

CPC**COOPERATIVE PATENT CLASSIFICATION****H05H**

PLASMA TECHNIQUE (fusion reactors [G21B](#); ion-beam tubes [H01J 27/00](#); magnetohydrodynamic generators [H02K 44/08](#); producing X-rays involving plasma generation [H05G 2/00](#)); **PRODUCTION OF ACCELERATED ELECTRICALLY-CHARGED PARTICLES OR OF NEUTRONS** (obtaining neutrons from radioactive sources [G21](#), e.g. [G21B](#), [G21C](#), [G21G](#)); **PRODUCTION OR ACCELERATION OF NEUTRAL MOLECULAR OR ATOMIC BEAMS** (atomic clocks [G04F 5/14](#); devices using stimulated emission [H01S](#); frequency regulation by comparison with a reference frequency determined by energy levels of molecules, atoms, or subatomic particles [H03L 7/26](#))

H05H 1/00**Generating plasma; Handling plasma**

- H05H 1/0006 . {Investigating plasma, e.g. degree of ionisation (electron temperature)}
- H05H 1/0012 .. {by using radiation}
- H05H 1/0018 ... {Details}
- H05H 1/0025 ... {by using photoelectric means ([H05H 1/0031](#) to [H05H 1/0043](#) take precedence)}
- H05H 1/0031 ... {by interferrometry}
- H05H 1/0037 ... {by spectrometry (see [G01N 3/00](#))}
- H05H 1/0043 ... {by using infra-red or ultra-violet radiation}
- H05H 1/005 ... {by using X-rays or alpha rays (see [G01N 23/00](#))}
- H05H 1/0056 ... {by using neutrons (see [G01N 23/00](#))}
- H05H 1/0062 ... {by using microwaves (see [G01N 23/223](#))}
- H05H 1/0068 .. {by thermal means (see [G01N 25/00](#))}
- H05H 1/0075 ... {Langmuir probes}
- H05H 1/0081 .. {by electric means (see [G01N 27/00](#), [G01R](#))}
- H05H 1/0087 .. {by magnetic means (see [G01N 27/00](#), [G01R](#))}
- H05H 1/0093 .. {by acoustic, e.g. ultrasonic means (see [G01N 29/02](#))}

- H05H 1/02 . Arrangements for confining plasma by electric or magnetic fields; Arrangements for heating plasma ({[G21B 1/00](#) takes precedence;} electron optics [H01J](#))
- H05H 1/03 .. using electrostatic fields
- H05H 1/04 .. using magnetic fields substantially generated by the discharge in the plasma
- H05H 1/06 ... longitudinal pinch devices
- H05H 1/08 ... Theta pinch devices {e.g. SCYLLA}
- H05H 1/10 .. using externally-applied magnetic field only {e.g. Q-machines, Yin-Yang, base-ball}
- H05H 1/105 ... {using magnetic pumping}
- H05H 1/11 ... using cusp configuration ([H05H 1/14](#) takes precedence)
- H05H 1/12 ... wherein the containment vessel forms a closed or nearly closed loop ({[G21B 1/05](#) takes precedence)}

- H05H 1/14 ... wherein the containment vessel is straight and has magnetic mirrors {[electron mirrors G21K 1/08B](#)}
- H05H 1/16 .. using externally-applied electric and magnetic field
- H05H 1/18 ... wherein the field oscillate at very high frequency, e.g. in the microwave range {e.g. using cyclotron resonance}
- H05H 1/20 .. Ohmic heating
- H05H 1/22 .. for injection heating {(G21B 1/15 takes precedence)}
- H05H 1/24 . Generating plasma {(gas-filled discharge reactors [H01J 37/32](#); nuclear fusion reactors [G21B 1/00](#); ohmic heating [H05H 1/20](#); injection heating [H05H 1/22](#))}
- H05H 1/2406 .. { Dielectric barrier discharges }
- H05H 2001/2412 ... {the dielectric being interposed between the electrodes }
- H05H 2001/2418 ... {the electrodes being embedded in the dielectric }
- H05H 2001/2425 ... {the electrodes being flush with the dielectric }
- H05H 2001/2431 ... {Cylindrical electrodes }
- H05H 2001/2437 ... {Multilayer systems }
- H05H 2001/2443 ... {Flow through, i.e. the plasma fluid flowing in a dielectric tube }
- H05H 2001/245 {Internal electrodes }
- H05H 2001/2456 {External electrodes }
- H05H 2001/2462 {Ring electrodes }
- H05H 2001/2468 {Spiral electrodes }
- H05H 1/2475 .. { Acoustic pressure discharge }
- H05H 2001/2481 ... {Piezoelectric actuators }
- H05H 2001/2487 ... {Mechanical actuators }
- H05H 2001/2493 ... {Horns }
- H05H 1/26 .. Plasma torches {(metal working with constricted arc [B23K 10/00](#), [H05H 10/02](#); metal spraying [B05B 7/18](#), [B05B 7/20](#))}
- H05H 1/28 ... Cooling arrangements
- H05H 1/30 ... using applied electromagnetic fields, e.g. high frequency or microwave energy ([H05H 1/28](#) takes precedence)
- H05H 1/32 ... using an arc ([H05H 1/28](#) takes precedence)
- H05H 1/34 Details, e.g. electrodes, nozzles {cf. [B23K 9/24](#)}
- H05H 1/3405 {Arc stabilising or constricting arrangements, e.g. by an additional gas flow (by externally applied magnetic field [H05H 1/40](#); by using powders or liquids [H05H 1/42](#); using coaxial protecting fluid [H05H 1/341](#))}
- H05H 1/341 {using coaxial protecting fluid (arc stabilising or constricting arrangements [H05H 1/3405](#); introducing materials into the plasma [H05H 1/42](#))}
- H05H 2001/3415 {indexing scheme associated with [H05H 1/34](#)}
- H05H 2001/3421 {transferred arc mode}
- H05H 2001/3426 {pilot arc}
- H05H 2001/3431 {coaxial cylindrical electrodes}
- H05H 2001/3436 {hollow cathode with internal coolant flow }

H05H 2001/3442	.....	{cathode with inserted tip}
H05H 2001/3447	.....	{rod-like cathode }
H05H 2001/3452	.....	{supplementary electrodes between cathode and anode, e.g. cascade }
H05H 2001/3457	.....	{nozzle protection devices}
H05H 2001/3463	.....	{oblique nozzle}
H05H 2001/3468	.....	{vortex generator}
H05H 2001/3473	.....	{safety means}
H05H 2001/3478	.....	{geometrical details}
H05H 2001/3484	.....	{convergent/divergent nozzle}
H05H 2001/3489	.....	{contact starting}
H05H 2001/3494	.....	{discharge parameter control }
H05H 1/36	.....	Circuit arrangements (H05H 1/38 , H05H 1/40 take precedence)
H05H 1/38	.....	Guiding or centering of electrodes
H05H 1/40	.....	using applied magnetic fields, e.g. for focusing or rotating the arc {cf. B23K 9/08 , B23K 9/073 }
H05H 1/42	....	with provision for introducing materials into the plasma, e.g. powder, liquid (electrostatic spraying, spraying apparatus with means for charging the spray electrically B05B 5/00){cf. B23K 9/324 , B05B 7/22 ; arc stabilising or constricting arrangements H05H 1/3405 ; coaxial protecting fluids H05H 1/341 }
H05H 1/44	....	using more than one torch
H05H 1/46	..	using applied electromagnetic fields, e.g. high frequency or microwave energy (H05H 1/26 takes precedence)
H05H 2001/4607	...	{Microwave discharges }
H05H 2001/4615	....	{Surface waves }
H05H 2001/4622	....	{Waveguides }
H05H 2001/463	....	{Antennas or applicators }
H05H 2001/4637	....	{Cables }
H05H 2001/4645	...	{Radiofrequency discharges }
H05H 2001/4652	....	{Inductively coupled }
H05H 2001/466	.....	{Electrodes }
H05H 2001/4667	.....	{Coiled antennas }
H05H 2001/4675	....	{Capacitively coupled }
H05H 2001/4682	....	{Associated power generators, e. G. Circuits, matching networks }
H05H 2001/469	...	{Flow through, i.e the plasma fluid flowing in a non-dielectric vessel }
H05H 2001/4692	....	{dielectric barrier discharge (H05H 1/2406 takes precedence)}
H05H 2001/4695	....	{Arc discharge }
H05H 2001/4697	....	{Glow discharge }
H05H 1/48	..	using an arc (H05H 1/26 takes precedence)
H05H 2001/481	...	{Corona discharges }
H05H 2001/483	....	{Pointed electrodes }

- H05H 2001/485 {Cylindrical electrodes, e.g. Rotary drums electrodes }
- H05H 2001/486 {Filamentary electrodes }
- H05H 2001/488 {Segmented electrodes }
- H05H 1/50 . . . and using applied magnetic fields, e.g. for focusing or rotating the arc
- H05H 1/52 . . . using exploding wires or spark gaps ([H05H 1/26](#) takes precedence; spark gaps in general [H01T](#))
- H05H 1/54 . . Plasma accelerators
- H05H 3/00** **Production or acceleration of neutral particle beams, e.g. molecular or atomic beams**
- H05H 3/02 . . Molecular or atomic beam generation {(charge exchange devices [G21K 1/14](#); polarising devices [G21K 1/16](#); using resonance or molecular beams for analysing or investigating materials [G01N 24/002](#); atomic clock [G04F 5/14](#); beam masers [H01S 1/06](#))}
- H05H 3/04 . . Acceleration by electromagnetic wave pressure
- H05H 3/06 . . Generating neutron beams (targets for producing nuclear reactions [H05H 6/00](#); neutron sources [G21G 4/02](#))
- H05H 5/00** **Direct voltage accelerators; Accelerators using single pulses ([H05H 3/06](#) takes precedence)**
- H05H 5/02 . . Details (targets for producing nuclear reactions [H05H 6/00](#))
- H05H 5/03 . . . Accelerating tubes (vessels or containers of electric discharge tubes with improved potential distribution over surface of vessel [H01J 5/06](#); shields of X-ray tubes associated with vessels or containers [H01J 35/16](#))
- H05H 5/04 . . { energised by electrostatic generators}
- H05H 5/042 . . . { of the van de Graaf type}
- H05H 5/045 . . . { High voltage cascades, e.g. Greinacher cascade}
- H05H 5/047 . . . { Pulsed generators}
- H05H 5/06 . . { Multistage accelerators}
- H05H 5/063 . . . { Tandems}
- H05H 5/066 . . . { Onion-like structures}
- H05H 5/08 . . Particle accelerators using step-up transformers, e.g. resonance transformers
- H05H 6/00** **Targets for producing nuclear reactions (supports for targets or objects to be irradiated [G21K 5/08](#)){preparation of tritium [C01B 4/00](#)}; {targets, e.g. pellets for fusion reactions by laser or charged particles beam injection [H05H 1/22](#)}**
- H05H 2006/002 . . {Windows }

- H05H 6/005 . {Polarised targets (polarising devices, e.g. for obtaining a polarised ion beam [G21K 1/16](#))}
- H05H 2006/007 . {Radiation protection arrangements , e.g. screens }
- H05H 7/00** **Details of devices of the types covered by groups [H05H 9/00](#), [H05H 11/00](#), [H05H 13/00](#)**
- H05H 7/001 . { Arrangements for beam delivery or irradiation (irradiation systems per se [G21K 5/00](#))}
- H05H 2007/002 .. {for modifying beam trajectory , e.g. gantries }
- H05H 2007/004 .. {for modifying beam energy, e.g. spread out Bragg peak devices }
- H05H 2007/005 .. {for modifying beam emittance , e.g. stochastic cooling devices, stripper foils }
- H05H 2007/007 .. {for focusing the beam to irradiation target }
- H05H 2007/008 .. {for measuring beam parameters }
- H05H 7/02 . Circuits or systems for supplying or feeding radio-frequency energy (radio-frequency generators [H03B](#))
- H05H 2007/022 .. {Pulsed systems }
- H05H 2007/025 .. {Radiofrequency systems }
- H05H 2007/027 .. {Microwave systems }
- H05H 7/04 . Magnet systems {e.g. undulators, wigglers (free-electron laser [H01S 3/0903](#))}; Energisation thereof
- H05H 2007/041 .. {for beam bunching , e.g. undulators }
- H05H 2007/043 .. {for beam focusing }
- H05H 2007/045 .. {for beam bending }
- H05H 2007/046 .. {for beam deflection }
- H05H 2007/048 .. {for modifying beam trajectory , e.g. gantry systems }
- H05H 7/06 . Two-beam arrangements; Multi-beam arrangements {storage rings}; Electron rings
- H05H 2007/065 .. {Multi-beam merging , e.g. funneling }
- H05H 7/08 . Arrangements for injecting particles into orbits
- H05H 2007/081 .. {Sources }
- H05H 2007/082 ... {Ion sources, e.g. ECR, duoplasmatron, PIG, laser sources }
- H05H 2007/084 ... {Electron sources }
- H05H 2007/085 .. {by electrostatic means }
- H05H 2007/087 .. {by magnetic means }
- H05H 2007/088 .. {by mechanical means, e.g. stripping foils }
- H05H 7/10 . Arrangements for ejecting particles from orbits
- H05H 7/12 . Arrangements for varying final energy of beam

- H05H 2007/122 . . {by electromagnetic means , e.g. RF cavities }
- H05H 2007/125 . . {by mechanical means , e.g. stripping foils }
- H05H 2007/127 . . {by emittance variation , e.g. stochastic cooling }

- H05H 7/14 . Vacuum chambers ([H05H 5/03](#) takes precedence)
- H05H 7/16 . . of the waveguide type
- H05H 7/18 . . Cavities; Resonators {(travelling-wave tubes [H01J 23/18](#); hyperfrequency cavities in general [H01P 7/04](#), [H01P 7/06](#))}
- H05H 7/20 . . . with superconductive walls

- H05H 7/22 . Details of linear accelerators, e.g. drift tubes ([H05H 7/02](#) to [H05H 7/20](#) take precedence)
- H05H 2007/222 . . {drift tubes }
- H05H 2007/225 . . {coupled cavities arrangements }
- H05H 2007/227 . . {power coupling , e.g. coupling loops }

- H05H 9/00 Linear accelerators**

- H05H 9/005 . { Dielectric wall accelerators}
- H05H 9/02 . Travelling-wave linear accelerators {travelling-wave tubes [H01J 25/34](#)}
- H05H 9/04 . Standing-wave linear accelerators
- H05H 9/041 . . { Hadron LINACS}
- H05H 9/042 . . . { Drift tube LINACS}
- H05H 9/044 . . . { Coupling cavity LINACS, e.g. side coupled}
- H05H 9/045 . . . { Radio frequency quadrupoles}
- H05H 9/047 . . . { Hybrid systems}
- H05H 9/048 . . { Lepton LINACS}

- H05H 11/00 Magnetic induction accelerators, e.g. betatrons**

- H05H 11/02 . Air-cored betatrons
- H05H 11/04 . Biased betatrons

- H05H 13/00 Magnetic resonance accelerators; Cyclotrons {(strophotrons, turbine tubes [H01J 25/62](#))}**

- H05H 13/005 . { Cyclotrons}
- H05H 13/02 . Synchrocyclotrons, i.e. frequency modulated cyclotrons
- H05H 13/04 . Synchrotrons

H05H 13/06	. Air-cored magnetic resonance accelerators
H05H 13/08	. Alternating-gradient magnetic resonance accelerators
H05H 13/085	.. { Fixed-field alternating gradient accelerators [FFAG]}
H05H 13/10	. Accelerators comprising one or more linear accelerating sections and bending magnets or the like to return the charged particles in a trajectory parallel to the first accelerating section, e.g. microtrons
H05H 15/00	Methods or devices for acceleration of charged particles not otherwise provided for
H05H 2240/00	Test
H05H 2240/10	. at atmospheric pressure
H05H 2240/20	. Non-thermal plasma
H05H 2242/00	Auxiliary systems
H05H 2242/10	. Cooling arrangements
H05H 2242/1005	.. Power supply other than for plasma torches
H05H 2245/00	test
H05H 2245/104	. spiral electrodes
H05H 2245/12	. Applications
H05H 2245/121	.. treatment of exhaust gas, e.g. Ambient air, ozonizers
H05H 2245/1215	... Exhaust gas
H05H 2245/122	.. medical applications { e.g. plasma scalpels, blades, bistouri}
H05H 2245/1225	... Sterilization of objects
H05H 2245/123	.. surface treatments
H05H 2245/1235	... coating of large volume items
H05H 2245/124	.. production of nanostructures
H05H 2245/125	.. portable devices
H05H 2277/00	Applications
H05H 2277/10	. Medical devices
H05H 2277/11	.. Radiotherapy
H05H 2277/113	... Diagnostic systems
H05H 2277/116	... Isotope production

- [H05H 2277/12](#) . Ion implantation
- [H05H 2277/13](#) . High energy applications , e.g. fusion
- [H05H 2277/14](#) . Portable devices
- [H05H 2277/1405](#) .. Detection systems