

**CPC****COOPERATIVE PATENT CLASSIFICATION****G21C**

**NUCLEAR REACTORS** (analogue computers therefor [G06G 7/54](#); fusion reactors, hybrid fission-fusion reactors [G21B](#); nuclear explosives [G21J](#))

**WARNING**

The following IPC groups are not used in the CPC scheme:

- [G21C 1/01](#) covered by all other groups of [G21C](#)
- [G21C 19/33](#) covered by all other subgroups of [G21C 19/34](#)

**G21C 1/00****Reactors**

G21C 1/02

- . Fast fission reactors, i.e. reactors not using a moderator; {Metal cooled reactors; Fast breeders}

G21C 1/022

- .. {Characterised by the concept and properties of the core}

G21C 1/024

- ... {where the core is divided in zones with fuel and zones with breeding material}

G21C 1/026

- ... {Reactors not needing refueling, i.e. reactors of the type breed-and-burn, e.g. travelling or deflagration wave reactors or seed-blanket reactors}

G21C 1/028

- .. {cooled by a pressurised coolant (cooling arrangements [G21C 15/00](#))}

G21C 1/03

- .. cooled by a coolant not essentially pressurised, e.g. pool-type reactors

G21C 1/04

- . Thermal reactors; {Epithermal reactors}

G21C 1/06

- .. Heterogeneous reactors, i.e. in which fuel and moderator are separated

G21C 1/07

- ... Pebble-bed reactors; Reactors with granular fuel

G21C 1/08

- ... moderator being highly pressurised, e.g. boiling water reactor, integral super-heat reactor, pressurised water reactor ([G21C 1/22](#) takes precedence)

G21C 1/082

- .... {Reactors where the coolant is overheated}

G21C 1/084

- .... {Boiling water reactors}

G21C 1/086

- .... {Pressurised water reactors}

G21C 2001/088

- .... {Inherently safe boiling water reactors}

G21C 1/09

- .... Pressure regulating arrangements, i.e. pressurisers

G21C 1/10

- .... moderator and coolant being different or separated

G21C 1/12

- ..... moderator being solid, e.g. Magnox reactor {gas-graphite reactor}

G21C 1/14

- ... moderator being substantially not pressurised, e.g. swimming-pool reactor ([G21C 1/22](#) takes precedence)

G21C 1/16

- .... moderator and coolant being different or separated, e.g. sodium-graphite reactor {sodium-heavy water reactor, organic coolant-heavy water reactor}

G21C 1/18

- ..... coolant being pressurised

G21C 1/20

- ..... moderator being liquid, e.g. pressure-tube reactor {also the construction of the pressure-tubes}

G21C 1/22

- ... using liquid or gaseous fuel

G21C 1/24

- .. Homogeneous reactors, i.e. in which the fuel and moderator present an effectively homogeneous medium to the neutrons

G21C 1/26

- ... Single-region reactors

- G21C 1/28 . . . Two-region reactors
- G21C 1/30 . Subcritical reactors; {Experimental reactors with exception of swimming-pool reactors or zero-energy reactors}
- G21C 1/303 . . {Experimental and irradiation arrangements inside the reactor (irradiation loops G21C 1/306; material testing by neutrons G01N 23/005)}
- G21C 1/306 . . {Irradiation loops}
- G21C 1/32 . Integral reactors, i.e. reactors wherein parts functionally associated with the reactor but not essential to the reaction, e.g. heat exchangers, are disposed inside the enclosure with the core (G21C 1/02 to G21C 1/30 take precedence)
- G21C 1/322 . . {wherein the heat exchanger is disposed above the core}
- G21C 1/324 . . {wherein the heat exchanger is disposed beneath the core}
- G21C 1/326 . . {wherein the heat exchanger is disposed next to or beside the core}
- G21C 1/328 . . {wherein the prime mover is also disposed in the vessel}
  
- G21C 3/00** **Reactor fuel elements and their assemblies; Selection of substances for use as reactor fuel elements**
- G21C 3/02 . Fuel elements {(manufacture thereof G21C 21/02)}
- G21C 3/04 . . Constructional details
- G21C 3/041 . . . {Means for removal of gases from fuel elements}
- G21C 3/042 . . . {Fuel elements comprising casings with a mass of granular fuel with coolant passages through them}
- G21C 3/044 . . . {Fuel elements with porous or capillary structure}
- G21C 2003/045 . . . {Pellets}
- G21C 2003/047 . . . . {Pellet-clad interaction}
- G21C 2003/048 . . . . {Shape of pellets}
- G21C 3/06 . . Casings; Jackets
- G21C 3/07 . . . characterised by their material, e.g. alloys
- G21C 3/08 . . . provided with external means to promote heat-transfer, e.g. fins, baffles
- G21C 3/10 . . . End closures; {Means for tight mounting therefor}
- G21C 3/105 . . . . {Flattened end-closures}
- G21C 3/12 . . . Means forming part of the element for locating it within the reactor core {(means not forming part of the element G21C 5/06)}
- G21C 3/14 . . . Means forming part of the element for inserting it into, or removing it from, the core; Means for coupling adjacent elements, {e.g. to form a stringer}
- G21C 3/16 . . Details of the construction within the casing
- G21C 3/17 . . . Means for storage or immobilisation of gases in fuel elements
- G21C 3/18 . . . Internal spacers or other non-active material within the casing, e.g. compensating for expansion of fuel rods or for compensating excess reactivity (interlayers G21C 3/20)
- G21C 3/20 . . . with coating on fuel or on inside of casing; with non-active interlayer between casing and active material {with multiple casings or multiple active layers}
- G21C 3/22 . . with fissile or breeder material in contact with coolant
- G21C 3/24 . . with fissile or breeder material in fluid form within a non-active casing

G21C 3/26	..	with fissile or breeder material in powder form within a non-active casing
G21C 3/28	..	with fissile or breeder material in solid form within a non-active casing
G21C 3/30	.	Assemblies of a number of fuel elements in the form of a rigid unit
G21C 3/32	..	Bundles of parallel pin-, rod-, or tube-shaped fuel elements
G21C 3/3206	...	{Means associated with the fuel bundle for filtering the coolant, e.g. nozzles, grids}
G21C 3/3213	...	{Means for the storage or removal of fission gases (means for the storage of fission gases in the elements <a href="#">G21C 3/16</a> ; means for the removal of fission gases from elements <a href="#">G21C 3/04</a> )}
G21C 3/322	...	Means to influence the coolant flow through or around the bundles
G21C 2003/3225	....	{by waterrods}
G21C 3/324	...	Coats or envelopes for the bundles
G21C 3/3245	....	{made of moderator material}
G21C 3/326	...	comprising fuel elements of different composition; comprising, in addition to the fuel elements, other pin-, rod-, or tube-shaped elements, e.g. control rods, grid support rods, fertile rods, poison rods or dummy rods
G21C 2003/3262	....	{Enrichment distribution in zones}
G21C 2003/3265	.....	{Radial distribution}
G21C 2003/3267	.....	{Axial distribution}
G21C 3/328	....	Relative disposition of the elements in the bundle lattice
G21C 3/33	...	Supporting or hanging of elements in the bundle ( <a href="#">spacer grids G21C 3/34</a> ); Means forming part of the bundle for inserting it into, or removing it from, the core; Means for coupling adjacent bundles
G21C 3/3305	....	{Lower nozzle}
G21C 3/331	....	{Comprising hold-down means, e.g. springs}
G21C 3/3315	....	{Upper nozzle}
G21C 3/332	....	Supports for spacer grids
G21C 3/334	...	Assembling {, maintenance or repair of} the bundles {(assembling, maintenance or repair of other reactor components <a href="#">G21C 19/207</a> )}
G21C 3/335	...	Exchanging elements in irradiated bundles
G21C 3/336	...	Spacer elements for fuel rods in the bundle ( <a href="#">spacer grids G21C 3/34</a> )
G21C 3/338	....	Helicoidal spacer elements
G21C 3/34	...	Spacer grids
G21C 3/3408	....	{Compact spacer grids, e.g. made of a plate or a blade}
G21C 3/3416	....	{Spacer grids formed by metallic wires, e.g. springs}
G21C 3/3424	....	{Fabrication of spacer grids}
G21C 2003/3432	....	{Grids designed to influence the coolant, i.e. coolant mixing function}
G21C 3/344	....	formed of assembled tubular elements
G21C 3/348	....	formed of assembled non-intersecting strips
G21C 3/352	....	formed of assembled intersecting strips
G21C 3/356	....	being provided with fuel element supporting members
G21C 3/3563	.....	{Supporting members formed only by deformations in the strips}

- G21C 3/3566 . . . . . {Supporting members formed only of elements fixed on the strips}
- G21C 3/36 . . Assemblies of plate-shaped fuel elements or coaxial tubes
- G21C 3/38 . Fuel units consisting of a single fuel element in a supporting sleeve {or in another supporting element}
- G21C 3/40 . Structural combination of fuel element with thermoelectric element for direct production of electric energy from fission heat (for temperature measurement [G21C 17/10](#) ) {or with another arrangement for direct production of electric energy, e.g. a thermionic device (combination with thermoelements for temperature measurements [G21C 17/102](#))}
- G21C 3/42 . Selection of substances for use as reactor fuel
- G21C 3/44 . . Fluid or fluent reactor fuel
- G21C 3/46 . . . Aqueous compositions
- G21C 3/48 . . . . True or colloidal solutions of the active constituent
- G21C 3/50 . . . . Suspensions of the active constituent; Slurries
- G21C 3/52 . . . Liquid metal compositions
- G21C 3/54 . . . Fused salt, oxide or hydroxide compositions
- G21C 3/56 . . . Gaseous compositions; Suspensions in a gaseous carrier
- G21C 3/58 . . Solid reactor fuel {Pellets made of fissile material}
- G21C 3/60 . . . Metallic fuel; Intermetallic dispersions
- G21C 3/62 . . . Ceramic fuel
- G21C 3/623 . . . . {Oxide fuels}
- G21C 3/626 . . . . {Coated fuel particles}
- G21C 3/64 . . . . Ceramic dispersion fuel, e.g. cermet
  
- G21C 5/00 Moderator or core structure; Selection of materials for use as moderator**
- G21C 5/02 . Details
- G21C 5/04 . . Spatial arrangements allowing for Wigner growth
- G21C 5/06 . . Means for locating or supporting fuel elements {(means forming part of the element [G21C 3/12](#))}
- G21C 5/08 . . Means for preventing undesired asymmetric expansion of the complete structure; {Stretching devices, pins}
- G21C 5/10 . . Means for supporting the complete structure {(arrangements for supporting vessels and core-structures [G21C 13/024](#))}
- G21C 5/12 . characterised by composition, e.g. the moderator containing additional substances which ensure improved heat resistance of the moderator {(purification of fluid moderators during the operation of the reactor [G21C 19/30](#))}
- G21C 5/123 . . {Moderators made of organic materials}
- G21C 5/126 . . {Carbonic moderators (carbon and graphite in general [C01B 31/00](#); refractory carbon-bulbs [C04B 35/00](#); carbon electrodes [C25B](#))}
- G21C 5/14 . characterised by shape
- G21C 5/16 . . Shape of its constituent parts
- G21C 5/18 . characterised by the provision of more than one active zone
- G21C 5/20 . . wherein one zone contains fissile material and another zone contains breeder material

G21C 5/22	.. wherein one zone is a superheating zone
<b>G21C 7/00</b>	<b>Control of nuclear reaction</b>
G21C 7/005	. {Flux flattening}
G21C 7/02	. by using self-regulating properties of reactor materials, {e.g. Doppler effect} (arrangements that involve temperature stability G21C 7/32)
G21C 7/04	.. of burnable poisons (burnable poisons in fuel rods G21C 3/326)
G21C 7/06	. by application of neutron-absorbing material, i.e. material with absorption cross-section very much in excess of reflection cross-section
G21C 7/08	.. by displacement of solid control elements, e.g. control rods
G21C 7/10	... Construction of control elements
G21C 7/103	.... Control assemblies containing one or more absorbants as well as other elements, e.g. fuel or moderator elements
G21C 7/107	.... Control elements adapted for pebble-bed reactors
G21C 7/11	.... Deformable control elements, e.g. flexible, telescopic, articulated
G21C 7/113	.... Control elements made of flat elements; Control elements having cruciform cross-section
G21C 7/117	.... Clusters of control rods; Spider construction
G21C 7/12	... Means for moving control elements to desired position (dropping rods in an emergency G21C 9/02)
G21C 7/14	.... Mechanical drive arrangements
G21C 7/16	.... Hydraulic or pneumatic drive
G21C 7/18	... Means for obtaining differential movement of control elements
G21C 7/20	... Disposition of shock-absorbing devices (shock-absorbers in general F16F ) {Braking arrangements}
G21C 7/22	.. by displacement of a fluid or fluent neutron-absorbing material, {e.g. by adding neutron-absorbing material to the coolant}
G21C 7/24	.. Selection of substances for use as neutron-absorbing material
G21C 7/26	. by displacement of the moderator or parts thereof {by changing the moderator concentration}
G21C 7/27	.. Spectral shift control
G21C 7/28	. by displacement of the reflector or parts thereof
G21C 7/30	. by displacement of the reactor fuel or fuel elements
G21C 7/32	. by varying flow of coolant through the core {by adjusting the coolant or moderator temperature}
G21C 7/34	. by utilisation of a primary neutron source
G21C 7/36	. Control circuits
<b>G21C 9/00</b>	<b>Emergency protection arrangements structurally associated with the reactor {e.g. safety valves provided with pressure equalisation devices} (emergency cooling arrangements G21C 15/18)</b>
G21C 9/001	. {against explosions e.g. blast shields}
G21C 9/002	. {against Na- or Ka- reactions}
G21C 9/004	. Pressure suppression

- G21C 9/008 .. by rupture-discs or -diaphragms
- G21C 9/012 .. by thermal accumulation or by steam condensation, e.g. ice condensers
- G21C 9/016 . Core catchers
- G21C 9/02 . Means for effecting very rapid reduction of the reactivity factor under fault conditions, e.g. reactor fuse; {Control elements having arrangements activated in an emergency} (control elements per se [G21C 7/00](#))
- G21C 9/022 .. {Reactor fuses}
- G21C 9/024 .. {Rupture diaphragms}
- G21C 9/027 .. by fast movement of a solid, e.g. pebbles
- G21C 9/033 .. by an absorbent fluid
- G21C 9/04 . Means for suppressing fires {Earthquake protection}
- G21C 9/06 .. Means for preventing accumulation of explosives gases, e.g. recombiners

**G21C 11/00****Shielding structurally associated with the reactor**

- G21C 11/02 . Biological shielding (in general [G21F](#) ) {Neutron or gamma shielding}
- G21C 11/022 .. {inside the reactor vessel}
- G21C 11/024 ... {structurally combined with the casing}
- G21C 11/026 .. {in apertures or channels through a wall}
- G21C 11/028 .. {characterised by the form or by the material}
- G21C 11/04 .. on waterborne craft
- G21C 11/06 . Reflecting shields, i.e. for minimising loss of neutrons
- G21C 11/08 . Thermal shields; Thermal linings, i.e. for dissipating heat from gamma radiation which would otherwise heat an outer biological shield {Thermal insulation}
- G21C 11/081 .. {consisting of a non-metallic layer of insulating material}
- G21C 11/083 .. {consisting of one or more metallic layers}
- G21C 11/085 ... {consisting exclusively of several metallic layers}
- G21C 11/086 .. {consisting of a combination of non-metallic and metallic layers, e.g. metal-sand-metal-concrete}
- G21C 11/088 .. {consisting of a stagnant or a circulating fluid}

**G21C 13/00****Pressure vessels; Containment vessels; Containment in general (for chemical or physical processes [B01J 3/00](#); pressure vessels in general [F16J 12/00](#))**

- G21C 13/02 . Details
- G21C 13/022 .. {Ventilating arrangements}
- G21C 13/024 .. Supporting constructions for pressure vessels or containment vessels
- G21C 13/028 .. Seals, e.g. for pressure vessels or containment vessels
- G21C 13/0285 ... {for container apertures}
- G21C 13/032 .. Joints between tubes and vessel walls, e.g. taking into account thermal stresses
- G21C 13/036 ... the tube passing through the vessel wall, i.e. continuing on both sides of the wall
- G21C 13/04 .. Arrangements for expansion and contraction
- G21C 13/06 .. Sealing-plugs (for pressure vessels in general [F16J 13/00](#))

G21C 2013/063	...	{Seals for closures or for rotatable closures}
G21C 13/067	...	for tubes, e.g. standpipes; Locking devices for plugs
G21C 13/0675	....	{Seals for the plugs}
G21C 13/073	...	Closures for reactor-vessels, e.g. rotatable
G21C 13/0735	....	{Seals for closures or for rotatable closures}
G21C 13/08	.	Vessels characterised by the material; Selection of materials for pressure vessels
G21C 13/087	..	Metallic vessels
G21C 13/0875	...	{Tube-type vessels, e.g. for not essentially pressurised coolants}
G21C 13/093	..	Concrete vessels
G21C 13/0933	...	{made of prestressed concrete}
G21C 13/0936	....	{Particulars concerning prestressing devices and cables}
G21C 13/10	.	Means for preventing contamination in the event of leakage, {e.g. double wall}
<b>G21C 15/00</b>	<b>Cooling arrangements within the pressure vessel containing the core; Selection of specific coolants</b>	
G21C 15/02	.	Arrangements or disposition of passages in which heat is transferred to the coolant; {Coolant flow control devices (G21C 19/04 takes precedence; coolant flow control through fuel assemblies, e.g. flow restrictors G21C 3/322)}
G21C 15/04	..	from fissile or breeder material {(G21C 3/32 takes precedence)}
G21C 15/06	...	in fuel elements
G21C 15/08	..	from moderating material
G21C 15/10	..	from reflector or thermal shield
G21C 15/12	..	from pressure vessel; from containment vessel
G21C 15/14	..	from headers; from joints in ducts
G21C 15/16	.	comprising means for separating liquid and steam (separating in general B01D; steam traps F16D)
G21C 15/18	.	Emergency cooling arrangements; Removing shut-down heat
G21C 15/182	..	{comprising powered means, e.g. pumps}
G21C 2015/185	...	{using energy stored in reactor system}
G21C 2015/187	...	{using energy from the electric grid}
G21C 15/20	.	Partitions or thermal insulation between fuel channel and moderator
G21C 15/22	.	Structural association of coolant tubes with headers (joints of tubes in general F16L)
G21C 15/24	.	Promoting flow of the coolant (electrodynamic pumps H02K 44/02)
G21C 15/243	..	for liquids
G21C 15/247	...	for liquid metals
G21C 15/25	...	using jet pumps
G21C 15/253	..	for gases, e.g. blowers
G21C 15/257	..	using heat-pipes {(in general F28D, F28F)}
G21C 15/26	..	by convection, e.g. using chimneys, using divergent channels



- G21C 15/28
- . Selection of specific coolants (if serving as the moderator [G21C 5/12](#); compositions per se [C09K 5/00](#); {organic coolants [G21C 5/123](#)}); {Additions to the reactor coolants, e.g. against moderator corrosion (purification and regeneration of the reactor coolants [G21C 19/30](#))}
- G21C 17/00**
- Monitoring; Testing** (measuring in general [G01](#)); **{Maintaining}**
- G21C 17/001
- . {Mechanical simulators (electrical or magnetic simulators [G06G 7/54](#))}
- G21C 17/002
- . {Detection of leaks (by testing the coolant or the moderator [G21C 17/04](#))}
- G21C 17/003
- . Remote inspection of vessels, e.g. pressure vessels
- G21C 17/007
- .. Inspection of the outer surfaces of vessels
- G21C 17/01
- .. Inspection of the inner surfaces of vessels
- G21C 17/013
- .. Inspection vehicles
- G21C 17/017
- . Inspection or maintenance of pipe-lines or tubes in nuclear installations
- G21C 17/02
- . Devices or arrangements for monitoring coolant or moderator
- G21C 17/021
- .. {Solid moderators testing, e.g. graphite}
- G21C 17/022
- .. for monitoring liquid coolants or moderators
- G21C 17/0225
- ... {Chemical surface treatment, e.g. corrosion (corrosion prevention in presence of water from scale removal or by modification of the properties of the liquid [C02F 5/00](#); inhibiting corrosion by adding corrosion inhibitors [C23F 11/00](#))}
- G21C 17/025
- ... for monitoring liquid metal coolants {(molten metal sampling in general [G01N 1/125](#))}
- G21C 17/0255
- .... {Liquid metal leaks detection (detecting leaks in pipe-line systems in general [F17D 5/00](#))}
- G21C 17/028
- .. for monitoring gaseous coolants
- G21C 17/032
- .. Reactor-coolant flow measuring or monitoring {(measuring volume or mass flow in general [G01F](#))}
- G21C 17/035
- .. Moderator- or coolant-level detecting devices {(indicating or measuring liquid level in general [G01F 23/00](#))}
- G21C 17/038
- .. Boiling detection in moderator or coolant
- G21C 17/04
- .. Detecting burst slugs
- G21C 17/041
- ... {characterised by systems for checking the coolant channels, e.g. matrix systems}
- G21C 17/042
- ... {Devices for selective sampling, e.g. valves, shutters, rotatable selector valves}
- G21C 17/044
- ... {Detectors and metering devices for the detection of fission products}
- G21C 17/045
- .... {Precipitation chambers}
- G21C 17/047
- .... {Detection and metering circuits}
- G21C 17/048
- ... {characterised by a special construction of fuel elements, e.g. by a confined "tracer"}
- G21C 17/06
- . Devices or arrangements for monitoring or testing fuel or fuel elements outside the reactor core, e.g. for burn-up, for contamination ([G21C 17/08](#), [G21C 17/10](#) take precedence; detecting leaking fuel elements during reactor operation [G21C 17/04](#))
- G21C 17/063
- .. {Burn-up control ([G21C 17/066](#) takes precedence)}
- G21C 17/066
- .. {Control of spherical elements}
- G21C 17/07
- .. Leak testing



- G21C 17/08 . Structural combination of reactor core or moderator structure with viewing means, e.g. with television camera, periscope, window
- G21C 17/10 . Structural combination of fuel element, control rod, reactor core, or moderator structure with sensitive instruments, e.g. for measuring radioactivity, strain
- G21C 17/102 . . {the sensitive element being part of a fuel element or a fuel assembly (structural combination with a thermoelectric element for direct production of electrical energy G21C 3/40)}
- G21C 17/104 . . Measuring reactivity
- G21C 17/108 . . Measuring reactor flux
- G21C 17/112 . . Measuring temperature
- G21C 17/116 . . Passages or insulators, e.g. for electric cables
- G21C 17/12 . . Sensitive element forming part of control element
- G21C 17/14 . Period meters
- G21C 19/00 Arrangements for treating, for handling, or for facilitating the handling of, fuel or other materials which are used within the reactor, e.g. within its pressure vessel**
- G21C 19/02 . Details of handling arrangements
- G21C 19/04 . . Means for controlling flow of coolant over objects being handled; Means for controlling flow of coolant through channel being serviced, {e.g. for preventing "blow-out"}
- G21C 19/06 . . Magazines for holding fuel elements or control elements
- G21C 19/065 . . . {Rotatable magazines}
- G21C 19/07 . . . Storage racks; Storage pools
- G21C 19/08 . . Means for heating fuel elements before introduction into the core; Means for heating or cooling fuel elements after removal from the core
- G21C 19/10 . . Lifting devices or pulling devices adapted for co-operation with fuel elements or with control elements (manipulators B25J)
- G21C 19/105 . . . with grasping or spreading coupling elements
- G21C 19/11 . . . with revolving coupling elements, e.g. socket coupling
- G21C 19/115 . . . with latching devices and ball couplings
- G21C 19/12 . . Arrangements for exerting direct hydraulic or pneumatic force on fuel element or on control element
- G21C 19/14 . characterised by their adaptation for use with horizontal channels in the reactor core
- G21C 19/16 . Articulated or telescopic chutes or tubes for connection to channels in the reactor core
- G21C 19/18 . Apparatus for bringing fuel elements to the reactor charge area, e.g. from a storage place
- G21C 19/19 . Reactor parts specifically adapted to facilitate handling, e.g. to facilitate charging or discharging of fuel elements
- G21C 19/20 . Arrangements for introducing objects into the pressure vessel; Arrangements for handling objects within the pressure vessel; Arrangements for removing objects from the pressure vessel
- G21C 19/202 . . {Arrangements for handling ball-form, i.e. pebble fuel}
- G21C 19/205 . . {Interchanging of fuel elements in the core, i.e. fuel shuffling}

- G21C 19/207 .. {Assembling, maintenance or repair of reactor components ([G21C 3/334 takes precedence](#))}
- G21C 19/22 .. Arrangements for obtaining access to the interior of a pressure vessel whilst the reactor is operating
- G21C 19/24 ... by using an auxiliary vessel which is temporarily sealed to the pressure vessel
- G21C 19/26 . Arrangements for removing jammed or damaged fuel elements or control elements; Arrangements for moving broken parts thereof
- G21C 19/28 . Arrangements for introducing fluent material into the reactor core; Arrangements for removing fluent material from the reactor core ([pumping coolant G21D](#))
- G21C 19/30 .. with continuous purification of circulating fluent material, e.g. by extraction of fission products {deterioration or corrosion products, impurities, e.g. by cold traps ([purification of circulating fluid fuels G21C 19/50](#); [separation in general B01D](#))}
- G21C 19/303 ... specially adapted for gases ([decontamination of gases G21F 9/02](#))
- G21C 19/307 ... specially adapted for liquids ([decontamination of liquids G21F 9/04](#))
- G21C 19/31 .... for molten metals
- G21C 19/313 ..... using cold traps
- G21C 19/317 ... Recombination devices for radiolytic dissociation products
- G21C 19/32 . Apparatus for removing radioactive objects or materials from the reactor discharge area, e.g. to a storage place; Apparatus for handling radioactive objects or materials within a storage place or removing them therefrom ([disposal of waste material G21F 9/00](#))
- G21C 19/34 . Apparatus or processes for dismantling nuclear fuel, e.g. before reprocessing; {Apparatus or processes for dismantling strings of spent fuel elements} ([shielded cells G21F 7/00](#))
- G21C 19/36 .. Mechanical means only
- G21C 19/365 ... Removing cannings or casings from fuel
- G21C 19/37 .... by separating into pieces both the canning or the casing and the fuel element, e.g. by cutting or shearing
- G21C 19/375 ... Compacting devices, e.g. for fuel assemblies
- G21C 19/38 .. Chemical means only
- G21C 19/40 . Arrangements for preventing occurrence of critical conditions, e.g. during storage
- G21C 19/42 . Reprocessing of irradiated fuel
- G21C 19/44 .. of irradiated solid fuel
- G21C 19/46 ... Aqueous processes, {e.g. by using organic extraction means, including the regeneration of these means}
- G21C 19/48 ... Non-aqueous processes
- G21C 19/50 .. of irradiated fluid fuel, {e.g. regeneration of fuels while the reactor is in operation}
- G21C 21/00** **Apparatus or processes specially adapted to the manufacture of reactors or parts thereof** ([in general section B, e.g. B23](#))
- G21C 21/02 . Manufacture of fuel elements or breeder elements contained in non-active casings
- G21C 21/04 .. by vibrational compaction or tamping {of fuel in the jacket}
- G21C 21/06 .. by {rotatable} swaging {of the jacket around the fuel}
- G21C 21/08 .. by a slip-fit cladding process {by crimping the jacket around the fuel}

- G21C 21/10 . . by extrusion, drawing, or stretching {by rolling, e.g. "picture frame" technique}
- G21C 21/12 . . by hydrostatic or thermo-pneumatic canning {in general by pressing without lengthening, e.g. explosive coating}
- G21C 21/14 . . by plating {the fuel} in a fluid
- G21C 21/16 . . by casting or dipping techniques
- G21C 21/18 . Manufacture of control elements covered by group [G21C 7/00](#)
- G21C 23/00** **Adaptations of reactors to facilitate experimentation or irradiation**