CLASS 429, CHEMISTRY: ELECTRICAL CURRENT PRODUCING APPARATUS, PRODUCT, AND PROCESS

SECTION I - CLASS DEFINITION

This class is the generic class for devices which produce an electrical current by means of a chemical reaction or change in physical state (e.g., from liquid to gas, etc.). Also included are the following subject matter not provided for elsewhere.

A. Structural combinations of the device, subcombinations and elements thereof.

B. Electrolyte, compositions of the same, and process of preparation.

C. Process of operating the device.

D. Miscellaneous process involving the device.

(1) Note. The meaning to be given to the various "art" terms appearing in this class, but which have not been included in the glossary below, is the same as that generally accepted or in common usage. However, certain terms employed in this class, which are included below, have been assigned definitions tailored to meet the needs of this class and therefore those may be more restricted or less limited or even altogether different from those in common usage.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

A. LINES WITH AND SEARCH NOTES TO COMPOUND, COMPOSITION, AND MATERIAL CLASSES.

1. A compound, per se, is classified in a compound class regardless of utility. See References to Other Classes below for an example of a class for inorganic compounds and nonmetallic elements having a Class 429 utility

2. A composition or material, per se, (except for electrolyte) for Class 429 subject matter is classified in the appropriate composition or material class. Further, a Class 429 article or product mentioned by name only (except for separator) without any inclusion of structure and defined only in terms of its composition or material is classified in the appropriate composition or material classes, particularly those listed below in References to Other Classes.

The rules for determining Class placement of the Original Reference (OR) for claimed chemical compositions are set forth in the Class Definition of Class 252 in the section LINES WITH OTHER CLASSES AND WITHIN THIS CLASS, subsection COMPOSITION CLASS SUPERIORITY, which includes a hierarchical ORDER OF SUPERIORITY FOR COMPOSITION CLASSES.

a. The following guidelines are to be followed in determining whether structure is present in any of the named subject matter: (1) A recitation of any numerical dimension of the product is deemed structure; (2) a product composed of two or more layers is deemed structure; (3) randomly disposed pores or cells in a porous, cellular or foamed product is deemed structure; and (4) internal characteristics such as crystalline form, molecular orientation, etc., is not considered structure.

b. Once the determination has been made that structure exists in the composition or material noted above and it is singly disclosed or claimed for a battery, the patent is classified in this class (429).

B. LINES AND SEARCH NOTES TO ARTICLE OR PRODUCT CLASSES

1. As a general rule an article is classified, the class providing specifically for the same or a generic class which can take the same.

An exception to this rule is an article mentioned in name only and defined in terms of its composition or material is classified in one of the composition or material classes. (See "Lines With And Search Notes To Compound, Composition, And Material Classes," 2, above, and References to Other Classes associated with the above section.)

This class (429) provides for a battery combination comprising a casing, electrodes and a separator. Also various subcombinations of the above.

Usually the application or use of a current-producing device (battery) in combination with other devices is classified in appropriate classes. See References to Other Classes, below.

C. LINES WITH AND SEARCH NOTES TO PROCESS AND APPARATUS CLASSES

See References to Other Classes below.

D. LINES BETWEEN CLASS 429, CLASS 204, AND CLASS 205

Wherein structure or process is common to both classes, the following line is to be observed. Where combined subject matter of both Class 204 and Class 429 is claimed or disclosed, classification will be based on the proximate function, e.g., current production, (Class 429) and the production of a product (Class 204). Generic claims are to be classified in the generic class (204). Also see the Search Class notes below to Class 204 and Class 205.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

16, Miscellaneous Hardware (e.g., Bushing, Carpet Fastener, Caster, Door Closer, Panel Hanger, Attachable or Adjunct Handle, Hinge, Window Sash Balance, etc.), appropriate subclasses for subject matter of that class adapted for use with battery structure. (See "Lines And Search Notes To Article Or Product Classes" above)

29, Metal Working, subclass 2 for apparatus and process for making metallic battery grids; subclasses 730+ for apparatus, and subclasses 623.1+ for process of making a battery not including the use of the same. (Process And Apparatus Class)

34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses for processes and apparatus for treating a battery or part thereof by drying or gas/vapor contact with the same. (Process And Apparatus Class)

49, Movable or Removable Closures, appropriate subclasses for closures of that class. (See "Lines And Search Notes To Article Or Product Classes" above)

53, Package Making, appropriate subclasses for methods of and apparatus for encompassing or encasing goods or materials with a separate cover or band which serves as means for identifying, protecting, or unit handling the goods or materials. (Process And Apparatus Class)

60, Power Plants, for power plants combined with battery or fuel cell structure. (See "Lines And Search Notes To Article Or Product Classes" above)

65, Glass Manufacturing, appropriate subclasses for process or apparatus for making a battery part of glass by a glass working operation(s). (Process And Apparatus Class)

73, Measuring and Testing, appropriate subclasses for apparatus adapted for use with a battery for making a measurement or test of any kind. The combination of such apparatus and a battery is proper subject matter for Class 429. (See "Lines And Search Notes To Article Or Product Classes" above)

73, Measuring and Testing, appropriate subclasses for testing processes and apparatus in general. (Process And Apparatus Class)

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, etc., subclasses 228+ for a consolidated metal particle composition. (See above, "Lines With And Search Notes To Compound, Composition, And Material Classes, 2")

102, Ammunition and Explosives Devices, appropriate subclasses, especially subclasses 200+ for fuses, primers, and igniting devices utilizing electrical energy. (See "Lines And Search Notes To Article Or Product Classes" above)

105, Railway Rolling Stock, subclass 51 for battery holders for electric locomotives. (See "Lines And Search Notes To Article Or Product Classes" above)

106, Compositions: Coating or Plastic, appropriate subclasses for a composition which is in fluent or solid noncoherent form and which is adapted for coating or impregnating and for change to a less fluent, or a solid coherent, form by setting (e.g., concrete, plastic, etc.), chemical reaction, removal or solvent, solidification from a molten state, etc. In a patent directed to a filler or pigment for a coating composition, the recitation of size or structure of the constituent particle or fibers is not sufficient to exclude said patent from Class 106. (See above, "Lines With And Search Notes To Compound, Composition, And Material Classes, 2")

106, Compositions: Coating or Plastic, appropriate subclasses for articles of general utility defined by compositions for Class 106 and see (1) Note of Class 106 for a listing of classes having articles defined by the composition. (See "Lines And Search Notes To Article Or Product Classes.")

106, Compositions, Coating or Plastic, for processes of making subject matter of that class. (Process And Apparatus Class)

114, Ships, subclass 20.1 for the combination of torpedo and battery structure. (See "Lines And Search Notes To Article Or Product Classes".)

116, Signals and Indicators, appropriate subclasses for mechanical indicators adapted for use with batteries. (See "Lines And Search Notes To Article Or Product Classes" above.)

136, Batteries: Thermoelectric and Photoelectric, subclasses 200+ for thermoelectric batteries, subclasses 243+ for photoelectric batteries. (See Lines With Other Classes and Within This Class, Lines And Search Notes To Article Or Product Classes.)

137, Fluid Handling, for process and apparatus for handling a fluid usually of general utility; and especially subclasses 260+ for structure for battery or electrolytic cell replenishment. (See "Lines And Search Notes To Article Or Product Classes".)

137, Fluid Handling, subclass 43 for nonspill vents for batteries, subclasses 260+ for battery replenishment apparatus and subclasses 386+ for automatic liquid level control devices of general application even though disclosed for batteries. (Process And Apparatus Class)

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclasses 32+ for apparatus and subclass 111 for process for pasting (filling) battery grids. Other appropriate subclasses for the filling of a battery with fluent material, i.e., electrolyte. (See "Lines And Search Notes To Article Or Product Classes".)

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, appropriate subclasses for processes and apparatus for filling batteries, particularly subclasses 1.1+ for grid pasting process and subclasses 32+ for grid pasting apparatus. (Process And Apparatus Class)

148, Metal Treatment, subclasses 400+ for metal stock material which is (a) produced by a process of that class (148); or (b) distinguished by (a) internal structure (e.g., crystalline, etc.), or (b) characteristics (e.g., semiconductor, etc.) of the metal. (See above, "Lines With And Search Notes To Compound, Composition, And Material Classes, 2")

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses for processes of apparatus for making batteries by operations of that class. (Process And Apparatus Class)

162, Paper Making and Fiber Liberation, appropriate subclasses for a nonstructural (a) single-layer waterlaid fibrous product, (b) plural-layer product including a layer of fibers applied to a second layer by a process provided for in that class (162), or (c) paper homogeneously impregnated throughout. Note particularly subclasses 141 through 181.1 + which include any nonstructural fiber. (See above, "Lines With And Search Notes To Compound, Composition, And Material Classes, 2")

162, Paper Making and Fiber Liberation, subclasses 100+ for paper stock material of general utility. (See "Lines And Search Notes To Article Or Product Classes" above)

162, Paper Making and Fiber Liberation, appropriate subclass for process and apparatus for making battery part; especially subclass 138 for process of making paper product having specified electrical products. (Process And Apparatus Class)

164, Metal Founding, appropriate subclasses for apparatus for metal casting and processes of casting metal grids, and subclass 109 for uniting battery plates by casting. (Process And Apparatus Class)

166, Wells, subclass 248 for process of applying electrical current through the earth for treating a well. (Process And Apparatus Class)

174, Electricity: Conductors and Insulators, appropriate subclasses for subject matter of that class not limited to battery structure, per se. (See "Lines And Search Notes To Article Or Product Classes" above)

180, Motor Vehicles, appropriate subclasses for subject matter of that class combined with battery structure and especially subclass 68.5 for battery mountings or holders combined with significant motor vehicle structure. (See "Lines And Search Notes To Article Or Product Classes" above)

200, Electricity: Circuit Makers and Breakers, appropriate subclass for circuit makers-breakers (e.g., switch, etc.) adapted for use with batteries. The combination of a battery or significant battery structure and a circuit maker or breaker integral with the battery is subject matter for class (429). (See "Lines And Search Notes To Article Or Product Classes" above)

204, Chemistry: Electrical and Wave Energy, for products solely disclosed as made by a process of Class 204 except for (1) products which

comprise two contiguous metallic layers and (2) products of processes classifiable in subclasses 157.15+ and 450+. (See "Lines And Search Notes To Article Or Product Classes" above)

204, Chemistry: Electrical and Wave Energy, subclasses 194+ for electrolytic apparatus and other appropriate subclasses for subject matter involving the use of electrical or wave energy (e.g., short-circuited battery, internal battery, cathodic or anodic protector devices, testers which use an electrochemically produced current only to operate an indicator such as a meter (especially subclasses 400+), etc.). In cases where the combined subject matter of both Class 204 and Class 429 is claimed or disclosed, classification will be based on the proximate function, (e.g., current production is provided for in Class 429, production of a product is provided for in Class 204, etc.). Generic claims are properly classified in Class 204. (Process And Apparatus Class)

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclass 50 for a product made by electrolysis involving electrolytic marking, battery electrode active material forming, electroforming, or electrolytic coating. (See "Lines And Search Notes To Article Or Product Classes" above)

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, appropriate subclasses for electrolytic processes, in general. In cases where the combined subject matter of both Class 205 and Class 429 is claimed or disclosed, classification will be based on the proximate function (e.g., current production is provided for in Class 429, electrolytic production of a product is provided for in Class 205, etc.). Generic claims to electrolysis are properly classified in Class 205. (Process And Apparatus Class)

206, Special Receptacle or Package, appropriate subclasses for special receptacles or packages, especially subclasses 524.1+ for acid-proof receptacles, and subclasses 601+ for receptacles or packages for an electrical article and subclasses 603+ for battery package. Class 206 takes special receptacles and packages of general utility. Class 429 takes special receptacle having battery structure. (See "Lines And Search Notes To Article Or Product Classes" above)

219, Electric Heating, subclasses 200+ for heating device adapted for use with batteries or heaters combined with batteries. (See "Lines And Search Notes To Article Or Product Classes" above)

219, Electric Heating, appropriate subclass for apparatus and process of making, repairing, etc., batteries by electric heating, e.g., welding, etc. (Process And Apparatus Class)

220, Receptacles, appropriate subclasses for metallic receptacles of general utility or metallic receptacle adapted to hold batteries. (See "Lines And Search Notes To Article Or Product Classes".)

222, Dispensing, appropriate subclasses for dispensing apparatus adapted for use with battery structure. (See "Lines And Search Notes To Article Or Product Classes" above.)

228, Metal Fusion Bonding, appropriate subclasses for bonding battery structure, especially subclass 58 for cross reference art collection on batteries. (See "Lines With And Search Notes To Process And Apparatus Classes" above.)

242, Winding, Tensioning or Guiding, subclasses 430+ for a method or apparatus for making a composite article which may include a wound battery component. (Process And Apparatus Class)

249, Static Molds, appropriate subclasses for static molds for forming battery parts, especially subclass 60 for molding a grid. (Process And Apparatus Class)

252, Compositions, appropriate subclass for a general utility and subclass 62.2 for electrolyte compositions for electrical devices. (See above, "Lines With And Search Notes To Compound, Composition, And Material Classes, 2")

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, appropriate subclasses for shaping and treating plastic material, especially subclasses 614+ for composite electrical article involving vitrifying or sintering of preform to make inorganic natural and subclasses 104+ for process of forming electrical articles by shaping electroconductive material. (Process And Apparatus Class)

294, Handling: Hand and Hoist-Line Implements, cross reference art collection 903 for hand-held battery carriers. (See "Lines And Search Notes To Article Or Product Classes." above)

307, Electrical Transmission or Interconnection Systems, appropriate subclasses for electric connections with batteries. (See "Lines And

Search Notes To Article Or Product Classes" above.)

315, Electric Lamp and Discharge Devices: Systems, subclass 55 for combination of load device (electric current generator) and electrical circuit structure. (See "Lines And Search Notes To Article Or Product Classes.")

320, Electricity: Battery and Condenser Charging and Discharging, subclass 3 for battery charging or discharging including the batteries. (See "Lines And Search Notes To Article Or Product Classes" above.)

320, Electricity: Battery and Condenser Charging and Discharging, for electrical systems and the corresponding methods of battery charging and discharging; subclass 57 having the structural combination of a battery and an electrical rectifier, regardless of whether the electrical interconnections between the battery and rectifier are claimed or not. (Process And Apparatus Class)

324, Electricity: Measuring and Testing, subclasses 425+ for battery testers. (See "Lines And Search Notes To Article Or Product Classes" above.)

324, Electricity: Measuring and Testing, for process and apparatus for measuring or testing batteries including the battery a part of the claimed combination. (Process And Apparatus Class)

340, Communications: Electrical, appropriate subclasses for systems of imparting communications (intelligence), a part of which has electrical components (e.g., batteries), especially subclasses 636.1 through 636.21 wherein the system is responsive to a battery condition. (Process and Apparatus Class)

361, Electricity: Electrical Systems and Devices, subclasses 500+ for electrolytic devices not elsewhere classified and especially for capacitors and coulometers. See these subclasses for combinations and subcombinations of the same. (See "Lines And Search Notes To Article Or Product Classes" above.)

362, Illumination, appropriate subclasses for the combination of illumination means and a battery. (See "Lines And Search Notes To Article Or Product Classes" above.)

368, Horology: Time Measuring Systems or Devices, subclasses 73+, 107+, and 203+ for battery-operated time devices. (See "Lines And Search Notes To Article Or Product Classes" above.)

379, Telephonic Communications, appropriate subclasses for telephones combined with batteries. (See "Lines And Search Notes To Article Or Product Classes" above.)

381, Electrical Audio Signal Processing Systems and Devices, appropriate subclasses for hearing aids and the like combined with a battery. (See "Lines And Search Notes To Article Or Product Classes" above.)

420, Alloys or Metallic Compositions, appropriate subclasses for alloys of general utility and not having structure. (See "Lines And Search Notes To Article Or Product Classes" above.)

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for apparatus for that class adapted for use with battery structure. (See "Lines And Search Notes To Article Or Product Classes" above.)

423, Chemistry of Inorganic Compounds, appropriate subclasses for inorganic compounds and nonmetallic elements having a Class 429 utility. (See "Lines With And Search Notes To Compound, Composition, And Material Classes" above.)

428, Stock Material or Miscellaneous Articles, appropriate subclasses for stock materials of general utility and appropriate subclasses for electrodes without any structure. (See "Lines And Search Notes To Article Or Product Classes" above.)

439, Electrical Connectors, appropriate subclasses for an electrical connector, per se; and subclass 726 and 754+ for a battery post clamp-type connector. Class 429 takes the combination of clamp with significant battery structure or the combination is constructed in such a manner that the connector is inseparable from battery. (Process And Apparatus Class)

441, Buoys, Rafts, and Aquatic Devices, subclass 18 for buoys combined with batteries. (See "Lines And Search Notes To Article Or Product Classes" above.)

446, Amusement Devices: Toys, subclasses 484+, for electric toys having a self contained voltage source, and see the Search Notes thereunder. (See "Lines And Search Notes To Article Or Product Classes" above.)

520, Synthetic Resins or Natural Rubbers, appropriate subclasses, particularly Class 523, subclass 134 for a composition specialized for use as a battery container or battery cover composition. (See above, "Lines With And Search Notes To Compound, Composition, And Material Classes, 2" above)

607, Surgery: Light, Thermal, and Electrical Application, appropriate subclasses, especially subclasses 149+ for battery elements which function by reason of being contacted by the body. Also, batteries especially constructed to be implanted in the body. (See "Lines And Search Notes To Article Or Product Classes" above.)

623, Prosthesis (i.e., Artificial Body Members), Parts Thereof, or Aids and Accessories Therefor, appropriate subclasses for battery systems used with artificial body parts. (See "Lines And Search Notes To Article Or Product Classes" above.)

423, Chemistry of Inorganic Compounds, appropriate subclasses for process of making inorganic chemical compounds useful in batteries. (Process And Apparatus Class)

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, for molding apparatus useful in making batteries. (Process And Apparatus Class)

SECTION IV - GLOSSARY

ACTIVE MATERIAL

The element, chemical compound, or composition which chemically reacts to produce a transfer of electrons through an external circuit.

BATTERYCELL

Two spaced electrodes provided with means to transfer an ionic current therebetween.

ELECTRODE

The electron current carrying material or structure at which the current producing chemical reaction takes place

ELECTROLYTE

A material capable of passing an ionic current.

FUEL CELL

A device used to produce an electrical current wherein one of the reactants is fed to the cell.

REACTANT

The material which includes an active material as one of its components.

SEPARATOR

A material used to space or maintain a pair of electrodes out of contact. This includes material which function only to stop dendritic growth (treeing) between the electrodes.A cell or group of cells.

SUBCLASSES

1 HAVING POLARITY SAFETY FEATURE:
This subclass is indented under the class definition. Apparatus having structural means to connect the terminals in a desired polarity relationship.

2 HAVING LIVING MATTER, E.G., MICROORGANISM, ETC.:
This subclass is indented under the class definition. Apparatus having bacteria or other living organism(s) as an integral part thereof and the related process.

3 HAVING PULSE FEATURE:
This subclass is indented under the class definition. Apparatus capable of producing periodic electrical output and the related process.

4 WITH SONIC OR ULTRASONIC FEATURE:
This subclass is indented under the class definition. Apparatus having periodic motion applied to the same by sonic or ultrasonic means and the related process.

5 RADIO ACTIVE MATERIAL CONTAINING:
This subclass is indented under the class definition. Apparatus having material which emits atomic radiation.

SEE OR SEARCH CLASS:

136, Batteries: Thermoelectric and Photoelectric, subclass 202 for a thermoelectric battery-nuclear energy type.

310, Electrical Generator or Motor Structure, subclass 301 for electrical generators involving a nuclear reaction.

6 WITH PRESSURE EQUALIZING MEANS FOR LIQUID IMMERSION OPERATION:
This subclass is indented under the class definition. Apparatus having means to equalize the pressure between the inside of a casing and the surrounding liquid environment when the apparatus is immersed.

7 WITH NONBATTERY ELECTRICAL COMPONENT ELECTRICALLY CONNECTED WITHIN CELL CASING OTHER THAN TESTING OR INDICATING COMPONENTS:
This subclass is indented under the class definition. Apparatus having a nonelectrochemical current producing electrical component within a battery casing in combination with conventional components.

SEE OR SEARCH THIS CLASS, SUBCLASS:
90+, for battery having testing or indicating means.

8 HAVING DISPARATE NONELECTRICAL FUNCTION:
This subclass is indented under the class definition. Apparatus having a function other than or in addition to that of producing electricity and the function is foreign to the electrical production.

9 HAVING DIVERSE CELLS OR DIVERSE REMOVABLE CELLS IN A SUPPORT MEANS:
This subclass is indented under the class definition. Apparatus consisting of multiple different types of electrical cells or a support means having different types of cells at least one of which is removable from the support.

10 HAVING MAGNETIC FIELD FEATURE:
This subclass is indented under the class definition. Apparatus which makes use of a magnet or a magnetic field in any of its forms and the related process.

11 CURRENT PRODUCTION DEPENDENT UPON TEMPERATURE DIFFERENTIAL BETWEEN A PAIR OF ELECTRODES:
This subclass is indented under the class definition. Apparatus wherein the electrical current is produced by maintaining a pair of electrodes at different temperatures and the related process.

SEE OR SEARCH THIS CLASS, SUBCLASS:
120,, for a battery having heat exchange means.

47 HAVING EARTH FEATURE:
This subclass is indented under the class definition. Apparatus wherein a portion of the earth constitutes a part of the battery.

SEE OR SEARCH THIS CLASS, SUBCLASS:
119,, for sea water-type battery.

48 PRESERVING CELL IN STORAGE FEATURE:
This subclass is indented under the class definition. Process and apparatus for maintaining a battery in storage.

49 REGENERATING, SALVAGE OR REPAIR FEATURE OTHER THAN ONLY ADDITION OF ELECTROLYTE TO CELL OR ELECTRICALLY CHARGING PER SE:
This subclass is indented under the class definition. Apparatus or process having means for or the step of restoring, or aid in restoring the battery to its former condition after decay, injury, or partial destruction.

(1) Note. Since the addition of electrolyte, per se, to and the charging of a battery are such a conventional way to regenerate the same, classification on these features are not included herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
50,, for process of operating, battery including step of adding an electrolyte.

SEE OR SEARCH CLASS:
164, Metal Founding, subclass 92.1 for process of repairing or restoring article, for use.
320, Electricity: Battery or Capacitor Charging or Discharging, appropriate subclass for electrically charging or rejuvenating (e.g., depolarizing, etc.) a battery.

50 PROCESS OF CELL OPERATION:
This subclass is indented under the class definition. Process involving the operation of a battery (to provide electricity) and includes starting the battery and adding or using a specified electrolyte.

51 Electrolyte circulation:
This subclass is indented under subclass 50. Process including the step of circulating the electrolyte.

SEE OR SEARCH THIS CLASS, SUBCLASS:
408, for a process of circulating electrolyte in a fuel cell.

52 Activation of inactive cell:
This subclass is indented under subclass 50. Process involving the step of starting up a dormant cell.

53 MEANS EXTERNALLY RELEASING INTERNAL GAS PRESSURE FROM CLOSED CELL, I.E., VALVE ETC.:
This subclass is indented under the class definition. Apparatus having means to release an internal gas pressure to the exterior of a closed cell.

54 Elastic, resilient or spring biasing valve means:
This subclass is indented under subclass 53. Apparatus wherein the release means is either an (a) elastic, (b) resilient, or (c) spring, biasing valve structure.

55 Elastic band or O-ring valve member:
This subclass is indented under subclass 54. Apparatus having an elastic band or O-ring in the valve structure.

56 Blowout type:
This subclass is indented under subclass 53. Apparatus wherein the release means functions upon reaching a predetermined pressure thereby preventing damage to the apparatus.

57 SEALED CELL HAVING GAS PREVENTION OR ELIMINATION MEANS:
This subclass is indented under the class definition. Apparatus wherein the device is completely closed and has means within the same for preventing formation of or eliminating gas pressure.

58 Prevention means controlling an auxiliary device:
This subclass is indented under subclass 57. Apparatus wherein the prevention means functions to control an auxiliary device, e.g., a charge disconnect, etc.

59 Prevention or elimination means is one of the cell electrodes or is electrically connected to an electrode:
This subclass is indented under subclass 57. Apparatus wherein the gas control means is electrically connected to an electrode.

60 Electrodes having different total capacity or one electrode with charge or discharge reserve:
This subclass is indented under subclass 59. Apparatus wherein the electrodes have diverse total capacities or one electrode has a charge or discharge reserve.

61 WITH CONTROL MEANS RESPONSIVE TO BATTERY CONDITION SENSING MEANS:
This subclass is indented under the class definition. Apparatus having means sensitive to variations in a cell condition and a regulating means, functioning in response thereto to effect an operation or change.

SEE OR SEARCH CLASS:
73, Measuring and Testing, appropriate subclasses for condition sensing means, per se, and see the "SEARCH NOTES" under Class 73 definition.
320, Electricity: Battery or Capacitor Charging or Discharging, appropriate subclass for controlling charging or discharging of a battery or capacitor in response to a battery or capacitor condition.
340, Communications: Electrical, subclass 635 for electrical apparatus condition responsive system and subclasses 636.1-636.21 for battery condition responsive apparatus.

62 Temperature control:
This subclass is indented under subclass 61. Apparatus wherein the temperature is regulated.

SEE OR SEARCH CLASS:
320, Electricity: Battery or Capacitor Charging or Discharging, appropriate subclass for controlling charging or discharging of a battery or capacitor in response to a battery or capacitor condition, especially subclasses 150+ for detection of a thermal condition.

63 Electrolyte feeding control from reserve supply:
This subclass is indented under subclass 61. Apparatus wherein the feeding of the electrolyte is regulated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
72+, for nonautomatic feeding of the electrolyte.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 386+ for automatic liquid level control devices of general utility.

64 Having valve in control:
This subclass is indented under subclass 63. Apparatus having valve means as a part of the sensing or control means.

65 TERMINAL PROTECTOR OTHER THAN SEAL THROUGH CASING:
This subclass is indented under the class definition. Apparatus having means to protect the terminal or a terminal projector, per se, other than that which forms a seal between the casing and the terminal.

SEE OR SEARCH CLASS:
439, Electrical Connectors, appropriate subclasses especially subclasses 190+ for an electrical connector having a retainer or a passageway for fluent material; subclasses 519+ for an electrical connector with provision to restrict environmental effects; subclass 726 for an insulated clamp-type connector for a storage battery post; and subclasses 745+ for a metallic clamp-type connector for a storage battery terminal, generally.

66 HAVING MEANS TO ACCOMMODATE ELECTRODE EXPANSION:
This subclass is indented under the class definition. Apparatus having means permitting enlargement of the electrode.

67 HAVING MOVABLE MECHANICAL MEANS TO PROVIDE RELATIVE MOTION BETWEEN ELECTRODE AND ELECTROLYTE:
This subclass is indented under the class definition. Apparatus having means which provide mechanical motion functioning to produce relative motion between the electrode(s) and the electrolyte.

(1) Note. Means to activate the cell only is not considered proper for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
113+, for a deferred action battery activated by movement of electrode or contained electrolyte.
408, 450, 451, and 544, for a process or means for moving an electrolyte in a fuel cell.

68 Means moves electrode:
This subclass is indented under subclass 67. Apparatus wherein the movable mechanical means provides motion to the electrode.

69 Rotary motion:
This subclass is indented under subclass 68. Apparatus wherein the electrode is caused to revolve.

70 Means moves electrolyte externally of electrode chamber:
This subclass is indented under subclass 67. Apparatus wherein the movable mechanical means causes motion of the electrolyte outside of the electrode compartment.

71 WITH SYSTEM HAVING MEANS TO MOVE VENTILATING FLUID:
This subclass is indented under the class definition. Apparatus having means to move a ventilating fluid to or from the battery.

SEE OR SEARCH CLASS:
114, Ships, subclass 20.1 for torpedoes having batteries.

72 HAVING SPECIFIED VENTING, FEEDING OR CIRCULATION STRUCTURE (OTHER THAN FEEDING OR FILLING FOR ACTIVATING DEFERRED ACTION-TYPE BATTERY):
This subclass is indented under the class definition. Apparatus having means for manipulating a fluid in a battery structure to (a) vent, (b) feed, or (c) circulate the same.

(1) Note. Since a filler opening of a battery is so conventional and will inherently function to allow feeding and venting, said filler opening is not considered proper for this and indented subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:
110+, for deferred action-type battery wherein feeding and venting are common.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 260+ for battery replenishment apparatus.
141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclass 18 for filling devices useful in filling batteries.

73 Single filling opening and means to equalize fluid level in plural cells:
This subclass is indented under subclass 72. Apparatus having one filling opening and structure functioning to equalize the liquid level in all sections of the battery.

74 Having means to control electrolyte level when liquid is added, other than a visual reference point:
This subclass is indented under subclass 72. Apparatus having means to regulate the liquid level of the electrolyte when it is added to the battery.

SEE OR SEARCH THIS CLASS, SUBCLASS:
91,, for a battery having measuring testing or indicating means for a liquid level including a visual reference point.

75 For different levels:
This subclass is indented under subclass 74. Apparatus wherein means are provided to control more than one liquid level.

76 Float valve:
This subclass is indented under subclass 74. Apparatus wherein the control means is a valve operable by reason of it being buoyant.

77 By establishing an air lock:
This subclass is indented under subclass 74. Apparatus wherein the control means functions by creating an airlock.

78 Liquid seal only:
This subclass is indented under subclass 77. Apparatus wherein a liquid seal only causes the airlock.

79 Movable valve structure supported within the filler opening:
This subclass is indented under subclass 77. Apparatus wherein a movable valve structure is provided in the filler opening.

80 Having (manual) electrolyte storage feeding a device:
This subclass is indented under subclass 72. Apparatus having manual means to store the electrolyte and feed the same to the battery.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclass 160 for battery replenishment system.

81 Having nonmovable means providing motion between electrolyte and electrodes, i.e., circulation:
This subclass is indented under subclass 72. Apparatus having stationary structure functioning to aid fluid circulation in the battery structure, i.e., circulation between electrolyte and electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

67+, for movable means providing circulation in a battery structure.

82 Venting structure:

This subclass is indented under subclass 72. Apparatus providing an opening for ingress or egress of a fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

53+, for battery having means to release internal gas pressure.

83 Separate ventilating inlet and exhaust openings:

This subclass is indented under subclass 82. Apparatus having different opening for ingress and egress of a fluid.

84 Nonspill fluent electrolyte type other than gas diffusive type:

This subclass is indented under subclass 82. Apparatus wherein the vent contains structure functioning to prevent the spilling of the electrolyte when the apparatus is tilted, upended, or placed in a position other than that which is normal for operation.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 43 for structure of this type of general utility.

85 Weight actuated valve type:

This subclass is indented under subclass 84. Apparatus comprising a weight means functioning as a part of a valve means to render the apparatus operative.

86 Reactive, absorbable or diffusive type:

This subclass is indented under subclass 82. Apparatus wherein the vent contains structure or materials which react with, absorb or diffuse the fluid passing therethrough.

87 Gang type:

This subclass is indented under subclass 82. Apparatus wherein the plural vents have a community feature.

SEE OR SEARCH THIS CLASS, SUBCLASS:

71,, wherein means are provided to remove from or supply a fluid to plural vents.

88 Having manifold:

This subclass is indented under subclass 87. Apparatus wherein the community feature is a manifold.

89 Other stopper, cap or plug type:

This subclass is indented under subclass 82. Apparatus having a stopper, cap or plug-type venting means other than those in subclasses 62, 83, 84, and 86.

90 WITH MEASURING, TESTING, OR INDICATING MEANS:

This subclass is indented under the class definition. Apparatus having means to measure, test or indicate a condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

53+, for pressure release control.

61+, for control means responsive to a condition sensor.

SEE OR SEARCH CLASS:

73, Measuring and Testing, appropriate subclasses for process or apparatus for making a measurement or test.

116, Signals and Indicators, appropriate subclasses for signalling and indicating devices, per se.

324, Electricity: Measuring and Testing, appropriate subclasses for apparatus for measuring and testing electrical properties.

91 For charge or liquid level:

This subclass is indented under subclass 90. Apparatus wherein the battery charge or liquid level is measured, tested, or indicated.

92 Having electrical circuitry:

This subclass is indented under subclass 91. Apparatus wherein the battery has electrical circuitry other than that normally used in the same.

93 External type:
This subclass is indented under subclass 92. Apparatus wherein the electrical circuit is located outside of the battery.

94 PLURAL CONCENTRIC OR SINGLE COILED ELECTRODE:
This subclass is indented under the class definition. Apparatus comprising a battery having coiled or plural concentric electrodes, or coiled or plural concentric electrodes, per se.

95 HAVING MEANS FOR DRAINING OR REMOVING ELECTROLYTE FROM A CELL OTHER THAN FILLER OPENING:
This subclass is indented under the class definition. Apparatus having means other than the filler opening providing egress of the electrolyte.

96 CELL SUPPORT FOR REMOVABLE CELL:
This subclass is indented under the class definition. Apparatus comprising support means providing for removal of the cell(s), or a cell support, per se, for a removable cell(s).

SEE OR SEARCH CLASS:
105, Railway Rolling Stock, subclasses 50+ for battery supports combined with subject matter of that class.
180, Motor Vehicles, subclass 68.5 for battery support combined with subject matter of that class.
294, Handling: Hand and Hoist-Line Implements, cross reference art collection 903 for hand-held battery carriers.

97 Having switch or interlock means:
This subclass is indented under subclass 96. Apparatus having (a) a device to turn on/off the operation of the battery, or (b) a means to control the flow of current to/from the battery depending upon some other operation, e.g., the opening of a door, etc.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, appropriate subclasses for electrical switches.
307, Electrical Transmission or Interconnection Systems, subclass 326 for systems designed to protect the individual; and subclass 150 for power-pack systems.
361, Electricity: Electrical Systems and Devices, appropriate subclasses for systems designed to protect the apparatus.

98 Having disparate support structure, e.g., eyeglass temple, etc.:
This subclass is indented under subclass 96. Apparatus having named support structure which has a function other than primarily supporting the cell(s).

SEE OR SEARCH THIS CLASS, SUBCLASS:
8,, for battery apparatus having a function other than that of primarily producing electricity.

99 For plural cells:
This subclass is indented under subclass 96. Apparatus wherein the support holds plural removable cells which are a group of separate cells, or the cells are capable of being separated.

SEE OR SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 150 for power-pack systems.

100 Support or holder per se:
This subclass is indented under subclass 96. Apparatus comprising means, per se, for holding or supporting the cell(s).

101 FLUID ACTIVE MATERIAL OR TWO-FLUID ELECTROLYTE COMBINATION HAVING AREAS OF NONMIXTURE:
This subclass is indented under the class definition. Apparatus or materials wherein the active material or material for use as the active material in the apparatus is in a fluid state, or an apparatus which specifically defines a two-fluid electrolyte combination.

SEE OR SEARCH THIS CLASS, SUBCLASS:

400, through 535, for fluid active material which is supplied from an external source, e.g., fuel cell, etc.

102 Active material in molten state:
This subclass is indented under subclass 101. Subject matter wherein the active material is in its molten state when it is being used to produce a current in an apparatus.

103 With fused electrolyte, i.e., molten:
This subclass is indented under subclass 102. Subject matter wherein the molten active material is in combination with a fused or molten electrolyte when the combination is in operable current-producing relationship.

104 With solid-state electrolyte:
This subclass is indented under subclass 102. Subject matter wherein the molten active material is in combination with a solid state ionic transfer or exchange-type electrolyte.

105 Active material in solution:
This subclass is indented under subclass 101. Subject matter wherein the active material is in a dissolved state in a liquid solvent forming a solution.

106 Copper sulfate solution:
This subclass is indented under subclass 105. Subject matter wherein the active material is a solution of copper sulfate.

107 Iron containing material:
This subclass is indented under subclass 105. Subject matter wherein the active material is a solution of dissolved iron, or where an active material is iron in combination with an active material in solution.

108 Nitrogen containing material:
This subclass is indented under subclass 105. Subject matter wherein the active material in solution is a dissolved nitrogen-containing compound, or is a solution of nitric acid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

203,, for nitrogen containing electrolyte which is not the active material.

109 Chromium containing material:
This subclass is indented under subclass 105. Subject matter wherein the active material in solution is a dissolved chromium-containing compound.

SEE OR SEARCH THIS CLASS, SUBCLASS:

203,, for nitrogen containing electrolyte which is not the active material.

110 DEFERRED ACTION TYPE:
This subclass is indented under the class definition. Apparatus wherein the action of the battery is (a) started by bringing active components of the same into operative relationship, or (b) depended upon light or heat to cause a chemical reaction.

111 Responsive to light:
This subclass is indented under subclass 110. Apparatus wherein the battery is activated or reactivated by light which causes a chemical reaction.

SEE OR SEARCH CLASS:

136, Batteries: Thermoelectric and Photoelectric, subclasses 243+ for photoelectric batteries whereby electricity is produced without the aid of a chemical reaction.

112 Responsive to heat:
This subclass is indented under subclass 110. Apparatus wherein the battery is activated or reactivated by heat which causes a chemical reaction.

SEE OR SEARCH CLASS:

136, Batteries: Thermoelectric and Photoelectric, subclasses 200+ for thermoelectric batteries.

113 Responsive to movement of electrode on contained electrolyte:
This subclass is indented under subclass 110. Apparatus wherein the battery is activated by bringing together the contained electrolyte and electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

67,, for movable means providing relative motion between the electrode and electrolyte.

114 Activated by spin or set back:
This subclass is indented under subclass 113. Apparatus wherein the activation of the battery is caused by (a) a turning (centrifugal, centripetal) force, or (b) a rapid abrupt acceleration of deceleration.

115 Activated by explosive charge:
This subclass is indented under subclass 113. Apparatus wherein the activation is caused by an explosive charge attached to or within the battery.

116 Frangible separation means:
This subclass is indented under subclass 113. Apparatus wherein the battery has a breakable means separating the electrolyte from other components.

117 By orientation of the cell:
This subclass is indented under subclass 113. Apparatus wherein the activation of the battery is caused by turning the same to a direction other than its normal position.

118 Responsive to addition of liquid:
This subclass is indented under subclass 110. Apparatus wherein the battery is activated by the addition of a liquid which may be the electrolyte, per se, or water or other solvent functioning to dissolve the electrolyte materials.

SEE OR SEARCH THIS CLASS, SUBCLASS:

72+, for apparatus for feeding fluid materials to the battery for purposes other than activating the same.

119 Activated by immersion, e.g., sea water type:
This subclass is indented under subclass 118. Apparatus wherein the battery is activated by submerging the same in a liquid.

120 WITH HEAT EXCHANGE FEATURE:
This subclass is indented under the class definition. Apparatus having means functioning to (a) heat/cool the same, or (b) allowing heating/cooling of the same, e.g., special construction, passageway, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

11,, for battery having heat exchange means for producing a temperature differential between electrodes.

434, through 442, for a fuel cell with heat exchange feature.

121 ADJUNCTS IN COMBINATION WITH OR FOR CONNECTION TO AN EXTERNAL ELECTRICAL ELECTRIC CURRENT CARRYING MEMBER OF A BATTERY OTHER THAN TERMINAL PROTECTORS, E.G., TERMINAL ADAPTER, CAPS, LIFTERS, ETC. AND CONNECTORS PER SE:
This subclass is indented under the class definition. Apparatus which are in combination with or are designed to be connected to an electric current carrying member located on an external portion of a cell or a plurality of cells for purposes other than protecting a battery terminal. Also cell connectors, per se.

SEE OR SEARCH CLASS:

439, Electrical Connectors, appropriate subclasses for connectors which attach to battery terminals.

122 CURRENT PRODUCING CELL, ELEMENTS, SUBCOMBINATIONS AND COMPOSITIONS FOR USE THEREWITH AND ADJUNCTS:
This subclass is indented under the class definition. Apparatus comprising means for producing an electrical current, subcombination of the same and related compositions.

123 Having means to interchangeably connect plural individual cells or means to connectively support cell to current seeking apparatus:
This subclass is indented under subclass 122. Apparatus wherein the cell has means (1) to join plural cells interchangeable with one and another, or (2) to join and support the same

with some apparatus which uses current from said cell.

124 Printed cell type:
This subclass is indented under subclass 122. Apparatus wherein the cell is made in the manner as a printed circuit.

125 Standard cell or counter emf type:
This subclass is indented under subclass 122. Apparatus wherein the cell is either the standard or counter electromotive force type.

126 Cell with protective layer on electrolyte:
This subclass is indented under subclass 122. Apparatus having means forming a protective surface on the electrolyte.

127 Tape or flexible-type cell including tape fuel cells or subcombination thereof:
This subclass is indented under subclass 122. Apparatus wherein the cell is in the form of a long thin strip or it is very pliable.

128 Electrode or plural tablets, pellets or discs:
This subclass is indented under subclass 122. Apparatus having an electrode composed of plural tablets, pellets, or discs.

129 Separator, retainer or spacer insulating structure (other than a single porous flat sheet, or either an impregnated or coated sheet not having distinct layers):
This subclass is indented under subclass 122. Apparatus comprising a structure positioned between or for use between cell electrodes to physically or functionally separate the electrodes. Included in this subclass are separator, retainer, or spaced structures such as rods, buttons, frames, etc., which merely space the electrodes; separators which physically and functionally separate the electrodes and which enclose or envelop the electrodes or a portion thereof in any manner; structures having plural components; and sheet materials which have projection thereon.

(1) Note. To constitute structure for this and indented subclasses, there must be claimed (disclosure) subject matter involving: (a) More than a single porous sheet. (b) Plural layers. (c) Any of the structures specifically set out in the indented subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

247,, for separator, retainer, or spacer structures of porous flat sheet materials including impregnated or coated support materials which form a single flat sheet material having essentially uniform porosity. See the search notes thereunder.

130 Insulator structure is only spacer of the rod, button, strip, or frame type:
This subclass is indented under subclass 129. Apparatus directed to only a spacer such as a rod, button, strip, or frame which physically separates, or for separating and maintaining a pair of electrodes in a spaced relationship.

131 Having electrode enclosing feature:
This subclass is indented under subclass 129. Apparatus which encloses or is adapted for enclosing an electrode to physically separate an active material from an opposing electrode and to functionally retain or hold the active material in position to stop transfer of an active material to the opposing electrode.

132 Separating material in bulk form about electrode:
This subclass is indented under subclass 131. Apparatus wherein the insulating material in bulk form surrounds the electrode.

133 Cylindrical unit cell type, flat unit cell type or porous cup type:
This subclass is indented under subclass 131. Apparatus in combination with or for use in unit cell-type batteries either cylindrical or flat. Also porous cup-type separators which generally are of carbon and are used to separate two distinct fluids in the apparatus.

134 Paste or gel:
This subclass is indented under subclass 133. Apparatus having material in the form of a paste or gel and usually contains an electrolyte.

135 With layer of material or spacing means:
This subclass is indented under subclass 134. Apparatus having a layer of material or spacing means which either supports the paste material, retains an active material in position, or physically separates opposing electrodes.

136 Envelope type:
This subclass is indented under subclass 131. Apparatus having means to enclose or are for use with plate-type electrode and covers both sides of the plate electrode.

137 Coating on electrode:
This subclass is indented under subclass 136. Apparatus wherein the envelope is a coated material.

138 Having support frame or cover:
This subclass is indented under subclass 136. Apparatus wherein the envelope includes a supporting frame or cover combined with separator layers.

139 Having edge bond or seal:
This subclass is indented under subclass 136. Apparatus wherein the envelope is formed by sealing or bonding the edge portion.

140 Tubular type:
This subclass is indented under subclass 131. Apparatus which are tubular in form and functions in an electrode tubular-type plate to hold the active material around a current collector spine or rod.

141 Having plural layers of diverse material:
This subclass is indented under subclass 140. Apparatus wherein the tubular structure is composed of multiple laminae, at least two of which are from different materials.

142 Having plural distinct components:
This subclass is indented under subclass 129. Apparatus having multiple distinct parts.

143 Ribs or projections attached to sheet material:
This subclass is indented under subclass 142. Apparatus having ribs or projections attached to a sheet material layer.

144 Plural layers:
This subclass is indented under subclass 142. Apparatus having multiple layers.

145 Having defined porosity either functional or by size (i.e., semipermeable, permselective, ionpermeable, microporous, etc.):
This subclass is indented under subclass 144. Apparatus wherein the porosity characteristic of at least one layer has been specifically defined.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclass 566 for metallic stock material containing metal particles and having an interconnected void structure.

146 Having electrode spacing projections:
This subclass is indented under subclass 129. Apparatus having projections separating an electrode from the base sheet of the material and are other than ribs which have been attached to the base sheet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
143,, for sheet material having attached ribs or projections.

147 Projections are deformed portions, of a sheet material, i.e., corrugations, etc.:
This subclass is indented under subclass 146. Apparatus wherein the projections are portions of the base sheet which have been deformed from the general plane of the base sheet.

148 Plural housing having spacing means or channels for air circulation and short prevention:
This subclass is indented under subclass 122. Apparatus wherein a plurality of battery housings are spaced from each other by some means which provides space for air to circulate therebetween, whereby the drying action of the air prevents shorts from forming between external terminal of the cells.

149 Plural cells:
This subclass is indented under subclass 122. Apparatus comprising more than one cell.

SEE OR SEARCH THIS CLASS, SUBCLASS:
9,, for plural diverse cells or plural diverse removable cells in a support.

99,, for cell support for or with plural cells.

SEE OR SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 150 for power packs.

150 With integral switch means:
This subclass is indented under subclass 149. Apparatus having switch means integral with the cell(s) structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
97,, for removable cells having a support or support, per se, having switch means.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, appropriate subclasses for electrical switches of the type used with the cells of this class.

151 Casing having interlocking structure:
This subclass is indented under subclass 149. Apparatus wherein the casing has means to interjoin one part thereof with another.

152 Individual cells connected in repeating contiguous layered units:
This subclass is indented under subclass 149. Apparatus comprising single cells joined in repeating touching laminae units.

SEE OR SEARCH THIS CLASS, SUBCLASS:
162,, for single cells of this type.

153 Having unit enclosing housing:
This subclass is indented under subclass 152. Apparatus having a housing encasing the individual cells either as a single unit or multiunits forming in effect a single casing.

154 Having sectional component:
This subclass is indented under subclass 153. Apparatus wherein the housing is divided into parts.

155 Of tray, cup or dish shape in nested or telescopic relationship:
This subclass is indented under subclass 154. Apparatus wherein the housing parts are in the form of a (a) tray, (b) cup, or (c) dish shape, all of which are in a nested or telescopic relationship.

156 Complete cells:
This subclass is indented under subclass 149. Apparatus wherein individual cells have all components self-contained, and could, if separated, function as a single cell.

157 In end-to-end contact, e.g., stacked button-type cell, etc.:
This subclass is indented under subclass 156. Apparatus wherein the cells are arranged in such a manner that one end of a cell contacts the end of another cell, e.g., in a vertical plane, side-by-side, etc.

158 Having intercell connector:
This subclass is indented under subclass 156. Apparatus wherein the cells have means to electrically connect the same.

SEE OR SEARCH THIS CLASS, SUBCLASS:
160,, for plural cells having electrical connecting means between the cells.
161,, for a single cell unit made of plural plates (electrodes) having means to electrically connect the same.

159 And common external casing, tray or clamp means:
This subclass is indented under subclass 158. Apparatus wherein the cells have a common external support means in the form of a casing, tray, or clamp.

160 Having intercell connector:
This subclass is indented under subclass 149. Apparatus having electrical connecting means between the cells.

SEE OR SEARCH THIS CLASS, SUBCLASS:
158,, for plural complete cells having intercell connector.

161, for a single cell unit made of plural plates (electrodes) having means to electrically connect the same.

161 Intracell assembly having cell electrode connector:
This subclass is indented under subclass 122. Apparatus comprising plural electrode components electrically connected to form a single cell unit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
158,, for plural complete cells having an intercell connector.
160,, for plural cells having an intercell connector.

162 Flat-type unit cell and specific unit cell components:
This subclass is indented under subclass 122. Apparatus wherein a single cell is formed of flat components which are usually used in a group. Also components specifically designed for use with the same.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152+, for a group of flat cells formed as an integral unit.

163 Cell enclosure structure, e.g., housing, casing, container, cover, etc.:
This subclass is indented under subclass 122. Apparatus comprising means functioning to confine cell structure.

164 Cylindrical unit cell type, e.g., cup container electrode, tubular electrode, casing, etc.:
This subclass is indented under subclass 163. Apparatus comprising a single cell generally round in shape.

(1) Note. The enclosure portion of the apparatus may be one of the cell electrodes or the active material of the cell.

165 Having centrally located anode, i.e., 'inside-out' type cell:
This subclass is indented under subclass 164. Apparatus having a positive electrode located in the center thereof.

166 Reactive metallic can, cup or tubular electrode:
This subclass is indented under subclass 164. Apparatus wherein the cell has a container-type electrode which is chemically reactive.

167 Having outer nonreactive housing, casing, or jacket:
This subclass is indented under subclass 166. Apparatus having a chemically inactive container or cover outside of the reactive electrode.

168 Having metallic or conductive outer casing:
This subclass is indented under subclass 167. Apparatus having a metallic or electrically conductive casing on the outside of the nonreactive housing, casing, jacket, etc.

169 Outer casing electrically connected to reactive electrode:
This subclass is indented under subclass 168. Apparatus having an electrical connection between the outer casing and the reactive electrode.

170 Electrical contact terminal plate or cap clamped to or embedded in a portion of the housing:
This subclass is indented under subclass 169. Apparatus having an electrical contact terminal plate or cap, clamped to or embedded in a portion of the housing.

171 Having seal:
This subclass is indented under subclass 166. Apparatus having means preventing either ingress or egress of a fluid.

172 Mechanical clamping pressure seal:
This subclass is indented under subclass 171. Apparatus wherein the seal is of the mechanical clamping pressure type.

173 And sealing mass or compound:
This subclass is indented under subclass 172. Apparatus having a sealing mass or compound which, at some stage of the battery manufacture, said mass or compound was in a fluent or bulk form.

174 Having seal material:
This subclass is indented under subclass 164. Apparatus having means preventing either ingress or egress of a fluid, i.e., sealing material.

175 Cover only:
This subclass is indented under subclass 163. Apparatus directed only to a means for closing an opening in the container or casing.

176 Container only:
This subclass is indented under subclass 163. Apparatus directed only to the container portion of the battery case.

SEE OR SEARCH CLASS:
206, Special Receptacle or Package, especially subclasses 524.1+ for acid proof containers of generally utility or not having structure which makes them readily adapted for battery use.

177 Housing or casing with plural covers:
This subclass is indented under subclass 163. Apparatus wherein the housing or casing has more than one cover.

178 Having terminal:
This subclass is indented under subclass 163. Apparatus having an electrical terminal.

179 On or through a side of housing:
This subclass is indented under subclass 178. Apparatus wherein the terminal is located on or protruding through the housing.

180 Sealing sleeve embedded or molded in cover:
This subclass is indented under subclass 178. Apparatus wherein the terminal has a sealing sleeve embedded in or molded in the cover.

181 And terminal seal:
This subclass is indented under subclass 178. Apparatus wherein the terminal has means preventing ingress or egress or a fluid.

182 Means to stop rotational movement between cover and terminal:
This subclass is indented under subclass 181. Apparatus having means functioning to prevent rotary movement between the cover and terminal.

183 Having threaded compression means:
This subclass is indented under subclass 181. Apparatus wherein the terminal has a threaded compression means.

184 Sealing mass or compound:
This subclass is indented under subclass 181. Apparatus wherein the seal includes a sealing mass or compound which, at some stage of battery manufacture, said mass or compound was in a fluid or bulk form.

185 Having seal feature:
This subclass is indented under subclass 163. Apparatus having means preventing either the egress or ingress of a fluid.

186 Having cell assembly support feature:
This subclass is indented under subclass 163. Apparatus having means to support a cell assembly.

187 Having handle or lifting device:
This subclass is indented under subclass 163. Apparatus having means facilitating the manipulation of the cell, i.e., a handle or lifting means, etc.

188 Include electrolyte chemically specified and method:
This subclass is indented under subclass 122. Apparatus having materials which function as an electrolyte and are chemically specified. Included also are the materials, per se.

SEE OR SEARCH THIS CLASS, SUBCLASS:
112, for fused salt or molten electrolyte materials.
472, 479, and 498-501, for electrolyte materials having utility in fuel cells.

SEE OR SEARCH CLASS:
252, Compositions, subclass 62.2 for electrolyte compositions for electrical devices other than batteries. An elec-

trolyte disclosed or claimed generally, e.g., battery and/or condenser, will be classified in Class 252 and crossed to 429. A sole disclosure or claim to a battery electrolyte will be classified in Class 429.

189 **Precursor composition:**
This subclass is indented under subclass 188. Subject matter which is or has a substance that proceeds the formation of an electrolyte.

199 **Halogen containing:**
This subclass is indented under subclass 188. Subject matter having a halogen atom as a part of chemical makeup.

200 **Hydrogen containing:**
This subclass is indented under subclass 199. Subject matter containing hydrogen other than that present in the water which helps form the solution.

201 **Ammonium:**
This subclass is indented under subclass 200. Subject matter wherein ammonia is combined with the halogen.

202 **Chromium containing:**
This subclass is indented under subclass 188. Subject matter having a chromium atom.

SEE OR SEARCH THIS CLASS, SUBCLASS:
109,, for fluid active material containing chromium.

203 **With acid containing N or P constituent:**
This subclass is indented under subclass 188. Subject matter having an acid containing a nitrogen or phosphorus atom.

SEE OR SEARCH THIS CLASS, SUBCLASS:
108,, for active material containing the nitrogen atom.

204 **Sulphuric acid:**
This subclass is indented under subclass 188. Subject matter containing sulphuric acid.

205 **Sulphate containing:**
This subclass is indented under subclass 204. Subject matter containing a salt of sulphuric acid.

206 **Alkaline:**
This subclass is indented under subclass 188. Subject matter which is a chemical base.

207 **With salt or acid component:**
This subclass is indented under subclass 206. Subject matter having either a salt or acid as a part thereof.

208 **Electrode support for suspending or holding an electrode in a battery:**
This subclass is indented under subclass 122. Apparatus for suspending or otherwise supporting the electrode in a battery structure, e.g., casing, etc.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 297.01 through 297.16 for electrode supports and work holders.

209 **Electrode:**
This subclass is indented under subclass 122. Apparatus directed to electrode structure.

210 **Bipolar type:**
This subclass is indented under subclass 209. Apparatus comprising an integral unit electrode wherein cathodic and anodic active material is electrically connected and bonded or adhered to opposite sides of a carrier.

211 **Having connector tab:**
This subclass is indented under subclass 209. Apparatus having a tab or electrical current contacting means.

212 **Having active material with organic component:**
This subclass is indented under subclass 209. Apparatus having active material containing an organic component.

213 **Organic component is active material:**
This subclass is indented under subclass 212. Apparatus wherein the organic material is the active material.

214 **Organic component is an antioxidant:**
This subclass is indented under subclass 212. Apparatus wherein the organic material functions to retard deterioration by oxidation.

215 **Organic component is an expander or addition agent for improving electrode capacity or plating characteristics:**
This subclass is indented under subclass 212. Apparatus wherein the organic material is an expander or addition agent for perfecting the electrode capacity, performance, or plating characteristics.

216 **Dendrite or 'tree' forming inhibitor:**
This subclass is indented under subclass 215. Apparatus having a material which prevents any arborescent crystalline growth.

217 **Organic component is a binder:**
This subclass is indented under subclass 212. Apparatus wherein the organic material functions as a binding agent.

218.1 **Chemically specified inorganic electrochemically active material containing:**
This subclass is indented under subclass 209. Subject matter containing an electrochemically active material which is inorganic and defined by its chemical component(s).

218.2 **Hydrogen storage material is active material:**
This subclass is indented under subclass 218.1. Subject matter wherein the electrochemically active inorganic material has the ability to absorb/desorb hydrogen.

(1) Note. Examples of materials provided for herein are mischmetal containing hydrogen-storage alloy and Ti-Ni hydride-forming material.

SEE OR SEARCH CLASS:
420, Alloys or Metallic Compositions, cross-reference art collection 900 for hydrogen storage alloys, per se.

219 **Silver component is active material:**
This subclass is indented under subclass 218.1. Apparatus having silver as a component thereof.

220 **Copper component is active material:**
This subclass is indented under subclass 218.1. Apparatus having copper as a component thereof.

221 **Iron component is active material:**
This subclass is indented under subclass 218.1. Apparatus having iron as a component thereof.

222 **Cadmium component is active material:**
This subclass is indented under subclass 218.1. Apparatus having cadmium as a compound thereof.

223 **Nickel component is active material:**
This subclass is indented under subclass 218.1. Apparatus having nickel as a component thereof.

224 **Manganese component is active material:**
This subclass is indented under subclass 218.1. Apparatus having manganese as a component thereof.

225 **Lead component is active material:**
This subclass is indented under subclass 218.1. Apparatus having lead as a component thereof.

226 **Alloy:**
This subclass is indented under subclass 225. Apparatus having one or more other metals forming a mixture.

227 **Metal sulphate or carbonate:**
This subclass is indented under subclass 225. Apparatus in the form of either lead sulphate or lead carbonate.

228 **Lead oxide:**
This subclass is indented under subclass 225. Apparatus wherein the lead is combined with oxygen.

229 **Zinc component:**
This subclass is indented under subclass 218.1. Apparatus having zinc as a component thereof.

230 **With mercury:**
This subclass is indented under subclass 229. Apparatus amalgamated with mercury or otherwise combined with mercury.

231 Zinc oxide:
This subclass is indented under subclass 229. Apparatus wherein the lead is combined with oxygen.

231.1 Alkalated transition metal chalcogenide component is active material:
This subclass is indented under subclass 218.1. Subject matter wherein the electrochemically active inorganic material is an alkali metal intercalated into a transition metal oxide, sulfide, selenide, or telluride; an example is LiTiS 2.

231.2 Alkalated vanadium (V) chalcogenide:
This subclass is indented under subclass 231.1. Subject matter wherein the electrochemically active inorganic material is an alkali metal intercalated into a vanadium oxide, sulfide, selenide, or telluride; an example is LiV 3O 8.

231.3 Alkalated cobalt (Co) chalcogenide:
This subclass is indented under subclass 231.1. Subject matter wherein the electrochemically active inorganic material is an alkali metal intercalated into a cobalt oxide, sulfide, selenide, or telluride; an example is LiCoO 2.

231.4 Alkalated carbon, graphite, or carbonaceous component is active material:
This subclass is indented under subclass 218.1. Subject matter wherein the electrochemically active inorganic material is an alkali metal intercalated into carbon allotrope (e.g., into carbon black, graphite, pitch, mesophase carbon, etc.).

231.5 Vanadium (V), chromium (Cr), niobium (Nb), molybdenum (Mo), titanium (Ti), or Tungsten (W) component is active material:
This subclass is indented under subclass 218.1. Subject matter wherein the electrochemically active inorganic material contains vanadium, chromium, niobium, molybdenum, titanium, or tungsten.

231.6 Alkaline earth metal or magnesium (Mg) component is active material:
This subclass is indented under subclass 218.1. Subject matter wherein the electrochemically active inorganic material contains an alkaline earth metal [i.e., calcium (Ca), strontium (Sr), barium (Ba), or radium (Ra)] or magnesium (Mg).

231.7 Halogenated carbon, graphite, or carbonaceous component is active material:
This subclass is indented under subclass 218.1. Subject matter wherein the electrochemically active inorganic material contains halogenated carbon, graphite, or carbonaceous material.

231.8 Carbon, graphite, or carbonaceous component is active material:
This subclass is indented under subclass 218.1. Subject matter wherein the electrochemically active inorganic material contains carbon, graphite, or carbonaceous material.

231.9 Alkali metal component is active material:
This subclass is indented under subclass 218.1. Subject matter wherein the electrochemically active inorganic material contains alkali metal [lithium (Li), potassium (K), sodium (Na), rubidium (Rb), cesium (Cs), or francium (Fr)].

231.95 The alkali metal is lithium:
This subclass is indented under subclass 231.9. Subject matter wherein the electrochemically active inorganic material contains lithium (e.g., Li-Al alloy, etc.).

232 Having inorganic binder or conductive filler:
This subclass is indented under subclass 209. Apparatus having material with an inorganic component which functions to bind other particles together or to impart an electrical conductivity to the material.

233 Grid or holder for active material:
This subclass is indented under subclass 209. Apparatus comprising electrically conductive means for supporting the active material (e.g., grids, holders, etc.) of the electrode.

234 Grid or holder has nonconducting component portion thereof:
This subclass is indented under subclass 233. Apparatus wherein the grid or holder for the active material includes a component which is not electrically conductive.

235 Having particulate or fibrous porous mass including a sintered mass:
This subclass is indented under subclass 233. Apparatus wherein the grid or holder for the active material is a mass of particulate or fibrous particles which are formed or bonded into a porous structure.

236 Having coating in the pores:
This subclass is indented under subclass 235. Apparatus wherein the particulate or fibrous particles are coated throughout the porous mass.

237 Having support or reinforcing member:
This subclass is indented under subclass 235. Apparatus wherein the mass of particulate or fibrous particles are in combination with a supporting or reinforcing structure.

238 Having longitudinal electrically conducting tubes or cores:
This subclass is indented under subclass 233. Apparatus wherein the grid or holder consists of longitudinal tubes or cores of an electrical conductive material.

239 Having conductive receptacle or mechanical locking means for the active material:
This subclass is indented under subclass 233. Apparatus wherein the holder is an electrical conductive receptacle for the active material or wherein a mechanical means is defined to lock the active material within a grid or holder.

240 Locking means being bendable tabs:
This subclass is indented under subclass 239. Apparatus where the grid or holder is provided with projections which are bent or may be bent for the expressed purpose of locking or holding the active material in position in the grid or holder.

241 Open mesh or perforated plate:
This subclass is indented under subclass 233. Apparatus wherein the grid is in the form of a plate having an open mesh or perforated structure.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclasses 596+ for metallic stock material having an aperture or cut.

242 Expanded metal:
This subclass is indented under subclass 241. Apparatus where the open mesh or perforations of the grid have been formed by expanded metal technique.

243 Having members in a face plane of the grid being offset from members in the plane of the opposite face:
This subclass is indented under subclass 241. Apparatus wherein the open mesh or perforation design defined by the elements in a face plane does not coincide with the design defined by the opposite face plane elements.

244 Distinct elements or members intermediate the face members:
This subclass is indented under subclass 243. Apparatus wherein distinct elements or members not coextensive with either set of members in a face plane are intermediate of the face members.

245 Materials chemically specified:
This subclass is indented under subclass 233. Apparatus wherein the chemical composition of the grid or holder is specifically defined.

246 With insulating separator, spacer or retainer means:
This subclass is indented under subclass 209. Subject matter directed to electrode in combination with insulating spacer or retainer means, i.e., separators, membranes, etc. The insulating material functions to physically and electronically separate the electrodes, to hold the active material into its desired position and to permit an ionically conduction of current when used in a battery.

247 Separator, retainer, spacer or materials for use therewith:
This subclass is indented under subclass 122. Apparatus comprising structure to be used as a separator, retainer, or spacer between the electrodes in a cell.

(1) Note. To constitute structure for this and indented subclasses there must be claimed (disclosure) subject matter involving: (a) a recitation of numerical dimension; (b) a coating on a substrate; and (c) structural connotations such as sheet, mat, fiber, filament, porosity, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

129,, for separator, retainer, or spacer which is (a) more than a single porous sheet, (b) plural layers, or (c) contains any of the structures specifically set out in the indented subclasses of subclass 129.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, subclass 500.21, (2) Note., for the lines between this class and other classes with respect to membranes defined by composition.

248 Having additive for effecting the charge capacity, life, etc., of a cell:
This subclass is indented under subclass 247. Apparatus combined with an additive material or component which functions to specifically change the properties such as the charge capacity of the plates or the life of the cell, etc.

249 Organic material:
This subclass is indented under subclass 247. Apparatus composed of or contains an organic component.

250 And wetting agent or surface acting agent:
This subclass is indented under subclass 249. Apparatus in combination with a wetting agent or surfactant.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 198+ for wetting agents (e.g., spreading, penetrating, leveling) or methods of making such agents, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

251 And inorganic material:
This subclass is indented under subclass 249. Apparatus combined with inorganic material.

252 Silicon containing:
This subclass is indented under subclass 251. Apparatus wherein the inorganic is or contains silicon.

253 Phenolic or thermosetting resin:
This subclass is indented under subclass 249. Apparatus wherein the organic component is either a phenolic or thermosetting resin.

254 Rubber or thermoplastic resin:
This subclass is indented under subclass 249. Apparatus wherein the organic component is rubber (natural or synthetic) or a thermoplastic.

255 Natural or treated plant materials:
This subclass is indented under subclass 249. Apparatus wherein the organic component is either a portion (in cross section) of a natural plant or a portion of a natural plant which has been nondestructively treated.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, appropriate subclasses for stock material made of natural plant material not otherwise provided for.

300 The electrolyte is gelled:
This subclass is indented under subclass 188. Subject matter wherein the electrolyte is in the form of a semirigid, colloidal dispersion of a solid with a liquid material.

301 Carbohydrate or derivative containing (e.g., starch, cellulose, etc.):
This subclass is indented under subclass 300. Subject matter wherein a carbohydrate or derivative thereof (e.g., starch, cellulose, wood pulp, etc.) is present in the gelled electrolyte.

302 Silicon containing:
This subclass is indented under subclass 300. Subject matter wherein a silicon containing material (e.g., silica gel, etc.) is present in the gelled electrolyte.

303 Organic polymer containing:
This subclass is indented under subclass 300. Subject matter wherein an organic polymer is present in the gelled electrolyte.

304 The electrolyte is solid:
This subclass is indented under subclass 188. Subject matter wherein the electrolyte is in solid form.

305 Temperature range of electrolyte operation or electrolyte processing is specified:
This subclass is indented under subclass 304. Subject matter wherein the temperature range at which the electrolyte operates or the temperature range at which the electrolyte is processed is specified.

306 Organic component containing:
This subclass is indented under subclass 304. Subject matter wherein an organic component is present in the electrolyte.

(1) Note. Organic component is a compound which fulfills the requirement of the Class 260 class definition (i.e., the molecule is characterized by two carbons bonded together, one atom of carbon bonded to at least one atom of hydrogen or of halogen, or one atom of carbon bonded to at least one atom of nitrogen by a single or double bond). Certain compounds which meet these criteria (i.e., HCN, CN-CN, HNCO, HNCS, cyanogenhalides, cyanamide, fulminic acid, and metal carbides) are regarded as exceptions to the criteria and are not considered organic compounds.

SEE OR SEARCH CLASS:
521, Synthetic Resins or Natural Rubbers, subclasses 25 through 39 for ion-exchange polymers and methods of preparing.

307 Chemically specified organic solute:
This subclass is indented under subclass 306. Subject matter wherein a chemically specified organic solute is present in the solid electrolyte.

308 Carbohydrate or derivative:
This subclass is indented under subclass 306. Subject matter wherein a carbohydrate or derivative thereof (e.g., starch, cellulose, wood pulp, etc.) is present in the solid electrolyte.

309 Two or more polymers (i.e., polymer mixture):
This subclass is indented under subclass 306. Subject matter wherein a physical mixture of at least two polymers is present in the solid electrolyte.

310 Hetero ring containing polymer:
This subclass is indented under subclass 306. Subject matter wherein a polymer which contains a hetero ring [i.e., a ring whose ring members consist of carbon and at least one hetero atom selected from chalcogen (i.e., oxygen, sulfur, selenium, or tellurium) or nitrogen] is present in the solid electrolyte.

311 Oxygen is a ring member of the hetero ring:
This subclass is indented under subclass 310. Subject matter wherein the polymer contains a hetero ring having oxygen as a member of the ring (e.g., polyfuran, etc.).

(1) Note. Examples of such hetero ring-containing polymers are polypyridine and polythiophene.

312 The hetero ring is three membered:
This subclass is indented under subclass 311. Subject matter wherein the oxygen containing hetero ring is a three-membered hetero ring (e.g., polyethylene oxide, etc.).

313 Silicon containing polymer:
This subclass is indented under subclass 306. Subject matter wherein a polymer which contains silicon (e.g., polysiloxanes, etc.) is present in the solid electrolyte.

314 Sulfur, nitrogen, or phosphorus containing polymer:
This subclass is indented under subclass 306. Subject matter wherein a polymer which contains sulfur, nitrogen, or phosphorus (e.g., polyaniline, polysulfone, etc.) is present in the solid electrolyte.

315 Nitrogen and phosphorus in the polymer:
This subclass is indented under subclass 314. Subject matter wherein the polymer contains both phosphorus and nitrogen.

316 Halogen containing polymer:
This subclass is indented under subclass 306. Subject matter wherein a polymer which contains halogen (fluorine, chlorine, bromine, iodine) is present in the solid electrolyte.

(1) Note. Examples of such halogen containing polymers are polyvinyl chloride and polyvinylidene fluoride.

317 Oxygen containing polymer:
This subclass is indented under subclass 306. Subject matter wherein a polymer which contains oxygen (e.g., polyethylene glycol, polymethacrylate, etc.) is present in the solid electrolyte.

318 Silver containing component:
This subclass is indented under subclass 304. Subject matter wherein a silver containing component (e.g., AgBr, Ag 4RbI 5, etc.) is present in the solid electrolyte.

319 Aluminum containing component (e.g., LiAlCl 4, etc.):
This subclass is indented under subclass 304. Subject matter wherein an aluminum containing component (e.g., LiAlCl 4, etc.) is present in the solid electrolyte.

320 The component is alumina (i.e., aluminum oxide):
This subclass is indented under subclass 319. Subject matter wherein the aluminum containing component is an aluminum oxide (Al 2O 3) (e.g., beta alumina, etc.).

321 Alkali metal containing component:
This subclass is indented under subclass 304. Subject matter wherein an alkali metal (Li, Na, K, Rb, Cs, Fr) is present in the solid electrolyte.

322 The alkali metal is lithium:
This subclass is indented under subclass 321. Subject matter wherein lithium is the alkali metal.

323 Lithium and halogen containing compound:
This subclass is indented under subclass 322. Subject matter wherein a compound that contains lithium and halogen is present in the solid electrolyte.

324 Chemically specified organic solvent containing:
This subclass is indented under subclass 188. Subject matter wherein a chemically specified organic solvent is present in the electrolyte.

325 And chemically specified inorganic solvent:
This subclass is indented under subclass 324. Subject matter wherein a chemically specified inorganic solvent (e.g., water, sulfuric acid, etc.) is present in the electrolyte in addition to the chemically specified organic solvent.

326 Plural organic solvents (i.e., solvent mixture):
This subclass is indented under subclass 324. Subject matter wherein two or more organic solvents are present in the electrolyte.

(1) Note. Examples of such solvent mixtures are (a) methyl ethyl carbonate and dimethyl carbonate, and (b) mixtures of straight chain ethers.

327 One of the organic solvents contains a hetero ring:
This subclass is indented under subclass 326. Subject matter wherein one of the organic solvents contains a hetero ring [i.e., a ring whose ring members consist of carbon and at least one hetero atom selected from chalcogen (i.e., oxygen, sulfur, selenium, or tellurium) or nitrogen].

(1) Note. An example of a solvent provided for herein is thiophene.

328 Nitrogen is ring member of the hetero ring:
This subclass is indented under subclass 327. Subject matter wherein one of the organic solvents contains nitrogen as ring member of the hetero ring (e.g., pyrrole, pyrrolidine, quinoline, etc.).

329 Oxygen is ring member of the hetero ring:
This subclass is indented under subclass 327. Subject matter wherein one of the organic solvents contains oxygen as ring member of the hetero ring (e.g., gamma butyrolactone, etc.).

330 The hetero ring is a cyclic carbonate:
This subclass is indented under subclass 329. Subject matter wherein the hetero ring having oxygen as a ring member is a cyclic carbonate.

(1) Note. A cyclic carbonate is a ring which has the grouping -O-C(=O)O- as part of the ring.

(2) Note. Examples of cyclic carbonates are butylene carbonate, a seven-membered ring, and propylene carbonate, a six-membered ring.

331 Plural cyclic carbonate solvents:
This subclass is indented under subclass 330. Subject matter wherein more than one cyclic carbonate solvent is present in the electrolyte.

332 And acyclic carbonate or acyclic carboxylic acid ester solvent:
This subclass is indented under subclass 330. Subject matter wherein (a) a cyclic carbonate solvent and (b) an acyclic carbonate solvent or an acyclic carboxylic acid ester solvent are present.

(1) Note. The term acyclic denotes an organic compound which contains no ring system.

(2) Note. Examples of acyclic carboxylic acid esters provided for herein are ethyl acetate and methyl acetate.

(3) Note. Examples of acylic carbonates provided for herein are dimethyl carbonate and ethyl propyl carbonate.

333 And acyclic ether solvent:
This subclass is indented under subclass 330. Subject matter wherein a cyclic carbonate solvent and an acyclic ether solvent are present.

(1) Note. Examples of acyclic ethers provided for herein are dimethoxyethane and diethoxypropane.

334 And acyclic oxygen or nitrogen containing solvent compound:
This subclass is indented under subclass 329. Subject matter wherein an oxygen hetero ring containing solvent and an acyclic solvent compound that contains nitrogen or oxygen are present in the electrolyte.

(1) Note. Examples of an acyclic solvent compound containing nitrogen provided for herein are dimethylformamide, trimethylamine, and nitromethane.

(2) Note. Examples of an acyclic solvent compound containing oxygen provided for herein are methyl ethyl ketone and propylene glycol.

335 The acyclic oxygen containing solvent compound is an acyclic ether:
This subclass is indented under subclass 334. Subject matter wherein an acyclic ether is present as the acyclic solvent compound containing oxygen.

336 Hetero ring in the organic solvent:
This subclass is indented under subclass 324. Subject matter wherein the organic solvent is a compound containing a hetero ring [i.e., a ring whose ring members consist of carbon and at least one hetero atom selected from chalcogen (oxygen, sulfur, selenium, or tellurium) or nitrogen].

(1) Note. Examples of hetero ring solvents provided for herein are sulfolane and dimethyl isoxazole.

337 Oxygen is the only ring hetero atom in the hetero ring (e.g., dioxolane, gamma butyrolactone, etc.):
This subclass is indented under subclass 336. Subject matter wherein the hetero ring contains oxygen as the only ring hetero atom (e.g., butyrolactone, tetrahydrofuran, dioxolane, etc.).

338 The hetero ring is a cyclic carbonate (e.g., ethylene carbonate, propylene carbonate, etc.):
This subclass is indented under subclass 337. Subject matter wherein the oxygen containing hetero ring is a cyclic carbonate in which the

hetero ring contains as part of its structure a -O-C(=O)-O- group (e.g., propylene carbonate, ethylene carbonate, butylene carbonate, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
342, for a linear carbonate.

339 Nitrogen containing organic solvent compound (e.g., acetonitrile, etc.):
This subclass is indented under subclass 324. Subject matter wherein the organic solvent is a nitrogen containing compound (e.g., acetonitrile, trimethylamine, dimethylformamide, etc.).

340 Sulfur containing organic solvent compound:
This subclass is indented under subclass 324. Subject matter wherein the organic solvent is a sulfur containing compound (e.g., dimethylsulfone, dimethylsulfoxide, etc.).

341 Oxygen containing organic solvent compound:
This subclass is indented under subclass 324. Subject matter wherein the organic solvent is an oxygen containing compound (e.g., linear ketone, ether, alcohol, etc.).

342 Acyclic carbonate solvent:
This subclass is indented under subclass 341. Subject matter wherein the oxygen containing organic solvent compound is an acyclic carbonate (e.g., dimethyl carbonate, methylethyl carbonate, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
338, for a cyclic carbonate solvent.

343 Acyclic carboxylic acid ester solvent:
This subclass is indented under subclass 341. Subject matter wherein the oxygen containing organic solvent compound is an acyclic carboxylic acid ester (e.g., ethyl acetate, ethyl propionate, etc.).

344 Chemically specified inorganic solvent other than water:
This subclass is indented under subclass 188. Subject matter wherein a chemically specified inorganic solvent which is not water (e.g., HF, aluminum chloride, etc.) is present in the electrolyte.

345 Sulfur or phosphorus in the inorganic solvent:
This subclass is indented under subclass 344. Subject matter wherein the chemically specified inorganic solvent contains sulfur or phosphorus (e.g., thionyl chloride, phosphorus oxychloride, etc.).

346 Sulfur dioxide containing inorganic solvent:
This subclass is indented under subclass 345. Subject matter wherein the chemically specified inorganic solvent contains sulfur dioxide.

347 Organic solute component in aqueous electrolyte:
This subclass is indented under subclass 188. Subject matter comprising an organic solute component in an aqueous electrolyte (e.g., nicotinic acid amide, terephthalic acid, etc.).

400 FUEL CELL, SUBCOMBINATION THEREOF, OR METHOD OF MAKING OR OPERATING:
This subclass is indented under the class definition. Apparatus for producing an electrical current wherein at least one active material or reactant is supplied to an electrochemical cell from an external source, e.g., fuel cell, metal/air cell, etc., subcombination of the apparatus, or a process of making or operating the same.

SEE OR SEARCH THIS CLASS, SUBCLASS:
50, through 52, for a process of operating a tape cell.
127, for tape or flexible batteries having means to sequentially or continuously move active electrode material into position to produce an electrical current.

SEE OR SEARCH CLASS:
205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclass 343 for subject matter wherein an electrolytic synthesis cell is combined with a fuel cell or is converted from a fuel cell to a synthesis cell.
431, Combustion, for processes of combustion or combustion starting, and

for apparatus particularly adapted to burn or ignite materials.

401 Biochemical fuel cell:
This subclass is indented under subclass 400. Subject matter comprising a fuel cell including a chemical component derived from a biological source, e.g., a bacterial reactant or algae, etc.

402 Metal-gas cell:
This subclass is indented under subclass 400. Subject matter comprising an electricity generating cell comprising a metal or metallic anode and a cathode supplied with a gas from an external source.

403 Gas is air or oxygen:
This subclass is indented under subclass 402. Subject matter wherein the cathode is supplied with air or oxygen.

404 Having means for metal fuel resupply:
This subclass is indented under subclass 403. Subject matter comprising an apparatus or system wherein the metal fuel is renewed or resupplied during the operation of the cell.

405 With specified electrode structure or material:
This subclass is indented under subclass 403. Subject matter wherein the electrode has a particular form or composition.

406 Zinc anode:
This subclass is indented under subclass 405. Subject matter wherein the anode comprises zinc metal.

407 Having means for directing oxidant flow:
This subclass is indented under subclass 403. Subject matter comprising an apparatus or system that assists or enables the flow of air or oxygen into the cell.

408 Process or means for producing, recycling, or treating reactant, feedstock, product, or electrolyte:
This subclass is indented under subclass 400. Subject matter comprising a step of or means for making, modifying, or reusing reactant, feedstock, product, or electrolyte.

SEE OR SEARCH THIS CLASS, SUBCLASS:
51, for a process of cell operation involving electrolyte circulation.
67, for a battery having means to provide relative motion between electrode and electrolyte.
72, through 89, for a battery having feeding or circulating structure.

SEE OR SEARCH CLASS:
48, Gas: Heating and Illuminating, for apparatus, processes, and compositions for the manufacture of a gas only for purposes of heating or illuminating, and means for the purification, distribution, and storage of such a gas.

409 Treatment of the electrolyte:
This subclass is indented under subclass 408. Subject matter comprising modification of the electrolyte, e.g., by removing impurities, altering its composition, etc.

410 Purification:
This subclass is indented under subclass 408. Subject matter comprising a means or process for removing adulterants, contaminants, or dilutants.

411 Hydrogen separator:
This subclass is indented under subclass 410. Subject matter comprising a means or process for enriching hydrogen, e.g., purifying reformate, etc.

412 Removing CO from reactant or product stream:
This subclass is indented under subclass 410. Subject matter comprising eliminating CO from reactant or product, e.g., by membrane filtration, adsorption, etc.

413 Humidification or dehumidification:
This subclass is indented under subclass 408. Subject matter comprising adding moisture to, or removing moisture from, the cell.

414 Removing or using product water:
This subclass is indented under subclass 413. Subject matter comprising expelling water produced by the cell reaction or adding it back into the cell.

415 **Recycling unconsumed reactant:**
This subclass is indented under subclass 408. Subject matter comprising recovering and reusing reactant that has not been converted to electricity or a product of a fuel cell reaction.

416 **Producing reactant:**
This subclass is indented under subclass 408. Subject matter comprising making reactant.

417 **Regenerating reactant from a reaction product:**
This subclass is indented under subclass 416. Subject matter comprising producing reactant by treating a compound created by a fuel cell reaction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
49, for a battery having regeneration features.

418 **By electrolysis:**
This subclass is indented under subclass 417. Subject matter wherein the reactant is regenerated by passing an electrical current through a cell reaction product thereby separating chemically bonded compounds, e.g., electrochemical treatment of water to produce hydrogen and oxygen, etc.

419 **Thermal regeneration:**
This subclass is indented under subclass 417. Subject matter wherein the reactant is produced using heat.

420 **Including water gas shift reaction:**
This subclass is indented under subclass 416. Subject matter wherein the reactant is produced by a reaction of CO with water.

421 **From metal, alloy, or metal-containing material:**
This subclass is indented under subclass 416. Subject matter wherein the reactant is produced from a reaction or treatment of a metal, alloy, or metal-containing material, e.g., metal hydride, etc.

422 **By electrochemical means:**
This subclass is indented under subclass 416. Subject matter wherein the reactant is produced by an applied current, e.g., electrolysis of water, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
418, for regenerating reactant from a reaction product by electrolysis.

SEE OR SEARCH CLASS:
205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclass 343 for subject matter wherein an electrolytic synthesis cell is combined with a fuel cell or is converted from a fuel cell to a synthesis cell.

423 **Reforming process:**
This subclass is indented under subclass 416. Subject matter wherein the reactant is produced by decomposing compounds, e.g., steam reformer, etc.

424 **Alcohol feedstock:**
This subclass is indented under subclass 423. Subject matter wherein the reactant is produced from an alcohol.

425 **Hydrocarbon feedstock:**
This subclass is indented under subclass 423. Subject matter wherein the reactant is produced from a hydrocarbon.

426 **Gasification of solid fuel:**
This subclass is indented under subclass 416. Subject matter wherein a reactant is produced from a high temperature conversion process using a solid material, e.g., coal, etc.

427 **Characterized by control or measuring means or method:**
This subclass is indented under subclass 408. Subject matter comprising a specified process or means for regulating or measuring production, recycling, or treatment of reactant, feedstock, product, or electrolyte.

428 Process or means for control of operation:
This subclass is indented under subclass 400. Subject matter comprising a specified process or means for regulating at least one operational parameter, e.g., heat, reactant supply, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
61, through 64, for a battery having control means responsive to a condition sensing means.

429 During startup or shutdown:
This subclass is indented under subclass 428. Subject matter wherein at least one operational parameter is controlled while starting or stopping operation.

430 Including measurement of electrical output:
This subclass is indented under subclass 428. Subject matter comprising controlling at least one operational parameter using a measurement of electrical energy produced by the cell.

431 Current:
This subclass is indented under subclass 430. Subject matter comprising controlling at least one operational parameter using current.

432 Voltage:
This subclass is indented under subclass 430. Subject matter comprising controlling at least one operational parameter using voltage.

433 Arrangement or process including thermal control:
This subclass is indented under subclass 428. Subject matter comprising controlling at least one parameter using an arrangement or process comprising control of a thermal property.

434 Including heat exchange means:
This subclass is indented under subclass 433. Subject matter comprising a process or means of thermal control whereby heat is added to or removed from a fuel cell component.

435 Plural heat exchangers:
This subclass is indented under subclass 434. Subject matter comprising multiple heat exchange units.

436 Heat exchange means external to fuel cell:
This subclass is indented under subclass 434. Subject matter comprising a heat exchange unit positioned outside of a fuel cell.

437 Liquid cooling:
This subclass is indented under subclass 434. Subject matter comprising a coolant in a liquid state.

438 Using a non-aqueous liquid coolant:
This subclass is indented under subclass 437. Subject matter comprising a liquid coolant that contains no water, e.g., alcohols, etc.

439 Gas cooling:
This subclass is indented under subclass 434. Subject matter comprising a coolant in a gaseous or vaporized state.

440 Including use of waste heat from fuel cell or afterburner:
This subclass is indented under subclass 434. Subject matter wherein thermal control of the cell is attained utilizing heat produced by the cell or heat produced by a device for burning unburned or partially burned fuel in exhaust gases of the cell.

(1) Note. This subclass accepts fuel cells wherein waste heat produced by the cell or an afterburner is used within the fuel cell process, e.g., to heat fuel cell reactants, etc.

441 Heating by combustion:
This subclass is indented under subclass 434. Subject matter comprising obtaining heat from burning a fuel.

442 Including temperature:
This subclass is indented under subclass 433. Subject matter comprising controlling at least one operational parameter using temperature.

443 Arrangement or process for reactant control (e.g., pressure or concentration, etc.):
This subclass is indented under subclass 428. Subject matter comprising regulating an operational parameter of at least one reactant.

444 Of gaseous reactant:
This subclass is indented under subclass 443. Subject matter comprising regulating at least one reactant in a gaseous state.

445 Depolarization or activation:
This subclass is indented under subclass 444. Subject matter comprising adjusting the reactivity of the gaseous reactant on the electrode.

446 Regulation of differential pressure:
This subclass is indented under subclass 444. Subject matter comprising adjusting the pressure gradient of a gaseous reactant.

447 Of liquid reactant or reactant in electrolyte:
This subclass is indented under subclass 443. Subject matter comprising regulating a least one reactant in a liquid state or contained in an electrolyte.

448 With concentration control:
This subclass is indented under subclass 447. Subject matter comprising regulating the amount of a liquid reactant per unit volume.

449 With concentration measuring means:
This subclass is indented under subclass 448. Subject matter comprising an apparatus for determining the amount of a liquid reactant per unit volume.

450 Control of electrolyte or water:
This subclass is indented under subclass 428. Subject matter comprising regulating a parameter relating to the electrolyte or water.

451 Control of electrolyte stream:
This subclass is indented under subclass 450. Subject matter comprising regulating electrolyte flow.

452 Grouping of fuel cells into stack or module:
This subclass is indented under subclass 400. Subject matter comprising a plurality of electrically connected fuel cells (i.e., a stack or module).

453 With means for reducing ionic short circuit:
This subclass is indented under subclass 452. Subject matter comprising a structure for minimizing or preventing ionic current from passing between cells.

454 With electrolyte or reactant supply or circulation:
This subclass is indented under subclass 452. Subject matter comprising means for feeding electrolyte or reactant to the cells or circulating the electrolyte within the cells.

455 With means for moving reactant:
This subclass is indented under subclass 454. Subject matter comprising a specific arrangement for transporting reactant.

456 With fluid distribution means:
This subclass is indented under subclass 454. Subject matter comprising apparatus for supplying fluid to each cell in the stack.

457 Flow field means (e.g., flow field plate, bipolar separator, etc.):
This subclass is indented under subclass 456. Subject matter comprising a component adjacent to the anode or cathode that distributes fuel, oxidant, or electrolyte to the cells.

SEE OR SEARCH THIS CLASS, SUBCLASS:
514, for a flow field plate adjacent to the anode or cathode that distributes fuel, oxidant, or electrolyte to an individual fuel cell which is not part of a stack or module.

458 Manifold:
This subclass is indented under subclass 456. Subject matter for simultaneously distributing fluid to a plurality of cells.

459 External manifold:
This subclass is indented under subclass 458. Subject matter wherein the fluid distribution means is positioned exteriorly of the fuel cells.

460 With sealing means:
This subclass is indented under subclass 458. Subject matter comprising a component for sealing an inlet or outlet of the manifold.

461 Manifold material:
This subclass is indented under subclass 458. Subject matter wherein the composition of the manifold is specified.

462 Having means for storing reactant (e.g., tank, etc.):
This subclass is indented under subclass 456. Subject matter comprising a container for storage of a reactant.

463 Comprising framed electrodes or frame-like gaskets:
This subclass is indented under subclass 452. Subject matter comprising electrodes with a specific surrounding structure or gasket.

464 With molten electrolyte:
This subclass is indented under subclass 452. Subject matter comprising a fuel cell stack wherein the electrolyte is in a fused state.

465 With solid electrolyte:
This subclass is indented under subclass 452. Subject matter comprising a fuel cell stack wherein the electrolyte is in a solid state.

466 Tubular or cylindrical configuration:
This subclass is indented under subclass 465. Subject matter wherein the solid electrolyte has a hollow or solid rod-like shape.

467 With means for stacking cells together:
This subclass is indented under subclass 452. Subject matter comprising a specified means for assembling the stack.

468 Specified material or component between adjacent cells:
This subclass is indented under subclass 467. Subject matter comprising a particular material or component placed between neighboring cells.

469 With sealing or supporting feature:
This subclass is indented under subclass 467. Subject matter comprising a means for sealing cells to prevent leaks or to maintain the position of cells in a particular arrangement.

470 With securing means:
This subclass is indented under subclass 467. Subject matter comprising a specified means for fastening the cells together.

471 Comprising a plurality of stacks (e.g., modular assembly, etc.):
This subclass is indented under subclass 452. Subject matter comprising multiple fuel cell stacks connected together.

472 Fuel cell with molten electrolyte:
This subclass is indented under subclass 400. Subject matter comprising a fuel cell wherein the electrolyte is in a fused state during operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102, through 104, for active material in the molten state.

473 With means for preventing or reducing electrode dissolution:
This subclass is indented under subclass 472. Subject matter comprising a means for eliminating or minimizing loss of electrode material.

474 With gas diffusion electrode:
This subclass is indented under subclass 472. Subject matter wherein the fused electrolyte is in combination with a gas permeable electrode.

475 With matrix containing electrolyte:
This subclass is indented under subclass 474. Subject matter wherein the fused electrolyte is held within a three-dimensional supporting structure.

476 With liquid or solid reactant or reactant in electrolyte:
This subclass is indented under subclass 472. Subject matter comprising a reactant in liquid or solid form or contained in a fused electrolyte.

477 Specified electrolyte material:
This subclass is indented under subclass 472. Subject matter wherein the electrolyte has a defined composition.

478 Comprising a carbonate:
This subclass is indented under subclass 477. Subject matter wherein the electrolyte has a carbonate functional group.

479 Fuel cell with solid electrolyte:
This subclass is indented under subclass 400. Subject matter comprising a fuel cell having a solid material which functions as an electrolyte.

SEE OR SEARCH THIS CLASS, SUBCLASS:
304, through 323, for a battery with a solid electrolyte.

480 With gas diffusion electrode:
This subclass is indented under subclass 479. Subject matter wherein the solid electrolyte is in combination with a gas permeable electrode.

481 Specified supporting layer:
This subclass is indented under subclass 480. Subject matter wherein the electrolyte/electrode interface comprises a defined supporting lamina or structure.

482 Specified electrode/electrolyte combination:
This subclass is indented under subclass 479. Subject matter comprising a solid electrolyte fuel cell, wherein the electrode and electrolyte each have a defined composition or feature.

483 Membrane electrode assembly (MEA):
This subclass is indented under subclass 482. Subject matter wherein electrodes having a defined composition and a specific polymeric electrolyte are combined in a single unit.

484 Specified electrode material:
This subclass is indented under subclass 479. Subject matter wherein the electrode has a defined composition.

SEE OR SEARCH THIS CLASS, SUBCLASS:
523, through 534, for electrode structure or compositions for use in fuel cells.

485 Metal or alloy containing:
This subclass is indented under subclass 484. Subject matter wherein the electrode comprises a metal or alloy.

486 Metal-ceramic composite or mixture (e.g., cermet, etc.):
This subclass is indented under subclass 485. Subject matter wherein the metal or alloy is combined with a ceramic material.

487 Noble metal or alloy:
This subclass is indented under subclass 485. Subject matter wherein the electrode comprises a noble metal or alloy.

488 Oxide material:
This subclass is indented under subclass 484. Subject matter wherein the electrode comprises a compound containing oxygen with one other element.

489 Complex oxide (e.g., $M_1M_2O_3$, etc.):
This subclass is indented under subclass 488. Subject matter wherein the electrode comprises a compound containing oxygen and more than one other element.

490 Gaseous or vaporized reactant:
This subclass is indented under subclass 479. Subject matter comprising a solid electrolyte fuel cell wherein at least one reactant is in a gaseous or vaporized state.

491 Specified solid electrolyte:
This subclass is indented under subclass 479. Subject matter comprising a solid electrolyte fuel cell having a defined electrolyte composition.

492 Polymeric material (e.g., proton exchange membrane (PEM), etc.):
This subclass is indented under subclass 491. Subject matter comprising a solid electrolyte in polymeric form.

SEE OR SEARCH CLASS:
521, Synthetic Resins or Natural Rubbers, subclasses 25 through 39 for ion-exchange polymers and methods of preparing.

493 Having sulfonic acid groups:
This subclass is indented under subclass 492. Subject matter comprising a solid electrolyte in polymeric form having bonded sulfonic acid groups.

494 Fluoropolymer:
This subclass is indented under subclass 493. Subject matter wherein a solid electrolyte is comprised of a fluoropolymer having bonded sulfonic acid groups.

495 Oxide:
This subclass is indented under subclass 491. Subject matter wherein the solid electrolyte is an oxygen compound.

496 Zirconium oxide:
This subclass is indented under subclass 495. Subject matter wherein the solid electrolyte is an oxide of zirconium, e.g., zirconia, etc.

497 Tubular-shaped solid electrolyte:
This subclass is indented under subclass 479. Subject matter wherein the solid electrolyte has a hollow cylindrical shape.

SEE OR SEARCH THIS CLASS, SUBCLASS:
466, for a tubular-shaped solid electrolyte in a fuel cell which is part of a stack or grouping.

498 Fuel cell with liquid electrolyte:
This subclass is indented under subclass 400. Subject matter comprising a fuel cell having a liquid material which functions as an electrolyte.

499 Aqueous electrolyte:
This subclass is indented under subclass 498. Subject matter comprising a water-based electrolyte.

500 Acidic:
This subclass is indented under subclass 499. Subject matter comprising a water-based electrolyte containing an acid.

501 Hydroxide:
This subclass is indented under subclass 499. Subject matter comprising a water-based electrolyte containing a hydroxide.

502 Fuel cell with specified reactant:
This subclass is indented under subclass 400. Subject matter comprising a fuel cell utilizing a defined reactant.

503 Particulate reactant (e.g., suspension, dispersion, etc.):
This subclass is indented under subclass 502. Subject matter wherein the reactant is in solid particle form.

504 Reactant contains a nitrogen compound (e.g., hydrazine, ammonia, etc.):
This subclass is indented under subclass 502. Subject matter wherein the reactant comprises a compound containing nitrogen, e.g., hydrazine, ammonia, etc.

505 Reactant includes carbon, oxygen, or hydrogen:
This subclass is indented under subclass 502. Subject matter wherein the reactant comprises a compound containing carbon, oxygen, or hydrogen.

506 Reactant is an alcohol:
This subclass is indented under subclass 505. Subject matter wherein the reactant comprises an alcohol, e.g., methanol, etc.

507 Means for joining components together:
This subclass is indented under subclass 400. Subject matter comprising a means for connecting constituents of the fuel cell.

SEE OR SEARCH THIS CLASS, SUBCLASS:
467, through 470, for a means for connecting cells together in a stack.

508 With sealing, spacing, or supporting feature:
This subclass is indented under subclass 507. Subject matter comprising a joining means which prevents leaks, separates components, or holds components of the cell in a particular arrangement.

SEE OR SEARCH THIS CLASS, SUBCLASS:
469, for a sealing or supporting feature for sealing cells to prevent leaks or to maintain the position of cells in a particular arrangement in a fuel cell stack.
532, through 534, for a matrix or support which is an integral part of the electrode.

509 Specified material:
This subclass is indented under subclass 508. Subject matter wherein the composition of the sealing, spacing, or supporting material is defined.

510 With bonded seal:
This subclass is indented under subclass 509. Subject matter wherein the specified sealing substance enables attachment of two surfaces together by a bonding process, e.g., glue, polymer, etc.

511 With clamping means:
This subclass is indented under subclass 508. Subject matter wherein sealing is accomplished using a device with opposite sides or parts that may be adjusted or brought closer together to hold or compress two elements, e.g., metal bolts, etc.

512 Means for distributing, storing, or preventing fluid movement:
This subclass is indented under subclass 400. Subject matter comprising a means for supplying, containing, or restricting movement of a fluid.

513 Having means for supplying reactant or electrolyte:
This subclass is indented under subclass 512. Subject matter comprising a means for allowing fluid reactant or electrolyte to enter or exit the cell.

514 Including flow field means (e.g., separator plate, etc.):
This subclass is indented under subclass 513. Subject matter comprising a component adjacent to the anode or cathode that distributes fuel, oxidant, and cooling fluids to the cell.

SEE OR SEARCH THIS CLASS, SUBCLASS:

457, for subject matter comprising a flow field means (e.g., plate, etc.) adjacent to the anode or cathode that distributes fuel, oxidant, or electrolyte to the cells in a fuel cell stack or module.

515 Having means for storing reactant (e.g., tank, reservoir, etc.):
This subclass is indented under subclass 512. Subject matter comprising a structure for containing a reactant.

516 Immobilizing structure or material (e.g., matrix, diaphragm, or membrane, etc.):
This subclass is indented under subclass 512. Subject matter comprising a means for preventing movement of a fluid.

517 Electrical current collector:
This subclass is indented under subclass 400. Subject matter comprising means for receiving electrical current from an electrode.

518 Bipolar separator (e.g., bipolar plate, etc.):
This subclass is indented under subclass 517. Subject matter comprising a component situated between cells which receives current from an anode in one cell and supplies current to a cathode in an adjacent cell.

SEE OR SEARCH THIS CLASS, SUBCLASS:

452, through 471, when a grouping of fuel cells or a fuel cell stack is positively recited in the claims, especially subclass 457 for a bipolar separator used as a flow field means and subclass 468 for bipolar separators placed between cells in a fuel cell stack.

519 Specified collector material:
This subclass is indented under subclass 517. Subject matter comprising a collector having a particular composition.

520 Composite material:
This subclass is indented under subclass 519. Subject matter wherein the collector is composed of two or more distinct, structurally complementary substances, e.g., metals, ceramics, glasses, polymers, etc.

521 Carbon-based material:
This subclass is indented under subclass 519. Subject matter comprising a collector formed of a material including carbon, e.g., graphite, etc.

522 Metal or alloy:
This subclass is indented under subclass 519. Subject matter comprising a collector formed of a metallic or metal alloy material.

523 Electrode structure or composition:
This subclass is indented under subclass 400. Subject matter comprising a specified electrode arrangement, feature, or material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
484, through 489, for fuel cell electrodes used in solid electrolyte fuel cells.

SEE OR SEARCH CLASS:
427, Coating Processes, subclass 115 for a method of producing a fuel cell electrode by coating.
502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, subclass 101 for method of making a catalytic electrode of general utility.

524 Including platinum catalyst:
This subclass is indented under subclass 523. Subject matter comprising an electrode having a platinum catalyst.

525 Including palladium catalyst:
This subclass is indented under subclass 523. Subject matter comprising an electrode having a palladium catalyst.

526 Including rhodium, ruthenium, or osmium catalyst:
This subclass is indented under subclass 523. Subject matter comprising an electrode having a rhodium, ruthenium, or osmium catalyst.

527 Including nickel, iron, or cobalt catalyst:
This subclass is indented under subclass 523. Subject matter comprising an electrode having a nickel, iron, or cobalt catalyst.

528 Including metal oxide catalyst:
This subclass is indented under subclass 523. Subject matter comprising an electrode having a metal oxide catalyst.

529 Having electrolyte matrix or barrier layer:
This subclass is indented under subclass 523. Subject matter comprising an electrode in combination with a matrix-type electrolyte or a layer of a barrier material.

530 Having organic component:
This subclass is indented under subclass 523. Subject matter comprising an electrode having a material containing carbon chemically bound to hydrogen.

531 Organic catalyst:
This subclass is indented under subclass 530. Subject matter wherein the organic component is a catalyst.

532 Having an inorganic matrix, substrate, or support:
This subclass is indented under subclass 523. Subject matter comprising an electrode having a matrix, substrate, or support composed of a material other than an organic material comprised of carbon and hydrogen.

533 Sintered particles:
This subclass is indented under subclass 532. Subject matter wherein the matrix, substrate, or support comprises fused inorganic particles.

534 Including gas diffusion material or layer:
This subclass is indented under subclass 532. Subject matter wherein the matrix, substrate, or support comprises a gas permeable substance or stratum.

535 Method of making a fuel cell, fuel cell stack, or subcombination thereof:
This subclass is indented under subclass 400. Subject matter comprising a process for fabricating a fuel cell, a stacked grouping of fuel cells, or subcombination thereof not specifically provided for elsewhere.

SEE OR SEARCH CLASS:
29, Metal Working, subclass 623.1 for process of making an electric battery cell.
427, Coating Processes, subclass 115 for a coating process which results in an element for use in a fuel cell.

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, subclass 101 for method of making a catalytic electrode of general utility.

CROSS-REFERENCE ART COLLECTIONS

900 FUEL CELL INCLUDING MEANS FOR POWER CONDITIONING (E.G., CONVERSION TO AC, ETC.):
This subclass is indented under the class definition. Subject matter comprising a fuel cell or fuel cell stack including means for output current modification.

901 FUEL CELL INCLUDING MEANS FOR UTILIZATION OF HEAT FOR UNRELATED APPLICATION (E.G., HEATING A BUILDING, ETC.):
This subclass is indented under the class definition. Subject matter comprising an apparatus for heating an object or structure outside of a fuel cell.

FOREIGN ART COLLECTIONS

The definitions below correspond to abolished subclasses from which these collections were formed. See the Foreign Art Collection schedule of this class for specific correspondences. [Note: The titles and definitions for *indented* art collections include all the details of the one(s) that are hierarchically superior.]

FOR 100 Gelled (429/190):
Foreign art collection in the form of a semirigid colloidal dispersion of a solid with a fluid or gelled materials.

FOR 101 Solid (429/191):
Foreign art collection which are solid in form.

FOR 102 Organic (429/192):
Foreign art collection containing an organic compound.

FOR 103 Metal oxide component (429/193):
Foreign art collection having an oxide of a metal as a portion thereof.

FOR 104 Nonaqueous solvent (429/194):
Foreign art collection having a dissolvent other than water.

FOR 105 With water (429/195):
Foreign art collection containing water.

FOR 106 Inorganic solvent (429/196):
Foreign art collection wherein the dissolvents are an inorganic material.

FOR 107 Plural nonaqueous system (429/197):
Foreign art collection having more than one nonaqueous dissolvent.

FOR 108 Having organic solute component (429/198):
Foreign art collection having organic material which mixes with or dissolves in a solvent.

FOR 109 Having inorganic active material chemically specified (429/218):
Foreign art collection for apparatus having active material which is inorganic and defined by its chemical components.

FOR 110 FUEL CELL, SUBCOMBINATION THEREOF OR METHODS OF OPERATING:
Foreign art collection including apparatus for producing an electrical current having an active material supplied to a cell from an external source, e.g., fuel cell, metal/air cell, etc., subcombination of the apparatus and the process of operating the same are also included.

FOR 111 Process of operating:
Foreign art collection including process of operating the apparatus.

FOR 112 Circulating or feeding electrolyte:
Foreign art collection including process having a step of circulating the electrolyte of feeding the same into or within the cell.

FOR 113 Active material in electrolyte:
Foreign art collection including process including the step of supplying active material which is dissolved in, introduced into, or carried by the electrolyte.

FOR 114 Fused or molten electrolyte:
Foreign art collection including process having the step of maintaining the electrolyte in a fused or molten stall during cell operation.

FOR 115 Generating, regenerating or recycling reactant:
Foreign art collection including process including the step of generating the active material before use in the cell, regenerating the same from by-products of the cell or recycling unused active material through the cell.

FOR 116 Plural cells having means to reduce ionic short circuit:
Foreign art collection including apparatus comprising a plurality of cells having a common electrolyte connection and means combined with the cell structure functioning to reduce or prevent ionic current from passing through the common electrolyte between the cells.

FOR 117 Having means for active material generation or regeneration:
Foreign art collection including apparatus having means to generate a material used in a cell, to generate a material in situ, or to regenerate a material from the cell by-products.

FOR 118 By heating or cooling:
Foreign art collection including apparatus having means providing a temperature differential.

FOR 119 By electrical current:
Foreign art collection including apparatus having means which allows electrical regeneration of the active material.

FOR 120 Automatic control means:
Foreign art collection including apparatus having automatic control means for regulating some operational feature of the cell.

FOR 121 Electrical output dependent:
Foreign art collection including apparatus wherein the control is responsive to the electrical output of the cell, either current or voltage.

FOR 122 Temperature dependent:
Foreign art collection including apparatus wherein the control is responsive to temperature.

FOR 123 Pressure dependent:
Foreign art collection including apparatus wherein the control is responsive to pressure.

FOR 124 Having heat exchange means:
Foreign art collection including apparatus having means to provide a temperature differential.

FOR 125 Active material electrode-type cell or subcombination thereof:
Foreign art collection including apparatus having an electrode containing an active material or the subcombination of said electrode.

FOR 126 Envelope cathode-type or subcombination thereof:
Foreign art collection including apparatus wherein the cathode surrounds or envelopes the anode and subcombinations thereof.

FOR 127 And chemically specified electrolyte material:
Foreign art collection including apparatus wherein the electrolyte material is chemically specified.

FOR 128 Solid electrolyte:
Foreign art collection including apparatus having a solid material which functions as an electrolyte.

FOR 129 Tubular:
Foreign art collection including apparatus wherein the electrolyte is tubular in form.

FOR 130 Plural disc or modules:
Foreign art collection including apparatus wherein the electrolyte is constructed of plural discs or modules.

FOR 131 Electrolyte composition chemically specified:
Foreign art collection including apparatus wherein the electrolyte material is chemically specified.

FOR 132 Housing member, seal, spacer or fluid distributing or directing means:
Foreign art collection including apparatus comprising separate elements having a util-

ity in or are in combination with a fuel-type cell to provide housing, sealing, spacing of fluid distribution or fluid direction of the cell.

FOR 133 Having sealing feature:
Foreign art collection including apparatus having a sealing feature specifically set forth as a part of the combination.

FOR 134 Having bonded seal, e.g., welded, adhesive, molded in situ, etc.:
Foreign art collection wherein the sealing feature is composed of an integral bond between elements.

FOR 135 Having clamping means:
Foreign art collection including apparatus wherein the sealing feature is of the mechanical pressure type produced by a clamping means.

FOR 136 Having support or spacers with fluid distribution means:
Foreign art collection including apparatus wherein the housing member support or spacer is provided with means to allow the fluid reactants or electrolyte to enter or exit therefrom.

FOR 137 And fluid directing means:
Foreign art collection including apparatus wherein the support or spacer directs the fluid flow along the face of the electrode.

FOR 138 Catalytic electrode structure or composition:
Foreign art collection including apparatus having a catalytic electrode which is structurally or chemically specified.

FOR 139 Having electrolyte matrix or barrier layer:
Foreign art collection including apparatus having an electrolyte matrix or barrier layer positioned between or in contact with a catalytic electrode.

FOR 140 Having organic constituent as part of the electrode:
Foreign art collection including apparatus wherein the electrode has an organic component.

FOR 141 Organic catalyst:
Foreign art collection including apparatus wherein the organic component is part of or is the catalysis of the electrode.

FOR 142 Having an inorganic matrix, substrate or support:
Foreign art collection including apparatus having distinct inorganic materials functioning as the matrix, substrate or support in the electrode.

FOR 143 Of sintered particles:
Foreign art collection including apparatus composed of sintered particles.

FOR 144 Chemically specified electrolyte:
Foreign art collection including subject matter wherein the electrolyte composition is chemically defined.

END