

1	HAVING POLARITY SAFETY FEATURE	419	....Thermal regeneration
2	HAVING LIVING MATTER, E.G., MICROORGANISM, ETC.	420	...Including water gas shift reaction
3	HAVING PULSE FEATURE	421	...From metal, alloy, or metal- containing material
4	WITH SONIC OR ULTRASONIC FEATURE	422	...By electrochemical means
5	RADIO ACTIVE MATERIAL CONTAINING	423	...Reforming process
6	WITH PRESSURE EQUALIZING MEANS FOR LIQUID IMMERSION OPERATION	424	....Alcohol feedstock
7	WITH NONBATTERY ELECTRICAL COMPONENT ELECTRICALLY CONNECTED WITHIN CELL CASING OTHER THAN TESTING OR INDICATING COMPONENTS	425 426 427	....Hydrocarbon feedstock ...Gasification of solid fuel ..Characterized by control or measuring means or method
8	HAVING DISPARATE NONELECTRICAL FUNCTION	428	.Process or means for control of operation
9	HAVING DIVERSE CELLS OR DIVERSE REMOVABLE CELLS IN A SUPPORT MEANS	429 430	..During startup or shutdown ..Including measurement of electrical output
10	HAVING MAGNETIC FIELD FEATURE	431	...Current
11	CURRENT PRODUCTION DEPENDENT UPON TEMPERATURE DIFFERENTIAL BETWEEN A PAIR OF ELECTRODES	432 433	...Voltage ..Arrangement or process including thermal control
400	FUEL CELL, SUBCOMBINATION THEREOF, OR METHOD OF MAKING OR OPERATING	434 435 436	...Including heat exchange means....Plural heat exchangers....Heat exchange means external to fuel cell
401	.Biochemical fuel cell	437	....Liquid cooling
402	.Metal-gas cell	438	....Using a non-aqueous liquid coolant
403	..Gas is air or oxygen	439	....Gas cooling
404	..Having means for metal fuel resupply	440	....Including use of waste heat from fuel cell or afterburner
405	..With specified electrode structure or material	441	....Heating by combustion
406	....Zinc anode	442	...Including temperature
407	..Having means for directing oxidant flow	443	..Arrangement or process for reactant control (e.g., pressure or concentration, etc.)
408	.Process or means for producing, recycling, or treating reactant, feedstock, product, or electrolyte	444 445	...Of gaseous reactant....Depolarization or activation
409	..Treatment of the electrolyte	446	....Regulation of differential pressure
410	..Purification	447	...Of liquid reactant or reactant in electrolyte
411	...Hydrogen separator	448	....With concentration control
412	...Removing CO from reactant or product stream	449	....With concentration measuring means
413	..Humidification or dehumidification	450	..Control of electrolyte or water
414	...Removing or using product water	451	...Control of electrolyte stream
415	..Recycling unconsumed reactant	452	.Grouping of fuel cells into stack or module
416	..Producing reactant	453	..With means for reducing ionic short circuit
417	...Regenerating reactant from a reaction product		
418	....By electrolysis		

454	..With electrolyte or reactant supply or circulation	488	...Oxide material
455	..With means for moving reactant	489	....Complex oxide (e.g., M M O , etc.)
456	..With fluid distribution means	490	..Gaseous or vaporized reactant
457	....Flow field means (e.g., flow field plate, bipolar separator, etc.)	491	..Specified solid electrolyte
458	....Manifold	492	...Polymeric material (e.g., proton exchange membrane (PEM), etc.)
459	.....External manifold	493	...Having sulfonic acid groups
460	.....With sealing means	494	....Fluoropolymer (e.g., Nafion, etc.)
461	....Manifold material	495	...Oxide
462	...Having means for storing reactant (e.g., tank, etc.)	496	....Zirconium oxide
463	..Comprising framed electrodes or frame-like gaskets	497	..Tubular-shaped solid electrolyte
464	..With molten electrolyte	498	..Fuel cell with liquid electrolyte
465	..With solid electrolyte	499	..Aqueous electrolyte
466	...Tubular or cylindrical configuration	500	...Acidic
467	..With means for stacking cells together	501	...Hydroxide
468	...Specified material or component between adjacent cells	502	..Fuel cell with specified reactant
469	..With sealing or supporting feature	503	..Particulate reactant (e.g., suspension, dispersion, etc.)
470	..With securing means	504	..Reactant contains a nitrogen compound (e.g., hydrazine, ammonia, etc.)
471	..Comprising a plurality of stacks (e.g., modular assembly, etc.)	505	..Reactant includes carbon, oxygen, or hydrogen
472	..Fuel cell with molten electrolyte	506	...Reactant is an alcohol
473	..With means for preventing or reducing electrode dissolution	507	..Means for joining components together
474	..With gas diffusion electrode	508	..With sealing, spacing, or supporting feature
475	..With matrix containing electrolyte	509	...Specified material
476	..With liquid or solid reactant or reactant in electrolyte	510	....With bonded seal
477	..Specified electrolyte material	511	...With clamping means
478	...Comprising a carbonate	512	..Means for distributing, storing, or preventing fluid movement
479	..Fuel cell with solid electrolyte	513	..Having means for supplying reactant or electrolyte
480	..With gas diffusion electrode	514	...Including flow field means (e.g., separator plate, etc.)
481	...Specified supporting layer	515	..Having means for storing reactant (e.g., tank, reservoir, etc.)
482	..Specified electrode/electrolyte combination	516	..Immobilizing structure or material (e.g., matrix, diaphragm, or membrane, etc.)
483	...Membrane electrode assembly (MEA)	517	..Electrical current collector
484	..Specified electrode material	518	..Bipolar separator (e.g., bipolar plate, etc.)
485	..Metal or alloy containing	519	..Specified collector material
486	....Metal-ceramic composite or mixture (e.g., cermet, etc.)		
487	....Noble metal or alloy		

520	...Composite material	61	WITH CONTROL MEANS RESPONSIVE TO BATTERY CONDITION SENSING MEANS
521	...Carbon-based material		
522	...Metal or alloy		
523	.Electrode structure or composition	62	.Temperature control
524	..Including platinum catalyst	63	.Electrolyte feeding control from reserve supply
525	..Including palladium catalyst	64	..Having valve in control
526	..Including rhodium, ruthenium, or osmium catalyst	65	TERMINAL PROTECTOR OTHER THAN SEAL THROUGH CASING
527	..Including nickel, iron, or cobalt catalyst	66	HAVING MEANS TO ACCOMMODATE ELECTRODE EXPANSION
528	..Including metal oxide catalyst	67	HAVING MOVABLE MECHANICAL MEANS TO PROVIDE RELATIVE MOTION BETWEEN ELECTRODE AND ELECTROLYTE
529	..Having electrolyte matrix or barrier layer		
530	..Having organic component		
531	...Organic catalyst	68	.Means moves electrode
532	..Having an inorganic matrix, substrate, or support	69	..Rotary motion
533	...Sintered particles	70	.Means moves electrolyte externally of electrode chamber
534	...Including gas diffusion material or layer	71	WITH SYSTEM HAVING MEANS TO MOVE VENTILATING FLUID
535	.Method of making a fuel cell, fuel cell stack, or subcombination thereof	72	HAVING SPECIFIED VENTING, FEEDING OR CIRCULATION STRUCTURE (OTHER THAN FEEDING OR FILLING FOR ACTIVATING DEFERRED ACTION-TYPE BATTERY)
47	HAVING EARTH FEATURE		
48	PRESERVING CELL IN STORAGE FEATURE		
49	REGENERATING, SALVAGE OR REPAIR FEATURE OTHER THAN ONLY ADDITION OF ELECTROLYTE TO CELL OR ELECTRICALLY CHARGING PER SE	73	.Single filling opening and means to equalize fluid level in plural cells
50	PROCESS OF CELL OPERATION	74	.Having means to control electrolyte level when liquid is added, other than a visual reference point
51	.Electrolyte circulation	75	..For different levels
52	.Activation of inactive cell	76	..Float valve
53	MEANS EXTERNALLY RELEASING INTERNAL GAS PRESSURE FROM CLOSED CELL, I.E., VALVE ETC.	77	..By establishing an air lock
54	.Elastic, resilient or spring biasing valve means	78	...Liquid seal only
55	..Elastic band or O-ring valve member	79	...Movable valve structure supported within the filler opening
56	.Blowout type	80	.Having (manual) electrolyte storage feeding a device
57	SEALED CELL HAVING GAS PREVENTION OR ELIMINATION MEANS	81	.Having nonmovable means providing motion between electrolyte and electrodes, i.e., circulation
58	.Prevention means controlling an auxiliary device	82	.Venting structure
59	.Prevention or elimination means is one of the cell electrodes or is electrically connected to an electrode	83	..Separate ventilating inlet and exhaust openings
60	..Electrodes having different total capacity or one electrode with charge or discharge reserve	84	..Nonspill fluent electrolyte type other than gas diffusive type
		85	...Weight actuated valve type

86	..Reactive, absorbable or diffusive type	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
87	..Gang type		
88	...Having manifold		
89	..Other stopper, cap or plug type		
90	WITH MEASURING, TESTING, OR INDICATING MEANS		
91	.For charge or liquid level		
92	..Having electrical circuitry	122	CURRENT PRODUCING CELL, ELEMENTS, SUBCOMBINATIONS AND COMPOSITIONS FOR USE THEREWITH AND ADJUNCTS
93	...External type		
94	PLURAL CONCENTRIC OR SINGLE COILED ELECTRODE		
95	HAVING MEANS FOR DRAINING OR REMOVING ELECTROLYTE FROM A CELL OTHER THAN FILLER OPENING	123	.Having means to interchangeably connect plural individual cells or means to connectively support cell to current seeking apparatus
96	CELL SUPPORT FOR REMOVABLE CELL		
97	.Having switch or interlock means	124	.Printed cell type
98	.Having disparate support structure, e.g., eyeglass temple, etc.	125	.Standard cell or counter emf type
99	.For plural cells	126	.Cell with protective layer on electrolyte
100	.Support or holder per se	127	.Tape or flexible-type cell including tape fuel cells or subcombination thereof
101	FLUID ACTIVE MATERIAL OR TWO-FLUID ELECTROLYTE COMBINATION HAVING AREAS OF NONMIXTURE	128	.Electrode or plural tablets, pellets or discs
102	.Active material in molten state	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)
103	..With fused electrolyte, i.e., molten		
104	..With solid-state electrolyte	130	..Insulator structure is only spacer of the rod, button, strip, or frame type
105	.Active material in solution		
106	..Copper sulfate solution	131	..Having electrode enclosing feature
107	..Iron containing material	132	...Separating material in bulk form about electrode
108	..Nitrogen containing material	133	...Cylindrical unit cell type, flat unit cell type or porous cup type
109	..Chromium containing material	134	....Paste or gel
110	DEFERRED ACTION TYPE	135	....With layer of material or spacing means
111	.Responsive to light	136	...Envelope type
112	.Responsive to heat	137	....Coating on electrode
113	.Responsive to movement of electrode on contained electrolyte	138	....Having support frame or cover
114	..Activated by spin or set back	139	....Having edge bond or seal
115	..Activated by explosive charge	140	...Tubular type
116	..Frangible separation means	141	....Having plural layers of diverse material
117	..By orientation of the cell	142	..Having plural distinct components
118	.Responsive to addition of liquid		
119	..Activated by immersion, e.g., sea water type		
120	WITH HEAT EXCHANGE FEATURE		

143	...Ribs or projections attached to sheet material	168	....Having metallic or conductive outer casing
144	...Plural layers	169	.....Outer casing electrically connected to reactive electrode
145	...Having defined porosity either functional or by size (i.e., semipermeable, permselective, ionpermeable, microporous, etc.)	170	....Electrical contact terminal plate or cap clamped to or embedded in a portion of the housing
146	..Having electrode spacing projections	171	....Having seal
147	...Projections are deformed portions, of a sheet material, i.e., corrugations, etc.	172	....Mechanical clamping pressure seal
148	.Plural housing having spacing means or channels for air circulation and short prevention	173	.....And sealing mass or compound
149	.Plural cells	174	..Having seal material
150	..With integral switch means	175	..Cover only
151	..Casing having interlocking structure	176	..Container only
152	..Individual cells connected in repeating contiguous layered units	177	..Housing or casing with plural covers
153	...Having unit enclosing housing	178	..Having terminal
154	....Having sectional component	179	...On or through a side of housing
155	.....Of tray, cup or dish shape in nested or telescopic relationship	180	...Sealing sleeve embedded or molded in cover
156	..Complete cells	181	...And terminal seal
157	...In end-to-end contact, e.g., stacked button-type cell, etc.	182	...Means to stop rotational movement between cover and terminal
158	...Having intercell connector	183	...Having threaded compression means
159	....And common external casing, tray or clamp means	184	...Sealing mass or compound
160	..Having intercell connector	185	..Having seal feature
161	.Intracell assembly having cell electrode connector	186	..Having cell assembly support feature
162	.Flat-type unit cell and specific unit cell components	187	..Having handle or lifting device
163	.Cell enclosure structure, e.g., housing, casing, container, cover, etc.	188	.Include electrolyte chemically specified and method
164	..Cylindrical unit cell type, e.g., cup container electrode, tubular electrode, casing, etc.	189	..Precursor composition
165	...Having centrally located anode, i.e., "inside-out" type cell	300	..The electrolyte is gelled
166	...Reactive metallic can, cup or tubular electrode	301	..Carbohydrate or derivative containing (e.g., starch, cellulose, etc.)
167	....Having outer nonreactive housing, casing, or jacket	302	...Silicon containing
		303	...Organic polymer containing
		304	..The electrolyte is solid
		305	...Temperature range of electrolyte operation or electrolyte processing is specified
		306	...Organic component containing
		307	....Chemically specified organic solute
		308	....Carbohydrate or derivative
		309	....Two or more polymers (i.e., polymer mixture)

310	....Hetero ring containing polymer	338	.....The hetero ring is a cyclic carbonate (e.g., ethylene carbonate, propylene carbonate, etc.)
311	.....Oxygen is a ring member of the hetero ring	339	...Nitrogen containing organic solvent compound (e.g., acetonitrile, etc.)
312	.....The hetero ring is three membered	340	...Sulfur containing organic solvent compound
313	....Silicon containing polymer	341	...Oxygen containing organic solvent compound
314	....Sulfur, nitrogen, or phosphorus containing polymer	342	....Acyclic carbonate solvent
315	.....Nitrogen and phosphorus in the polymer	343	....Acyclic carboxylic acid ester solvent
316	....Halogen containing polymer	344	..Chemically specified inorganic solvent other than water
317	....Oxygen containing polymer	345	...Sulfur or phosphorus in the inorganic solvent
318	...Silver containing component	346	....Sulfur dioxide containing inorganic solvent
319	..Aluminum containing component (e.g., LiAlCl ₄ , etc.)	347	..Organic solute component in aqueous electrolyte
320	....The component is alumina (i.e., aluminum oxide)	199	..Halogen containing
321	..Alkali metal containing component	200	...Hydrogen containing
322	....The alkali metal is lithium	201	....Ammonium
323	.....Lithium and halogen containing compound	202	..Chromium containing
324	..Chemically specified organic solvent containing	203	..With acid containing N or P constituent
325	...And chemically specified inorganic solvent	204	..Sulphuric acid
326	...Plural organic solvents (i.e., solvent mixture)	205	...Sulphate containing
327	....One of the organic solvents contains a hetero ring	206	..Alkaline
328	.....Nitrogen is ring member of the hetero ring	207	...With salt or acid component
329	.....Oxygen is ring member of the hetero ring	208	.Electrode support for suspending or holding an electrode in a battery
330	.....The hetero ring is a cyclic carbonate	209	.Electrode
331	.....Plural cyclic carbonate solvents	210	..Bipolar type
332	.....And acyclic carbonate or acyclic carboxylic acid ester solvent	211	..Having connector tab
333	.....And acyclic ether solvent	212	..Having active material with organic component
334	.....And acyclic oxygen or nitrogen containing solvent compound	213	...Organic component is active material
335	.....The acyclic oxygen containing solvent compound is an acyclic ether	214	...Organic component is an antioxidant
336	..Hetero ring in the organic solvent	215	...Organic component is an expander or addition agent for improving electrode capacity or plating characteristics
337	....Oxygen is the only ring hetero atom in the hetero ring (e.g., dioxolane, gamma butyrolactone, etc.)	216	....Dendrite or "tree" forming inhibitor
		217	...Organic component is a binder
		218.1	..Chemically specified inorganic electrochemically active material containing

CLASS 429 CHEMISTRY: ELECTRICAL CURRENT PRODUCING APPARATUS, PRODUCTION, AND PROCESS 429 - 7

218.2	...Hydrogen storage material is active material	235	...Having particulate or fibrous porous mass including a sintered mass
219	...Silver component is active material	236	...Having coating in the pores
220	...Copper component is active material	237	...Having support or reinforcing member
221	...Iron component is active material	238	...Having longitudinal electrically conducting tubes or cores
222	...Cadmium component is active material	239	...Having conductive receptacle or mechanical locking means for the active material
223	...Nickel component is active material	240	...Locking means being bendable tabs
224	...Manganese component is active material	241	...Open mesh or perforated plate
225	...Lead component is active material	242	...Expanded metal
226	...Alloy	243	...Having members in a face plane of the grid being offset from members in the plane of the opposite face
227	...Metal sulphate or carbonate	244	....Distinct elements or members intermediate the face members
228	...Lead oxide	245	..Materials chemically specified
229	...Zinc component	246	..With insulating separator, spacer or retainer means
230	...With mercury	247	.Separator, retainer, spacer or materials for use therewith
231	...Zinc oxide	248	..Having additive for effecting the charge capacity, life, etc., of a cell
231.1	...Alkalated transition metal chalcogenide component is active material	249	..Organic material
231.2	...Alkalated vanadium (V) chalcogenide	250	...And wetting agent or surface acting agent
231.3	...Alkalated cobalt (Co) chalcogenide	251	...And inorganic material
231.4	...Alkalated carbon, graphite, or carbonaceous component is active material	252	...Silicon containing
231.5	...Vanadium (V), chromium (Cr), niobium (Nb), molybdenum (Mo), titanium (Ti), or tungsten (W) component is active material	253	...Phenolic or thermosetting resin
231.6	...Alkaline earth metal or magnesium (Mg) component is active material	254	...Rubber or thermoplastic resin
231.7	...Halogenated carbon, graphite, or carbonaceous component is active material	255	...Natural or treated plant materials
231.8	...Carbon, graphite, or carbonaceous component is active material		
231.9	...Alkali metal component is active material	900	FUEL CELL INCLUDING MEANS FOR POWER CONDITIONING (E.G., CONVERSION TO AC, ETC.)
231.95	...The alkali metal is lithium		
232	...Having inorganic binder or conductive filler	901	FUEL CELL INCLUDING MEANS FOR UTILIZATION OF HEAT FOR UNRELATED APPLICATION (E.G., HEATING A BUILDING, ETC.)
233	..Grid or holder for active material		
234	...Grid or holder has nonconducting component portion thereof		

CROSS-REFERENCE ART COLLECTIONS

FOREIGN ART COLLECTIONS**FOR 000 CLASS-RELATED FOREIGN DOCUMENTS**

Any foreign patents or non-patent literature from subclasses that have been reclassified have been transferred directly to FOR Collections listed below. These Collections contain ONLY foreign patents or non-patent literature. The parenthetical references in the Collection titles refer to the abolished subclasses from which these Collections were derived.

CURRENT PRODUCING CELL, ELEMENTS, SUBCOMBINATIONS AND COMPOSITIONS FOR USE THEREWITH AND ADJUNCTS

.Include electrolyte chemically specified and method

CURRENT PRODUCING CELL, ELEMENTS, SUBCOMBINATIONS AND COMPOSITIONS FOR USE THEREWITH AND ADJUNCTS (429/122)

.Include electrolyte chemically specified and method (429/188)

- FOR 100 ..Gelled (429/190)
- FOR 101 ..Solid (429/191)
- FOR 102 ...Organic (429/192)
- FOR 103 ...Metal oxide component (429/193)
- FOR 104 ..Nonaqueous solvent (429/194)
- FOR 105 ...With water (429/195)
- FOR 106 ...Inorganic solvent (429/196)
- FOR 107 ...Plural nonaqueous system (429/197)
- FOR 108 ..Having organic solute component (429/198)
- .Electrode
- .Electrode (429/209)
- FOR 109 ..Having inorganic active material chemically specified (429/218)
- FOR 110 **FUEL CELL, SUBCOMBINATION THEREOF OR METHODS OF OPERATING (429/12)**
- FOR 111 .Process of operating (429/13)
- FOR 112 ..Circulating or feeding electrolyte (429/14)
- FOR 113 ...Active material in electrolyte (429/15)
- FOR 114 ..Fused or molten electrolyte (429/16)
- FOR 115 ..Generating, regenerating or recycling reactant (429/17)
- FOR 116 .Plural cells having means to reduce ionic short circuit (429/18)
- FOR 117 .Having means for active material generation or regeneration (429/19)
- FOR 118 ..By heating or cooling (429/20)
- FOR 119 ..By electrical current (429/21)
- FOR 120 .Automatic control means (429/22)
- FOR 121 ..Electrical output dependent (429/23)
- FOR 122 ..Temperature dependent (429/24)
- FOR 123 ..Pressure dependent (429/25)
- FOR 124 .Having heat exchange means (429/26)
- FOR 125 .Active material electrode-type cell or subcombination thereof (429/27)
- FOR 126 ..Envelope cathode-type or subcombination thereof (429/28)
- FOR 127 ..And chemically specified electrolyte material (429/29)
- FOR 128 .Solid electrolyte (429/30)
- FOR 129 ..Tubular (429/31)
- FOR 130 ..Plural disc or modules (429/32)
- FOR 131 ..Electrolyte composition chemically specified (429/33)
- FOR 132 .Housing member, seal, spacer or fluid distributing or directing means (429/34)
- FOR 133 ..Having sealing feature (429/35)
- FOR 134 ...Having bonded seal, e.g., welded, adhesive, molded in situ, etc. (429/36)
- FOR 135 ...Having clamping means (429/37)
- FOR 136 ...Having support or spacers with fluid distribution means (429/38)
- FOR 137And fluid directing means (429/39)
- FOR 138 .Catalytic electrode structure or composition (429/40)
- FOR 139 ..Having electrolyte matrix or barrier layer (429/41)
- FOR 140 ..Having organic constituent as part of the electrode (429/42)
- FOR 141 ...Organic catalyst (429/43)
- FOR 142 ..Having an inorganic matrix, substrate or support (429/44)

CLASS 429 CHEMISTRY: ELECTRICAL CURRENT PRODUCING APPARATUS, PRODUCT, AND PROCESS 429 - 9

FOR 143 ...Of sintered particles (429/45)

FOR 144 .Chemically specified electrolyte
(429/46)