100 **NUCLEAR FUSION**
101 .Pellet guidance systems (e.g., pellet injection means)
102 .Inertial confinement (e.g., nuclear explosive)
103 ..Photon beam (e.g., laser) irradiation
104 ...Optics
105 ..Particle beam irradiation (excluding photons)
106 ...Ion beam irradiation
107 .Fusion reaction by plural colliding plasmas or particle beams
108 .Including accelerating particles into a stationary or static target (e.g., Cockcroft-Walton generator type)
109 ..With target replenishing
110 ..With means for modifying the resultant neutron output, e.g., moderator means
111 ..With means to pulsate ion beam
112 ..Cyclotron type acceleration of nuclei
113 ..With electrostatic voltage generating means
114 ..Self-contained neutron sources (e.g., neutron or accelerator tube)
115 ...With cooled electrodes or target
116 ...With ion beam collimator or filtering structure (e.g., extractor electrode)
117 ..With ion beam collimator or filtering structure
118 ..Subterranean sources
119 ..With control circuitry
120 .Including bunched particle beam
121 .Magnetic confinement of plasma
122 ..Plasma formed in situ by laser
123 ..Principal heating by wave energy
124 ...Heating by time varying magnetic field (e.g., by compression)
125 ..Imploding liners
126 ..With enveloping charged particle confinement (e.g., E or P layer)
127 ..With injection of electrically charged or accelerated particles
128 ...Plasma injection
129 ...Negatively charged particle injection
130 ...Neutral particle injection
131 ..Auxiliary heating
132 ...Electromagnetic wave energy
133 ..Toroidal confinement of plasma
134 ...Divertors
135 ....Effuser
136 ...Limiters or liners
137 ...With solid internal conductor
138 ...Bumpy torus
139 ..Linear confinement
140 ...Mirror devices
141 ....Plasma formed or contained between spaced electrodes
142 ..Magnetic structure
143 ..With circuitry
144 .Plasma formed between spaced electrodes
145 ..Plasma focus
146 .Including removal or use of impurities or reaction products (e.g., energy)
147 ..Direct conversion of energy
148 ..Including use of heat or radiation to effect a chemical reaction
149 .Shock wave heating of plasma or gas (e.g., MHD heating)
150 .Chamber structure or material
151 .Fusion targets or pellets
152 ..For inertial confinement
153 **DETECTION OF RADIATION BY AN INDUCED NUCLEAR REACTION**
154 .By fission
155 .With boron
156 **NUCLEAR TRANSMUTATION (E.G., BY MEANS OF PARTICLE OR WAVE ENERGY)**
157 .Gamma or charged particle activation analysis
158 .By neutron bombardment
159 ..Neutron activation analysis
160 ...Subterranean
161 ....Specific nuclides
162 .....Metals
163 ......Aluminum, silicon
164 ......Uranium
165 .....Hydrogen, chlorine

166 .....Oxygen, carbon
167 ....With tracer injection
168 ..Halogens
169 ...Iodine
170 ..Actinides
171 ...Breeder or converter reactor structures
172 ....Fertile fuel assembly structure or arrangement
173 .....Having internal fertile regions
174 ....Having particular coolant fluid flow path or pattern within reactor core
175 .....Orifice or fluid control at inlet or outlet of coolant channels
176 .....Hydraulic holddown
177 .....Plural coolant loops or passes through reactor core
178 ....Fuel assembly holddown or support
179 ....Coolant manipulated and used exterior of reactor core
180 ...Formation of uranium isotopes
181 ....Uranium 233
182 ...Formation of plutonium isotopes
183 ..Doping of semiconductors
184 ..Rare earths
185 ..Alkali and alkaline elements
186 ..Molybdenum, technetium
187 ..Lead, polonium, bismuth
188 ..Sulfur, phosphorus
189 ..With reaction product treatment (e.g., recovery, separation)
190 .By charged particle bombardment
191 ..Alpha-neutron sources
192 ..To produce spallation reactions
193 ...To produce fissile isotopes
194 ..Proton bombardment
195 ...With reaction product treatment (e.g., recovery, separation)
196 ..Alpha (helium nucleus) bombardment
197 ...Wherein the reaction product is an actinide or transuranium element
198 ...With reaction product treatment (e.g., recovery, separation)
199 ..Deuteron bombardment
200 ...Wherein the reaction product is an actinide or transuranium element
201 ...With reaction product treatment (e.g., recovery, separation)
202 .Irradiation capsule, holder, or support
203 **SEAL ARRANGEMENTS**
204 .For nozzle
205 .Between pressure vessel cover and vessel or portion thereof
206 ..Rotating plug-type cover
207 **WITH CONTROL OF REACTOR (E.G., CONTROL OF COOLANT FLOW)**
208 .Pulsed reactors
209 .Spectral shift
210 .By coolant flow
211 ..Exterior of core (e.g., secondary loop control)
212 .By altering quantity of characteristic of fuel within critical area
213 ..Wherein control element includes a fissile material
214 .Reactor start-up
215 .By electronic signal processing circuitry (e.g., plural redundant circuits)
216 ..Plural sensed different conditions or measured variables correlated
217 ...Control programs
218 ....Xenon control
219 .By movement of control element or by release of neutron absorbing material
220 ..Wherein the control element is a reflector or moderator material
221 ...Variable fluent reflector/moderator level or density
222 ....Moderator dump
223 ..Rotatable control elements
224 ..Finger-type control elements (insertable into fuel element positions)
225 ...Including shock absorber
226 ..Wherein control element is driven directly into bed of fuel elements
227 ..Control element movable by means of cable and winch, chains or reels

228 ..Wherein driver or motivating is electric
229 ...Electrofluidic
230 ..Wherein driver or motivating is fluid
231 ...Pneumatic
232 ..By motion transforming means, e.g., rack and pinion
233 ..Releasable coupling
234 ..Including shock absorber
235 ..Means for locking control element in desired position
236 ..Including control rod insertion and removal schemes
237 ...Group movement of control elements
238 ...Setback
239 ..Rod or support carrying plural elements or diverse materials
240 .Sensing or detecting device attached to, embedded in, or integral with control element
241 .Power output control (e.g., load follows with steam dump)
242 .Means to inhibit control rod movement
243 .With cooling of control element
244 .Temperature reactivity control
245 **TESTING, SENSING, MEASURING, OR DETECTING A FISSION REACTOR CONDITION**
246 .Flowmeters
247 .Temperature or pressure measurement
248 .Optics
249 .Vessel monitoring or inspection
250 .Leak detection
251 ..Fuel element leak detection
252 ...By acoustic or ultrasonic wave energy
253 ...By the detection of fission products external to the fuel element
254 .Flux monitoring
255 ..Directly generating electrical signal (e.g., ion detection)
256 .Gas sensors (e.g., hydrogen detectors)
257 .Fuel assay (e.g., burnup)
258 .Position detection
259 .By particular instrumentation circuitry
260 **HANDLING OF FISSION REACTOR COMPONENT STRUCTURE WITHIN REACTOR SYSTEM**
261 .Fuel component
262 ..Including handling of a second different, diverse reactor component (e.g., control element, moderator element, vessel cover removal)
263 ...With pressure vessel cover removal
264 ..Charging or discharging of fuel
265 ...Refueling ball-type reactors
266 ....Means for separating low exposure from high exposure elements
267 ...Refueling schemes, patterns, or fuel cycles (e.g., in/out systems)
268 .Refueling machines
269 ..With magazine
270 ..With nonaxial transfer capability
271 ..Upper axial transfer
272 .Storage container systems for new and/or irradiated core elements
273 **SUBTERRANEAN REACTOR STRUCTURES (E.G., UNDERGROUND CONTAINMENT, UNDERGROUND EXPLOSIVE)**
274 .For minimizing radioactive contamination within an underground chamber or of the material removed therefrom
275 .For extracting materials or energy from the earth
276 ..In the form of heated water or steam
277 **REACTOR PROTECTION OR DAMAGE PREVENTION**
278 .By minimizing positive coolant void coefficient
279 .Fire extinguishing or prevention
280 .Core catchers
281 .Fluid flow reversal protection
282 .Emergency core coolant systems (e.g., injecting coolant into reactor or pipe systems)
283 .Pressure suppression and relief
284 ..By fusible means (e.g., ice)
285 .Expansion means (e.g., shock absorbers, roller bearings)
286 ..Pipe expansion joints
287 .Shield or barrier between radiation or heat source and object to be protected (e.g., insulation, thermal shield)

288 ..Particular materials
289 ..Thermal insulation
290 ...For liquid metal cooled fast reactors (e.g., insulation for vault roof, or for the vessel walls as by a layer of stagnant or quasi-stagnant coolant)
291 ...Concentric tubes or conduits with insulation
292 ..Concentric tubes or conduits
293 ..Containment structures
294 ...Pressure vessels
295 ....Concrete
296 .....Prestressed
297 .With turbine protection means (e.g., turbine trip or overspeed protection means)
298 .Auxiliary heat removal structure
299 ..Decay heat removal
300 .Recombiners
301 ..Catalytic
302 .Core restraint means
303 ..In-core restraint means
304 ..For moderator structures
305 .Corrosion or damage prevention
306 ..By addition of material to coolant
307 .With pressurizer means
308 **FISSION REACTOR MATERIAL (INCLUDING REACTION PRODUCTS) TREATMENT**
309 .Post accident impurity or contaminant removal
310 .Impurity removal
311 ..Reprocessing of fuel during reactor operation
312 ..By cold traps or hot traps
313 ..By filters, ion exchangers, or absorbers
314 ...Gas filters (e.g., adsorbers)
315 ...Electrostatic or magnetic filters
316 ..By pressurized fluid (i.e., blowdown)
317 **COMBINED**
318 .With propulsion means
319 ..Gaseous core
320 .With direct conversion means
321 ..Thermionic
322 .For storing excess energy
323 .With chemical reaction
324 ..To produce a combustible fuel
325 ...Cracking of hydrocarbons
326 .With laser
327 **CONTROL COMPONENT FOR A FISSION REACTOR**
328 .Liquid control component
329 ..With vaporization
330 ..Liquid metal control component
331 .Gaseous control component
332 .Telescopic control devices
333 .Wherein concentration of the reactivity affecting material varies radially or axially of the control element
334 ..By utilizing a follower
335 .Flexible control element
336 .Fuse actuated devices
337 ..Particulate type
338 .Particulate type (e.g., balls)
339 .Nonconventional control material
340 **REACTOR STRUCTURES WITH TESTING OR IRRADIATION FACILITIES**
341 .With material holder or support positioned outside the radiation source
342 .With provision for insertion of material to be irradiated into the radiation means
343 ..Flux trap reactor structures
344 ..By fluid pressure
345 ...Wherein the fluid is a liquid
346 **EPI-THERMAL REACTOR STRUCTURES (E.G., INTERMEDIATE NEUTRON SPECTRUM)**
347 **REACTOR STRUCTURES**
348 .Fast thermal composite core
349 .Flux flattening
350 .Moderator component varies in its effective density or materials
351 ..Spaced internal reflectors or moderators
352 .Orifice or fluid control at inlet or outlet of coolant channels
353 .With particular control rod guide structure
354 .Fuel material in contact with and supported by fluid
355 ..Fluidized beds
356 ..Fuel dispersed in liquid moderator, solution, etc.
357 ...Vapor forming, separating, or manipulating
358 ...With particular in situ reconstitution or modification of fuel moderator material

359 ..Fuel in molten state or in molten vehicle
360 ...Fuel in form of fused salt
361 .Circulating fluid within reactor
362 ..Fuel assembly supports
363 ...Suspended fuel assembly
364 ...Fuel assembly holddown or locking means
365 ....Hydraulic or pneumatic
366 ..Plural fluids or a fluid in plural phases circulating within reactor (e.g., pressure tube reactors)
367 ...In heat pipe means
368 ...Including chemically distinct gas
369 ....With formation, separation, or manipulation of a second gas
370 ...With formation, separation, or manipulation of a vapor (e.g., boiling water reactor (BWR) type)
371 ....With vapor-liquid separating means
372 ....With jet pump
373 ....Having specified fluid flow path or pattern within reactor core
374 .....Plural separate coolant loops through reactor core
375 .....With plural, coolant passes through reactor core
376 ......Re-entrant type
377 .....With particular flow directing or diverting means (e.g., flow baffle)
378 ....Vapor manipulated or used exterior of reactor core
379 .....With flow control of fluid within reactor
380 ....Nonaqueous vapor
381 ..Pebble bed reactor
382 ...Having core of separate pebble containers
383 ..Fluid is a gas
384 ...Wherein the gas is steam
385 ...Having specified flow path or pattern within reactor core
386 ....Plural separate loops
387 ....Plural passes through core
388 .....Re-entrant type
389 ....With particular flow directing or diverting means (e.g., flow baffle)
390 .....With core bypass means (e.g., passage along core barrel or through shield structure)
391 ...Manipulated or used exterior of the reactor core
392 ....With jet pump
393 ....With coaxial flow
394 ....With single structure component containment (e.g., pod arrangement)
395 ..Having specified fluid flow path or pattern within reactor core
396 ...Plural separate coolant loops through reactor core
397 ...Plural passes
398 ....Re-entrant type
399 ...With particular flow directing or diverting means (e.g., flow baffle)
400 ....With core bypass means (e.g., passage along core barrel or through shield structure)
401 ...One-fluid-type pressure tube reactor
402 ..Manipulated or used exterior of reactor core
403 ...Including tank, pool, or reservoir (e.g., swimming pool)
404 ....Having reactor core and heat exchanger or pump therein
405 .....With particular heat exchanger structure
406 ...Compact or integral (e.g., heat exchanger, core, pumps in same vessel)
407 ...With jet pumps
408 ...With means or structure to flash coolant into vapor
409 **FUEL COMPONENT STRUCTURE**
410 .With means to prevent thinning of the cladding (e.g., amoeba effect)
411 .Spherical particles
412 .Encased with nonfuel component
413 ..With internal pressurizer
414 ..Coated, preformed, or impregnated layer or part or adhesively bonded layers or parts
415 ...Lubricating layer
416 ...Multiple or composite cladding-type layers

417 ....Including getter layer or barrier layer
418 ..Getter, fission product retainer of filter
419 ..Burnable poison
420 ..Interpellet spacing or positioning means
421 ..Homogeneously intermixed
422 ...Alloyed fuel
423 ..Moderator or reflector
424 ..Coolant or heat exchange material
425 ..Heat insulating material
426 .Plural fuel segments or elements
427 ..In solid moderator block
428 ..Wherein the fissile content varies radially or axially within the same container (e.g., plural fuel layers)
429 ..Complementary segments within same container
430 ..Spherically shaped segments within same container
431 ..Concentric cylindrical elements
432 ..Plate-type fuel elements
433 ..Stacked (e.g., Candu type reactor fuel components)
434 ..In pack or bundle
435 ...Wherein the fissile content varies radially or axially across the pack or bundle
436 ...Wire-wrapped fuel elements
437 ...Having the fuel element ends positioned on or attached to rails
438 ...Including grid
439 ....With coolant flow path deflecting means
440 ....For ends of fuel elements
441 ....With nonintegral fuel element contacting means
442 ....With fuel element contacting protuberance or projection
443 ...With coolant flow path deflecting means
444 ....With coolant flow bypass means
445 ...With thermal expansion compensating means
446 ...With removable member
447 ...Including separate burnable poison or moderator
448 ...With means for spacing apart adjacent packs or bundles
449 ...Having provision or structure for insertion of control elements therein
450 .With condition sensing or indicating means
451 .Having particular end closure or seal (e.g., weld, plug, cap, etc.)
452 ..With indexing means
453 .Fuel support or covering provided with fins, projections, prongs, etc.)
454 ..With external fins, projections, prongs, etc.
455 .Hollow, annular, or graduated fuel layers or members (e.g., concentric, helical, etc.)
456 .Vented fuel
457 .Nonconventional jacket or can material
458 **MODERATOR OR REFLECTOR COMPONENT STRUCTURE FOR A FISSION REACTOR**
459 .With means for keying or assembling moderator blocks together
460 **ROTATING PLUG-TYPE COVER**
461 **VESSEL SUPPORT (E.G., CORE VESSEL SUPPORTS)**
462 **GRIDS**
463 **MISCELLANEOUS**

CROSS-REFERENCE ART COLLECTIONS

900 **PARTICULAR MATERIAL OR MATERIAL SHAPES FOR FISSION REACTORS**
901 .Fuel
902 ..With external lubricating or absorbing material
903 ..Shapes
904 .Moderator, reflector, or coolant materials
905 ..Organic
906 ..Metal
907 ..Dissociative coolants
908 **REACTOR GEOMETRY (OR PART THEREOF) DEFINED IN TERMS OF NUMERICAL VALUES**
909 **MOBILE REACTORS**
910 **ROTATING REACTORS**
911 **PLURAL REACTOR SYSTEMS**
912 **NUCLEAR REACTOR SYSTEMS SITUATED IN THE OCEAN**

913 **ANTIMATTER DEVICES AND METHODS**
914 **NUCLEAR EXPLOSIVES**
915 **FUSION REACTOR FUELS**
916 **METHODS OF MAKING FUSION FUEL TARGETS**
917 **UTILIZING DIFFERENT FUELS OR FUELS IN DIFFERENT FORMS, IN DIFFERENT REACTOR REGIONS IN RELATION TO AMOUNTS OF HEAT PRODUCED IN SAID REGIONS**
918 **ENTIRE REACTOR CORE OF SINGLE INTEGRAL STRUCTURE**

FOREIGN ART COLLECTIONS

FOR 000 **CLASS-RELATED FOREIGN DOCUMENTS**