

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](#))

1/00	Generating plasma; Handling plasma	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)}
1/0006	. {Investigating plasma, e.g. degree of ionisation (electron temperature)}		
1/0012	. . {by using radiation}		
1/0018	. . . {Details}	1/2406	. . {Dielectric barrier discharges}
1/0025	. . . {by using photoelectric means (H05H 1/0031 - H05H 1/0043 take precedence)}	2001/2412	. . . {the dielectric being interposed between the electrodes}
1/0031	. . . {by interferometry}	2001/2418	. . . {the electrodes being embedded in the dielectric}
1/0037	. . . {by spectrometry (see G01N 3/00)}	2001/2425	. . . {the electrodes being flush with the dielectric}
1/0043	. . . {by using infra-red or ultra-violet radiation}	2001/2431	. . . {Cylindrical electrodes}
1/005	. . . {by using X-rays or alpha rays (see G01N 23/00)}	2001/2437	. . . {Multilayer systems}
1/0056	. . . {by using neutrons (see G01N 23/00)}	2001/2443	. . . {Flow through, i.e. the plasma fluid flowing in a dielectric tube}
1/0062	. . . {by using microwaves (see G01N 23/223)}	2001/245	. . . . {Internal electrodes}
1/0068	. . {by thermal means (see G01N 25/00)}	2001/2456	. . . . {External electrodes}
1/0075	. . . {Langmuir probes}	2001/2462	. . . . {Ring electrodes}
1/0081	. . {by electric means (see G01N 27/00 , G01R)}	2001/2468	. . . . {Spiral electrodes}
1/0087	. . {by magnetic means (see G01N 27/00 , G01R)}	1/2475	. . {Acoustic pressure discharge}
1/0093	. . {by acoustic, e.g. ultrasonic means (see G01N 29/02)}	2001/2481	. . . {Piezoelectric actuators}
1/02	. Arrangements for confining plasma by electric or magnetic fields; Arrangements for heating plasma ({ G21B 1/00 takes precedence;} electron optics H01J)	2001/2487	. . . {Mechanical actuators}
1/03	. . using electrostatic fields	2001/2493	. . . {Horns}
1/04	. . using magnetic fields substantially generated by the discharge in the plasma	1/26	. . Plasma torches {(metal working with constricted arc B23K 10/00 , B23K 10/02 ; metal spraying B05B 7/18 , B05B 7/20)}
1/06	. . . longitudinal pinch devices	1/28	. . . Cooling arrangements
1/08	. . . Theta pinch devices {, e.g. SCYLLA }	1/30	. . . using applied electromagnetic fields, e.g. high frequency or microwave energy (H05H 1/28 takes precedence)
1/10	. . using externally-applied magnetic field only {, e.g. Q-machines, Yin-Yang, base-ball}	1/32	. . . using an arc (H05H 1/28 takes precedence)
1/105	. . . {using magnetic pumping}	1/34	. . . . Details, e.g. electrodes, nozzles {(cf. B23K 9/24)}
1/11	. . . using cusp configuration (H05H 1/14 takes precedence)	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)}
1/12	. . . wherein the containment vessel forms a closed or nearly closed loop {(G21B 1/05 takes precedence)}	1/341	. . . . . {using coaxial protecting fluid (arc stabilising or constricting arrangements H05H 1/3405 ; introducing materials into the plasma H05H 1/42)}
1/14	. . . wherein the containment vessel is straight and has magnetic mirrors	2001/3415	. . . . . {indexing scheme associated with H05H 1/34 }
1/16	. . using externally-applied electric and magnetic field	2001/3421	. . . . . {transferred arc mode}
1/18	. . . wherein the field oscillate at very high frequency, e.g. in the microwave range {, e.g. using cyclotron resonance}	2001/3426	. . . . . {pilot arc}
1/20	. . Ohmic heating	2001/3431	. . . . . {coaxial cylindrical electrodes}
1/22	. . for injection heating {(G21B 1/15 takes precedence)}		

2001/3436	. . . . .	{hollow cathode with internal coolant flow}	3/00	Production or acceleration of neutral particle beams, e.g. molecular or atomic beams
2001/3442	. . . . .	{cathode with inserted tip}	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)}
2001/3447	. . . . .	{rod-like cathode}		
2001/3452	. . . . .	{supplementary electrodes between cathode and anode, e.g. cascade}		
2001/3457	. . . . .	{nozzle protection devices}	3/04	. Acceleration by electromagnetic wave pressure
2001/3463	. . . . .	{oblique nozzle}	3/06	. Generating neutron beams (targets for producing nuclear reactions H05H 6/00 ; neutron sources G21G 4/02)
2001/3468	. . . . .	{vortex generator}		
2001/3473	. . . . .	{safety means}		
2001/3478	. . . . .	{geometrical details}	5/00	Direct voltage accelerators; Accelerators using single pulses (H05H 3/06 takes precedence)
2001/3484	. . . . .	{convergent/divergent nozzle}	5/02	. Details (targets for producing nuclear reactions H05H 6/00)
2001/3489	. . . . .	{contact starting}	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)
2001/3494	. . . . .	{discharge parameter control}	5/04	. energised by electrostatic generators
1/36	. . . . .	Circuit arrangements (H05H 1/38 , H05H 1/40 take precedence)	5/042	. . {of the van de Graaf type}
1/38	. . . . .	Guiding or centering of electrodes	5/045	. . {High voltage cascades, e.g. Greinacher cascade}
1/40	. . . . .	using applied magnetic fields, e.g. for focusing or rotating the arc {(cf. B23K 9/08 , B23K 9/073)}	5/047	. . {Pulsed generators}
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 })	5/06	. Multistage accelerators
1/44	. . . . .	using more than one torch	5/063	. . {Tandems}
1/46	. . . . .	using applied electromagnetic fields, e.g. high frequency or microwave energy (H05H 1/26 takes precedence)	5/066	. . {Onion-like structures}
2001/4607	. . . . .	{Microwave discharges}	5/08	. Particle accelerators using step-up transformers, e.g. resonance transformers
2001/4615	. . . . .	{Surface waves}	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}
2001/4622	. . . . .	{Waveguides}	2006/002	. {Windows}
2001/463	. . . . .	{Antennas or applicators}	6/005	. {Polarised targets (polarising devices, e.g. for obtaining a polarised ion beam G21K 1/16)}
2001/4637	. . . . .	{Cables}	2006/007	. {Radiation protection arrangements, e.g. screens}
2001/4645	. . . . .	{Radiofrequency discharges}	7/00	Details of devices of the types covered by groups H05H 9/00, H05H 11/00, H05H 13/00
2001/4652	. . . . .	{Inductively coupled}	7/001	. {Arrangements for beam delivery or irradiation (irradiation systems per se G21K 5/00)}
2001/466	. . . . .	{Electrodes}	2007/002	. . {for modifying beam trajectory, e.g. gantries}
2001/4667	. . . . .	{Coiled antennas}	2007/004	. . {for modifying beam energy, e.g. spread out Bragg peak devices}
2001/4675	. . . . .	{Capacitively coupled}	2007/005	. . {for modifying beam emittance, e.g. stochastic cooling devices, stripper foils}
2001/4682	. . . . .	{Associated power generators, e. G. Circuits, matching networks}	2007/007	. . {for focusing the beam to irradiation target}
2001/469	. . . . .	{Flow through, i.e. the plasma fluid flowing in a non-dielectric vessel}	2007/008	. . {for measuring beam parameters}
2001/4692	. . . . .	{dielectric barrier discharge (H05H 1/2406 takes precedence)}	7/02	. Circuits or systems for supplying or feeding radio-frequency energy (radio-frequency generators H03B)
2001/4695	. . . . .	{Arc discharge}	2007/022	. . {Pulsed systems}
2001/4697	. . . . .	{Glow discharge}	2007/025	. . {Radiofrequency systems}
1/48	. . . . .	using an arc (H05H 1/26 takes precedence)	2007/027	. . {Microwave systems}
2001/481	. . . . .	{Corona discharges}	7/04	. Magnet systems {, e.g. undulators, wigglers (free-electron laser H01S 3/0903)}; Energisation thereof
2001/483	. . . . .	{Pointed electrodes}	2007/041	. . {for beam bunching, e.g. undulators}
2001/485	. . . . .	{Cylindrical electrodes, e.g. Rotary drums electrodes}	2007/043	. . {for beam focusing}
2001/486	. . . . .	{Filamentary electrodes}	2007/045	. . {for beam bending}
2001/488	. . . . .	{Segmented electrodes}	2007/046	. . {for beam deflection}
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		

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