide way or tracks thereat such that the unit is removed or replaced by a sliding motion through the said opening in a direction across the flow path.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

506, for a flange or track on a flow line end for slidably coupling a filter thereto.

**482 TWO OR MORE SEPARATORS (E.G., SPACED FILTERS IN FLOW LINE OR CASING):**

This subclass is indented under the class definition. Apparatus comprising two or more operatively distinct filtering media in spaced or edge-to-edge relation, or comprised of two or more plies, at least two of said plies being functionally distinct.

(1) Note. Operatively distinct separating means under this definition includes a separator comprised of one continuous separating surface supported in such a manner as to form two or more spaced surfaces through which the gas flows, either in series or in parallel.

(2) Note. Although the title and definition are broad it is not intended that deflectors be cross referenced to this group of subclasses.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

342+, for multiple separators each with discrete and longitudinally confined gas inlet or outlet flow path.

**482.1 With heating or cooling means:**

This subclass is indented under subclass 482. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent.

**483 With framework for edge to edge relation:**

This subclass is indented under subclass 482. Apparatus having supporting or retaining means effective to maintain two or more media in end to end contiguous relation such that the region of greatest area or extent of the media is facially presented to the gasiform fluid.

**484 Spaced for parallel flow of gas:**

This subclass is indented under subclass 482. Apparatus in which the plurality of media are spaced across a flow stream so that each acts independently of the other upon only a portion of the gas stream so that the several media act substantially upon the gas at one time.

(1) Note. A single sheet type or running length separating media which is supported in such a manner as to result in a divided gas flow therethrough by virtue of the support means blocking gas flow is not proper subject matter under this definition, but is classified in subclass 500.

**485 Three or more serially spaced:**

This subclass is indented under subclass 482. Apparatus comprising at least three media spaced from each other so that the gas passes through each in turn.

**486 Plies or layers of different characteristics or orientation:**

This subclass is indented under subclass 482. Apparatus in which the media comprises facially contiguous elements or members of unlike material, mesh, screen and the like characteristics to define thereby functionally distinct members, or comprises like material differently oriented.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
522, for media comprised of facially contiguous elements of like characteristics and orientation.
- 487 Differing mesh sizes:**  
This subclass is indented under subclass 486. Apparatus in which the unlike characteristics relates to the size of flow passages in the members.
- 488 Variation in shape or size:**  
This subclass is indented under subclass 486. Apparatus in which the unlike characteristic pertains to the configuration, outline or dimension of the members.
- 489 Orientation of elements:**  
This subclass is indented under subclass 486. Apparatus in which contiguous similar members are placed one with respect to the other so that one said member is turned about some axis or shifted relative to the other to thereby (1) define a different flow relation to the said other, or (2) together define a modified or a different separating media.
- 490 WITH MEANS SECURING OR RETAINING SEPARATING MEDIA:**  
This subclass is indented under the class definition. Apparatus comprising (1) a media placed in a flow line by being previously distorted out of its normal or natural shape or size and retained within the flow line by its contact with the wall thereof and its tendency to regain its normal shape or (2) means distinct from the media itself to maintain or contain said media in a stable or sustained altitude either in or out of a flow line as by binding, framing, stitching, to support the media against gravity as to maintain it as a cohesive entity by means not including bonding of the media upon itself.
- (1) Note. Arrangements of deflectors should not be crossed referenced to this subclass nor to subclasses below this point in the schedule.
- 490.1 With heating or cooling means:**  
This subclass is indented under subclass 490. Apparatus having means for raising or lowering the temperature of a gaseous fluid mixture or separated constituent.
- 490.2 Two confined fluids in indirect contact:**  
This subclass is indented under subclass 490.1. Apparatus provided with a conduit or flow conductor for passing a nonsystem fluid proximate to but not in direct contact with at least a portion of a bounded gaseous fluid mixture or separated constituent to effect heat exchange therebetween, the nonsystem fluid being separate and distinct from the bounded gaseous fluid mixture or separated constituent.
- 491 Fastening means pierces or penetrates media:**  
This subclass is indented under subclass 490. Apparatus wherein the filter media is secured or attached to its retainer, frame, flow line or the like by a joining means or part which penetrates or pierces the media by a sharp or impaling means, or makes its own way through the media.
- 492 Internal frame or support means:**  
This subclass is indented under subclass 490. Apparatus in which the media is maintained or secured by imbedding a holding or reinforcing means within the media so that the imbedded means is substantially surrounded by the media.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
379, for collapsible filter bag securing or supporting means internally of the bag.
- 493 Hinged or pivoted retainer or clamp on backing frame or in flow line:**  
This subclass is indented under subclass 490. Apparatus in which the flow line itself or a means fixed (1) within a flow line, or (2) to a frame or support means for the filter, has a hinged or pivoted connection therebetween and some other part of the flow line, backing member or frame for retaining or securing the media.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
422, for similarly supported media non-detachably adjustable to various positions of use or to nonuse with respect to the gas mixture acted upon.
- 494 Grid or tray type for bottom support only:**  
This subclass is indented under subclass 490. Apparatus in which the supporting means comprises either a slatted framework or a solid member with very shallow vertical walls upon which the media rests, without any further support or retaining means being disclosed in contact with the media.
- (1) Note. Most of the patents in this subclass relate to powered or pulverulent material, such as lime, supported on a grid.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
515, for a filter in a foraminous container.  
516+, for particulate separating media held between open work members.
- SEE OR SEARCH CLASS:  
248, Supports, subclass 346.01 for grids or supports, per se, which may be disclosed for maintaining a powered or pulverulent gas separating media.
- 495 Unit or cohesive sheet-like media in flow line or frame:**  
This subclass is indented under subclass 490. Apparatus comprising a separating media which is either of self-sustaining form, encased or form maintained, or of coherent sheet form (not loose and particulate), said separating media being either retained in a flow line or retained in a peripheral support.
- (1) Note. A unit is considered to be any media of rigid form maintaining configuration which maintains its rigidity without a frame, or because of a frame. A media of cohesive sheet-like material is one that is flexible rather than self supporting and is unitary in the sense that it is coherent and has tensile strength. (Sheet-like as contrasted with a pad or mass of fibres and cohesive as contrasted with loose material).
- 496 With adjustable connector or size adjusting means:**  
This subclass is indented under subclass 495. Apparatus having means whereby (1) the retaining or securing means admits of adjustment to accommodate different sizes of media or different use positions either to satisfy the unit assembly or the flow line relation, or (2) the overall unit size may be changed by reason of a modified frame arrangement or the like.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
422, for separation media adjustable to various positions of use or nonuse without separation from the flow line.  
475, for means adjustable to control compactness of filter material.
- 497 Edge supporting or securing means for non-planar sheet form filter (e.g., zigzag):**  
This subclass is indented under subclass 495. Apparatus comprising means engaging the sheet form filter substantially at the running edge to maintain the said sheet in other than planar configuration or to support the nonplanar sheet in a flow line, any facial engagement being proximate the said edge.
- 498 Spiral or cylindrical:**  
This subclass is indented under subclass 497. Apparatus in which the resulting shape of the media takes the form of a cylinder or spiral.
- 499 With additional transversely arranged members:**  
This subclass is indented under subclass 497. Apparatus provided with one or more members which are in facial contact with the sheet media and thus serve as upstream, or downstream supports regarding the flow of gas.
- 500 Flexible sheet type maintained in nonplanar configuration:**  
This subclass is indented under subclass 495. Apparatus having means to retain cohesive sheet-like material in a nonplanar configuration either in a frame or in a flow line.



**501 With additional support means not positively engaged or joined to media (e.g., across face of filter):**

This subclass is indented under subclass 495. Apparatus having an auxiliary supporting or retaining means for the media which is (1) positioned within the frame and removable therefrom or (2) adjacent the media in the flow line and not directly secured thereto.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

516+, for massed or particulate material held between open work.

**502 Gasket or sealing means:**

This subclass is indented under subclass 495. Apparatus having a packing or pliant material used in the joining or coupling of the media to the frame or flow line or in maintaining the unit in a flow line to effect a gas-tight or cushioned seal.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

507, and 509, for resilient means securing or attaching the media in use position.

**503 Media within joinable or separable flow line sections:**

This subclass is indented under subclass 495. Apparatus in which the media or unit is maintained in a flow line which is provided with features of separability for ready access to the media upon separating the flow line sections.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

478+, for access means off-set to the gas flow path and not a part thereof requiring separability of the flow line sections.

**504 Aligned stop, media and removable retainer:**

This subclass is indented under subclass 495. Apparatus having means for joining a filter unit to a flow line or to the framework defining the extremity of a flow conductor and comprising a stop or flange against which the unit is abutted and a removable or movable clamping means which engages the unit to hold the said unit against the stop or flange, the stop, filter and

clamp being aligned in the general direction of air flow through the said flow line or framework.

**505 Flow line end coupling (e.g., pipe end):**

This subclass is indented under subclass 495. Apparatus in which the media is attached or secured to a flow line ingress or egress means from without the flow line such that the said media is outside of or substantially at an upstream or downstream boundary of the flow conduit.

**506 Flange or track on flow line for slidably retaining media:**

This subclass is indented under subclass 505. Apparatus having a track, groove or flange-like means as part of the conduit in which the media is slidably engaged or retained.

**507 Resilient attaching means:**

This subclass is indented under subclass 505. Apparatus in which the securing means has elastic properties or is not readily permanently deformed under normal use.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

377, for a bag type filter having a flow line coupling with a resilient part.

**508 Suspended or supported by bracket or from top of frame:**

This subclass is indented under subclass 495. Apparatus in which the means supporting or securing the media in or to the flow line is either in tension or shear.

(1) Note. The total disclosed support must not include a support portion extending vertically between the media and a conduit, apparatus part or the ground beneath the media.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

373, for filter bags suspended from a housing closure.

**509 Distorted media in flow line or resilient retaining means:**

This subclass is indented under subclass 495. Apparatus in which the securing means has elastic properties under normal use or wherein

the unit is held in place by its inherent resilience.

**510 Annular unit held between dished or plate-like end members for top and bottom support:**

This subclass is indented under subclass 495. Apparatus in which a filter unit of annular form, e.g., a hollow cylinder or doughnut, is held between a pair of substantially solid members applied axially (i.e., across the open ends) of the unit whereby gas flow is through the filter and through an opening in at least one of said members.

**511 Edge supported or secured only:**

This subclass is indented under subclass 495. Apparatus in which the securing or retaining means is disclosed as engaging the media along or substantially proximate the peripheral edge only, the remaining portions thereof being unsupported.

SEE OR SEARCH THIS CLASS, SUBCLASS:

497+, for nonplanar sheet form media, edge supported.

**512 Discrete fibrous or particulate solids:**

This subclass is indented under subclass 490. Apparatus for containing, securing in a flow line, or maintaining as a cohesive mass a filter media comprised of numerous individual entangled or unconnected elements.

(1) Note. For apparatus for positioning a filter unit, the filter media, per se, being comprised of entangled or unconnected elements, in a flow line see subclass 495 and (1) Note thereto.

SEE OR SEARCH THIS CLASS, SUBCLASS:

478, for a filter of discrete particles in a flow line with separate access means to the flow line or with passage means for the filter media off-set to the gas flow path.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, subclasses 274+ for processes of gas separation by filtering through a mass of particulate solids.

**513 Resilient securing means:**

This subclass is indented under subclass 512. Apparatus in which at least some portion of the filter media retaining means has elastic properties.

SEE OR SEARCH THIS CLASS, SUBCLASS:

377, for a bag type filter having a flow line coupling with a resilient part.

507, for a filter unit maintained at the end of a flow line by a resilient attaching means.

**514 Fused or bonded to a supporting or backing member:**

This subclass is indented under subclass 512. Apparatus wherein the media is joined to a securing, sustaining, or handling means by heat or by adhesion.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses for adhesively bonding particulate material to a backing member.

**515 Foraminous container:**

This subclass is indented under subclass 512. Apparatus in which the containing, securing or maintaining means comprises a receptacle, all faces or surfaces of which are porous or skeletal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

516+, for a filter media held between open work.

**516 Held between openwork:**

This subclass is indented under subclass 512. Apparatus comprising at least two members which serve to confine or retain the filter media therebetween said members permitting gas to flow therethrough.

(1) Note. A "member" under this definition may be no more than a series of parallel wires.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

494, for a grid for bottom support only of a separating media.

515, for a foraminous receptacle for holding a particulate or fibrous massed filter media.

**517 Between telescoped or nonplanar retainers:**

This subclass is indented under subclass 516. Apparatus in which the confining or retaining means is comprised of two members, one member partially or completely within the other member, or at least one member being of irregular or curved configuration.

**518 Between perforated plates:**

This subclass is indented under subclass 516. Apparatus in which the filter media is retained between continuous surfaces, each having at least one aperture formed therethrough.

**519 Between reticulated end closures:**

This subclass is indented under subclass 516. Apparatus in which the filter media is retained between at least two retainers each comprised of intersecting elongated elements arranged to form at least one opening, or interstice, bounded on all sides by said elongated elements.

**520 SPIRAL FILTER MEDIA:**

This subclass is indented under the class definition. Apparatus comprising a filter element which is rolled or wound either in face-to-face or spaced relation to form one or more spiral convolutions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

498, for filter sheet(s) edge supported in spiral form and subclass 484 for a spiral arrangement of spaced convolutions providing parallel flow for gas.

527, for a strand which is indiscriminately wound around itself, but not in a spiral.

**521 ZIGZAG, CORRUGATED, OR CONICAL:**

This subclass is indented under the class definition. Apparatus of cohesive filter material maintained in a configuration imposed upon it either by bonding upon itself or impregnants,

or by inherent characteristic, the configuration taking a zigzag, corrugated or conical form.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

497, and 500, for cohesive sheet-like media in a flow line or frame and in zigzag form.

**522 SPECIFIC MEDIA MATERIAL:**

This subclass is indented under the class definition. Apparatus in which (1) the stock, fiber, metal, weave, fabric or a modification thereof or (2) an added ingredient to bond, coat or impregnate stock material is specifically recited in a claim.

(1) Note. Special shapes or arrangements of filter material, or filter media retained or secured by means other than by bonding upon itself, are provided for elsewhere. in the subclasses beginning with subclass 474, or in subclass 529.

(2) Note. Under this definition, naming "Monel metal" or "copper", for example in a claim is a specific recitation of stock, "metal" or "fabric" is not a specific recitation. A named coating, for example, "tricresyl phosphate" is specific; a "viscous" coating is not.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

435, for deflectors with anti-erosion means.

474, and subclasses below or subclass 529 for special shapes or arrangements of filter material, or filter media retained or secured by means other than by bonding upon itself, are provided for elsewhere.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclasses 98+ and 221+ for a stock material product in the form of a single or plural layer web or sheet and having some defined structured (e.g., aperture, nonplanar arrangement, specific size of fibers or particles).

**523 Ceramic or sintered:**

This subclass is indented under subclass 522. Apparatus in which the media is a porous body made of a fired earth or by heating a powdered metal to form a coherent mass without thoroughly melting.

**524 With coating, impregnant, or bonding agent:**

This subclass is indented under subclass 522. Apparatus provided with (1) a material, fluid or discrete, which penetrates the separating media and is retained therein or thereon, either in its original form or physically combined therewith, or (2) an initially fluent film or layer of material either lying on or adhered to the surface of the separating media or by which component parts of a media are secured one to the other.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514, and 521, for filter media and bonding agents there classified.

SEE OR SEARCH CLASS:

131, Tobacco, subclass 343 for a smoke separator comprising plural diverse elements one of which is a plasticizer, adhesive, coating or impregnant, the separator disclosed for use in a tobacco user's appliance or article.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses, for adhesive bonding and miscellaneous chemical manufactures of sheet material.

424, Drug, Bio-Affecting and Body Treating Compositions, for an antiseptic or disinfecting composition which may be used for coating a filter.

428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a single or plural layer stock material product provided for in that class.

**525 Metal mesh or expanded material:**

This subclass is indented under subclass 522. Apparatus in which the media is comprised of (1) a woven, substantially regularly looped or linked metal of strand or ribbon form or (2) sheet material which has been more or less regularly provided with discontinuous slits or cuts

and thereafter subjected to tension forces to open up the slits or cuts.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclass 131 for a single or plural layer stock material product embodying an apertured component and subclasses 175+, 190, 193, and 196+ for such a product having a component embodying mechanically interengaged strands or strand-positions, subclass 596 for metallic stock which is apertured, and subclass 613 for such stock or article which is porous.

442, Fabric (Woven, Knitted, or Non-woven Textile or Cloth, etc.), subclasses 181+ and 304+ for a woven or knit fabric.

**526 Wadded or compressed:**

This subclass is indented under subclass 525. Apparatus in which the mesh or expanded sheet has been gathered or pressed together to a more compact and solid form.

**527 Fibrous or strand form:**

This subclass is indented under subclass 522. Apparatus in which the media is threaded like or of comparatively extensive length as contrasted with its diameter.

SEE OR SEARCH THIS CLASS, SUBCLASS:

520, for a continuous strand which is wound or coiled on itself or in spaced relation so as to form at least one spiral convolution.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, appropriate subclasses for a stock material product embodying a fiber layer, subclasses 292.1+ for a fiber-containing web or sheet, and subclasses 357+ for a mass of fibers or filaments which are coated or structurally defined.

**528 Organic (e.g., vegetable):**

This subclass is indented under subclass 527. Apparatus in which the fiber or strand is derived from matter which is or has been living

(e.g., hair, cellulose, coal) or is produced by organic chemical synthesis (e.g., nylon, polyethylene).

**529 MISCELLANEOUS (E.G., SHAPES):**

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

END