

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

### H05 ELECTRIC TECHNIQUES NOT OTHERWISE PROVIDED FOR

**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](#))

#### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

<b>1/00</b>	<b>Generating plasma; Handling plasma</b>	1/14	. . . wherein the containment vessel is straight and has magnetic mirrors
1/0006	. {Investigating plasma, e.g. degree of ionisation (electron temperature)}	1/16	. . using externally-applied electric and magnetic fields
1/0012	. . {by using radiation}	1/18	. . . wherein the fields oscillate at very high frequency, e.g. in the microwave range {, e.g. using cyclotron resonance}
1/0018	. . . {Details}	1/20	. . Ohmic heating
1/0025	. . . {by using photoelectric means ( <a href="#">H05H 1/0031</a> - <a href="#">H05H 1/0043</a> take precedence)}	1/22	. . for injection heating {( <a href="#">G21B 1/15</a> takes precedence)}
1/0031	. . . {by interferometry}	1/24	. Generating plasma {(gas-filled discharge reactors <a href="#">H01J 37/32</a> ; nuclear fusion reactors <a href="#">G21B 1/00</a> ; ohmic heating <a href="#">H05H 1/20</a> ; injection heating <a href="#">H05H 1/22</a> )}
1/0037	. . . {by spectrometry (see <a href="#">G01N 3/00</a> )}	1/2406	. . {Dielectric barrier discharges}
1/0043	. . . {by using infra-red or ultra-violet radiation}	2001/2412	. . . {the dielectric being interposed between the electrodes}
1/005	. . . {by using X-rays or alpha rays (see <a href="#">G01N 23/00</a> )}	2001/2418	. . . {the electrodes being embedded in the dielectric}
1/0056	. . . {by using neutrons (see <a href="#">G01N 23/00</a> )}	2001/2425	. . . {the electrodes being flush with the dielectric}
1/0062	. . . {by using microwaves (see <a href="#">G01N 23/223</a> )}	2001/2431	. . . {Cylindrical electrodes}
1/0068	. . {by thermal means (see <a href="#">G01N 25/00</a> )}	2001/2437	. . . {Multilayer systems}
1/0075	. . . {Langmuir probes}	2001/2443	. . . {Flow through, i.e. the plasma fluid flowing in a dielectric tube}
1/0081	. . {by electric means (see <a href="#">G01N 27/00</a> , <a href="#">G01R</a> )}	2001/245	. . . . {Internal electrodes}
1/0087	. . {by magnetic means (see <a href="#">G01N 27/00</a> , <a href="#">G01R</a> )}	2001/2456	. . . . {External electrodes}
1/0093	. . {by acoustic, e.g. ultrasonic means (see <a href="#">G01N 29/02</a> )}	2001/2462	. . . . {Ring electrodes}
1/02	. Arrangements for confining plasma by electric or magnetic fields; Arrangements for heating plasma (( <a href="#">G21B 1/00</a> takes precedence; ) electron optics <a href="#">H01J</a> )	2001/2468	. . . . {Spiral electrodes}
1/03	. . using electrostatic fields	1/2475	. . {Acoustic pressure discharge}
1/04	. . using magnetic fields substantially generated by the discharge in the plasma	2001/2481	. . . {Piezoelectric actuators}
1/06	. . . Longitudinal pinch devices	2001/2487	. . . {Mechanical actuators}
1/08	. . . Theta pinch devices {, e.g. <a href="#">SCYLLA</a> }	2001/2493	. . . {Horns}
1/10	. . using externally-applied magnetic fields only {, e.g. Q-machines, Yin-Yang, base-ball}	1/26	. Plasma torches {(metal working with constricted arc <a href="#">B23K 10/00</a> , <a href="#">B23K 10/02</a> ; metal spraying <a href="#">B05B 7/18</a> , <a href="#">B05B 7/20</a> )}
1/105	. . . {using magnetic pumping}	1/28	. . . Cooling arrangements
1/11	. . . using cusp configuration ( <a href="#">H05H 1/14</a> takes precedence)		
1/12	. . . wherein the containment vessel forms a closed or nearly closed loop {( <a href="#">G21B 1/05</a> takes precedence)}		

- 1/30 . . . using applied electromagnetic fields, e.g. high frequency or microwave energy ([H05H 1/28](#) takes precedence)
- 1/32 . . . using an arc ([H05H 1/28](#) takes precedence)
- 1/34 . . . Details, e.g. electrodes, nozzles {(cf. [B23K 9/24](#))}
- 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](#))}
- 1/341 . . . . . {using coaxial protecting fluid (arc stabilising or constricting arrangements [H05H 1/3405](#); introducing materials into the plasma [H05H 1/42](#))}
- 2001/3415 . . . . . {indexing scheme associated with [H05H 1/34](#)}
- 2001/3421 . . . . . {transferred arc mode}
- 2001/3426 . . . . . {pilot arc}
- 2001/3431 . . . . . {coaxial cylindrical electrodes}
- 2001/3436 . . . . . {hollow cathode with internal coolant flow}
- 2001/3442 . . . . . {cathode with inserted tip}
- 2001/3447 . . . . . {rod-like cathode}
- 2001/3452 . . . . . {supplementary electrodes between cathode and anode, e.g. cascade}
- 2001/3457 . . . . . {nozzle protection devices}
- 2001/3463 . . . . . {oblique nozzle}
- 2001/3468 . . . . . {vortex generator}
- 2001/3473 . . . . . {safety means}
- 2001/3478 . . . . . {geometrical details}
- 2001/3484 . . . . . {convergent/divergent nozzle}
- 2001/3489 . . . . . {contact starting}
- 2001/3494 . . . . . {discharge parameter control}
- 1/36 . . . . . Circuit arrangements ([H05H 1/38](#), [H05H 1/40](#) take precedence)
- 1/38 . . . . . Guiding or centering of electrodes
- 1/40 . . . . . using applied magnetic fields, e.g. for focusing or rotating the arc {(cf. [B23K 9/08](#), [B23K 9/073](#))}
- 1/42 . . . . . with provisions 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](#))}
- 1/44 . . . . . using more than one torch
- 1/46 . . . using applied electromagnetic fields, e.g. high frequency or microwave energy ([H05H 1/26](#) takes precedence)
- 2001/4607 . . . {Microwave discharges}
- 2001/4615 . . . {Surface waves}
- 2001/4622 . . . {Waveguides}
- 2001/463 . . . {Antennas or applicators}
- 2001/4637 . . . {Cables}
- 2001/4645 . . . {Radiofrequency discharges}
- 2001/4652 . . . {Inductively coupled}
- 2001/466 . . . {Electrodes}
- 2001/4667 . . . {Coiled antennas}
- 2001/4675 . . . {Capacitively coupled}
- 2001/4682 . . . . . {Associated power generators, e. G. Circuits, matching networks}
- 2001/469 . . . {Flow through, i.e. the plasma fluid flowing in a non-dielectric vessel}
- 2001/4692 . . . . . {dielectric barrier discharge ([H05H 1/2406](#) takes precedence)}
- 2001/4695 . . . . . {Arc discharge}
- 2001/4697 . . . . . {Glow discharge}
- 1/48 . . . using an arc ([H05H 1/26](#) takes precedence)
- 2001/481 . . . {Corona discharges}
- 2001/483 . . . . . {Pointed electrodes}
- 2001/485 . . . . . {Cylindrical electrodes, e.g. Rotary drums electrodes}
- 2001/486 . . . . . {Filamentary electrodes}
- 2001/488 . . . . . {Segmented electrodes}
- 1/50 . . . and using applied magnetic fields, e.g. for focusing or rotating the arc
- 1/52 . . . using exploding wires or spark gaps ([H05H 1/26](#) takes precedence; spark gaps in general [H01T](#))
- 1/54 . . . Plasma accelerators
- 3/00 Production or acceleration of neutral particle beams, e.g. molecular or atomic beams**
- 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](#))}
- 3/04 . . . Acceleration by electromagnetic wave pressure
- 3/06 . . . Generating neutron beams (targets for producing nuclear reactions [H05H 6/00](#); neutron sources [G21G 4/02](#))
- 5/00 Direct voltage accelerators; Accelerators using single pulses ([H05H 3/06](#) takes precedence)**
- 5/02 . . . Details (targets for producing nuclear reactions [H05H 6/00](#))
- 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](#))
- 5/04 . . . energised by electrostatic generators
- 5/042 . . . {of the van de Graaf type}
- 5/045 . . . {High voltage cascades, e.g. Greinacher cascade}
- 5/047 . . . {Pulsed generators}
- 5/06 . . . Multistage accelerators
- 5/063 . . . {Tandems}
- 5/066 . . . {Onion-like structures}
- 5/08 . . . Particle accelerators using step-up transformers, e.g. resonance transformers
- 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](#))}**
- 2006/002 . . . {Windows}
- 6/005 . . . {Polarised targets (polarising devices, e.g. for obtaining a polarised ion beam [G21K 1/16](#))}
- 2006/007 . . . {Radiation protection arrangements, e.g. screens}
- 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](#))}
- 2007/002 . . {for modifying beam trajectory, e.g. gantries}
- 2007/004 . . {for modifying beam energy, e.g. spread out Bragg peak devices}
- 2007/005 . . {for modifying beam emittance, e.g. stochastic cooling devices, stripper foils}
- 2007/007 . . {for focusing the beam to irradiation target}
- 2007/008 . . {for measuring beam parameters}
- 7/02 . Circuits or systems for supplying or feeding radio-frequency energy ([radio-frequency generators H03B](#))
- 2007/022 . . {Pulsed systems}
- 2007/025 . . {Radiofrequency systems}
- 2007/027 . . {Microwave systems}
- 7/04 . Magnet systems {, e.g. undulators, wigglers ([free-electron laser H01S 3/0903](#))}; Energisation thereof
- 2007/041 . . {for beam bunching, e.g. undulators}
- 2007/043 . . {for beam focusing}
- 2007/045 . . {for beam bending}
- 2007/046 . . {for beam deflection}
- 2007/048 . . {for modifying beam trajectory, e.g. gantry systems}
- 7/06 . Two-beam arrangements; Multi-beam arrangements {storage rings}; Electron rings
- 2007/065 . . {Multi-beam merging, e.g. funneling}
- 7/08 . Arrangements for injecting particles into orbits
- 2007/081 . . {Sources}
- 2007/082 . . . {Ion sources, e.g. ECR, duoplasmatron, PIG, laser sources}
- 2007/084 . . . {Electron sources}
- 2007/085 . . {by electrostatic means}
- 2007/087 . . {by magnetic means}
- 2007/088 . . {by mechanical means, e.g. stripping foils}
- 7/10 . Arrangements for ejecting particles from orbits
- 7/12 . Arrangements for varying final energy of beam
- 2007/122 . . {by electromagnetic means, e.g. RF cavities}
- 2007/125 . . {by mechanical means, e.g. stripping foils}
- 2007/127 . . {by emittance variation, e.g. stochastic cooling}
- 7/14 . Vacuum chambers ([H05H 5/03](#) takes precedence)
- 7/16 . . of the waveguide type
- 7/18 . . Cavities; Resonators {(travelling-wave tubes [H01J 23/18](#); hyperfrequency cavities in general [H01P 7/04](#), [H01P 7/06](#))}
- 7/20 . . . with superconductive walls
- 7/22 . Details of linear accelerators, e.g. drift tubes ([H05H 7/02](#) - [H05H 7/20](#) take precedence)
- 2007/222 . . {drift tubes}
- 2007/225 . . {coupled cavities arrangements}
- 2007/227 . . {power coupling, e.g. coupling loops}
- 9/00 Linear accelerators**
- 9/005 . {Dielectric wall accelerators}
- 9/02 . Travelling-wave linear accelerators {(travelling-wave tubes [H01J 25/34](#))}
- 9/04 . Standing-wave linear accelerators
- 9/041 . . {Hadron LINACS}
- 9/042 . . . {Drift tube LINACS}
- 9/044 . . . {Coupling cavity LINACS, e.g. side coupled}
- 9/045 . . . {Radio frequency quadrupoles}
- 9/047 . . . {Hybrid systems}
- 9/048 . . {Lepton LINACS}
- 11/00 Magnetic induction accelerators, e.g. betatrons**
- 11/02 . Air-cored betatrons
- 11/04 . Biased betatrons
- 13/00 Magnetic resonance accelerators; Cyclotrons {(strophotrons, turbine tubes [H01J 25/62](#))}**
- 13/005 . {Cyclotrons}
- 13/02 . Synchrocyclotrons, i.e. frequency modulated cyclotrons
- 13/04 . Synchrotrons
- 13/06 . Air-cored magnetic resonance accelerators
- 13/08 . Alternating-gradient magnetic resonance accelerators
- 13/085 . . {Fixed-field alternating gradient accelerators [FFAG]}
- 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
- 15/00 Methods or devices for acceleration of charged particles not otherwise provided for**
- 2240/00 Test**
- 2240/10 . at atmospheric pressure
- 2240/20 . Non-thermal plasma
- 2242/00 Auxiliary systems**
- 2242/10 . Cooling arrangements
- 2242/1005 . . Power supply other than for plasma torches
- 2245/00 test**
- 2245/104 . spiral electrodes
- 2245/12 . Applications
- 2245/121 . . treatment of exhaust gas, e.g. Ambient air, ozonizers
- 2245/1215 . . . Exhaust gas
- 2245/122 . . medical applications {, e.g. plasma scalpels, blades, bistouri}
- 2245/1225 . . . Sterilization of objects
- 2245/123 . . surface treatments
- 2245/1235 . . . coating of large volume items
- 2245/124 . . production of nanostructures
- 2245/125 . . portable devices
- 2277/00 Applications**
- 2277/10 . Medical devices
- 2277/11 . . Radiotherapy
- 2277/113 . . . Diagnostic systems
- 2277/116 . . . Isotope production
- 2277/12 . Ion implantation
- 2277/13 . High energy applications, e.g. fusion
- 2277/14 . Portable devices
- 2277/1405 . . Detection systems