

**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](#))

**Guidance heading:****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 23/34](#)) }
- 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 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

<a href="#">H05H 2001/3442</a>	.....	cathode with inserted tip
<a href="#">H05H 2001/3447</a>	.....	rod-like cathode
<a href="#">H05H 2001/3452</a>	.....	supplementary electrodes between cathode and anode, e.g. cascade
<a href="#">H05H 2001/3457</a>	.....	nozzle protection devices
<a href="#">H05H 2001/3463</a>	.....	oblique nozzle
<a href="#">H05H 2001/3468</a>	.....	vortex generator
<a href="#">H05H 2001/3473</a>	.....	safety means
<a href="#">H05H 2001/3478</a>	.....	geometrical details
<a href="#">H05H 2001/3484</a>	.....	convergent/divergent nozzle
<a href="#">H05H 2001/3489</a>	.....	contact starting
<a href="#">H05H 2001/3494</a>	.....	discharge parameter control
<a href="#">H05H 1/36</a>	.....	Circuit arrangements ( <a href="#">H05H 1/38</a> , <a href="#">H05H 1/40</a> take precedence)
<a href="#">H05H 1/38</a>	.....	Guiding or centering of electrodes
<a href="#">H05H 1/40</a>	.....	using applied magnetic fields, e.g. for focusing or rotating the arc {cf. <a href="#">B23K 9/08</a> , <a href="#">B23K 9/06C5</a> }
<a href="#">H05H 1/42</a>	....	with provision for introducing materials into the plasma, e.g. powder, liquid ( <a href="#">electrostatic spraying</a> , <a href="#">spraying apparatus with means for charging the spray electrically</a> <a href="#">B05B 5/00</a> ) {cf. <a href="#">B23K 9/324</a> , <a href="#">B05B 7/22</a> ; <a href="#">arc stabilising or constricting arrangements</a> <a href="#">H05H 1/3405</a> ; <a href="#">coaxial protecting fluids</a> <a href="#">H05H 1/341</a> }
<a href="#">H05H 1/44</a>	....	using more than one torch
<a href="#">H05H 1/46</a>	..	using applied electromagnetic fields, e.g. high frequency or microwave energy ( <a href="#">H05H 1/26</a> takes precedence)
<a href="#">H05H 2001/4607</a>	...	Microwave discharges
<a href="#">H05H 2001/4615</a>	....	Surface waves
<a href="#">H05H 2001/4622</a>	....	Waveguides
<a href="#">H05H 2001/463</a>	....	Antennas or applicators
<a href="#">H05H 2001/4637</a>	....	Cables
<a href="#">H05H 2001/4645</a>	...	Radiofrequency discharges
<a href="#">H05H 2001/4652</a>	....	Inductively coupled
<a href="#">H05H 2001/466</a>	.....	Electrodes
<a href="#">H05H 2001/4667</a>	.....	Coiled antennas
<a href="#">H05H 2001/4675</a>	....	Capacitively coupled
<a href="#">H05H 2001/4682</a>	....	Associated power generators, e. G. Circuits, matching networks
<a href="#">H05H 2001/469</a>	...	Flow through, i.e the plasma fluid flowing in a non-dielectric vessel
<a href="#">H05H 2001/4692</a>	....	dielectric barrier discharge ( <a href="#">H05H 1/2406</a> takes precedence)
<a href="#">H05H 2001/4695</a>	....	Arc discharge
<a href="#">H05H 2001/4697</a>	....	Glow discharge
<a href="#">H05H 1/48</a>	..	using an arc ( <a href="#">H05H 1/26</a> takes precedence)
<a href="#">H05H 2001/481</a>	...	Corona discharges
<a href="#">H05H 2001/483</a>	....	Pointed electrodes
<a href="#">H05H 2001/485</a>	....	Cylindrical electrodes, e.g. Rotary drums electrodes
<a href="#">H05H 2001/486</a>	....	Filamentary electrodes
<a href="#">H05H 2001/488</a>	....	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**

**Guidance heading:****H05H 2240/00****Test**

- H05H 2240/10 . at atmospheric pressure
- H05H 2240/20 . Non-thermal plasma

**Guidance heading:****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