

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 interferometry }
- 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 23/34](#)) }
- 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 \(by externally applied magnetic fieldH05H 1/40; by using powders or liquidsH05H 1/42; using coaxial protecting fluidH05H 1/341 \)](#) }
- H05H 1/341 { [using coaxial protecting fluid \(arc stabilising or constricting arrangementsH05H 1/3405; introducing materials into the plasmaH05H 1/42 \)](#) }
- 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 9/06C5 }
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