

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.

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|-------------|--|--------|---|
| 1/00 | Generating plasma; Handling plasma | 1/14 | . . . wherein the containment vessel is straight and has magnetic mirrors |
| 1/0006 | . {Investigating plasma, e.g. measuring the degree of ionisation or the electron temperature} | 1/16 | . . using externally-applied electric and magnetic fields |
| 1/0012 | . . {using electromagnetic or particle radiation, e.g. interferometry} | 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 (H05H 1/0031 - H05H 1/0043 take precedence)} | 1/22 | . . for injection heating {(G21B 1/15 takes precedence)} |
| 1/0031 | . . . {by interferometry} | 1/24 | . Generating plasma {(nuclear fusion reactors G21B 1/00 ; gas-filled discharge reactors H01J 37/32)} |
| 1/0037 | . . . {by spectrometry} | 1/2406 | . . {using dielectric barrier discharges, i.e. with a dielectric interposed between the electrodes} |
| 1/0043 | . . . {by using infrared or ultraviolet radiation} | 1/2418 | . . . {the electrodes being embedded in the dielectric} |
| 1/005 | . . . {by using X-rays or alpha rays} | 1/2425 | . . . {the electrodes being flush with the dielectric} |
| 1/0056 | . . . {by using neutrons} | 1/2431 | . . . {using cylindrical electrodes, e.g. rotary drums} |
| 1/0062 | . . . {by using microwaves} | 1/2437 | . . . {Multilayer systems} |
| 1/0068 | . . {by thermal means} | 1/2439 | . . . {Surface discharges, e.g. air flow control} |
| 1/0075 | . . . {Langmuir probes} | 1/2441 | . . . {characterised by the physical-chemical properties of the dielectric, e.g. porous dielectric} |
| 1/0081 | . . {by electric means} | 1/2443 | . . . {the plasma fluid flowing through a dielectric tube} |
| 1/0087 | . . {by magnetic means} | 1/245 | {the plasma being activated using internal electrodes} |
| 1/0093 | . . {by acoustic means, e.g. ultrasonic} | 1/246 | {the plasma being activated using external electrodes (H05H 1/245 takes precedence)} |
| 1/01 | . {Handling plasma, e.g. of subatomic particles} | 1/2465 | {the plasma being activated by inductive coupling, e.g. using coiled electrodes} |
| 1/02 | . Arrangements for confining plasma by electric or magnetic fields; Arrangements for heating plasma ({ G21B 1/00 takes precedence;} electron optics H01J) | 1/247 | . . {using discharges in liquid media} |
| 1/03 | . . using electrostatic fields | 1/2475 | . . {using acoustic pressure discharges} |
| 1/04 | . . using magnetic fields substantially generated by the discharge in the plasma | 1/2481 | . . . {the plasma being activated using piezoelectric actuators} |
| 1/06 | . . . Longitudinal pinch devices | | |
| 1/08 | . . . Theta pinch devices {, e.g. SCYLLA} | | |
| 1/10 | . . using externally-applied magnetic fields only {, e.g. Q-machines, Yin-Yang, base-ball} | | |
| 1/105 | . . . {using magnetic pumping} | | |
| 1/11 | . . . using cusp configuration (H05H 1/14 takes precedence) | | |
| 1/12 | . . . wherein the containment vessel forms a closed or nearly closed loop {(G21B 1/05 takes precedence)} | | |

- 1/2487 . . . {the plasma being activated using mechanical actuators}
- 1/2493 . . . {the plasma being activated using horns}
- 1/26 . . Plasma torches
- 1/28 . . . Cooling arrangements
- 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
- 1/3405 {Arrangements for stabilising or constricting the arc, e.g. by an additional gas flow}
- 1/341 {Arrangements for providing coaxial protecting fluids}
- 1/3421 {Transferred arc or pilot arc mode}
- 1/3423 {Connecting means, e.g. electrical connecting means or fluid connections}
- 1/3425 {Melting or consuming electrodes}
- 1/3431 {Coaxial cylindrical electrodes}
- 1/3436 {Hollow cathodes with internal coolant flow}
- 1/3442 {Cathodes with inserted tip}
- 1/3447 {Rod-like cathodes}
- 1/3452 {Supplementary electrodes between cathode and anode, e.g. cascade}
- 1/3457 {Nozzle protection devices}
- 1/3463 {Oblique nozzles}
- 1/3468 {Vortex generators}
- 1/3473 {Safety means}
- 1/3478 {Geometrical details}
- 1/3484 {Convergent-divergent nozzles}
- 1/3489 {Means for contact starting}
- 1/3494 {Means for controlling discharge parameters}
- 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 ({arc stabilising or constricting arrangements [H05H 1/3405](#); coaxial protecting fluids [H05H 1/341](#);} electrostatic spraying, spraying apparatus with means for charging the spray electrically [B05B 5/00](#) {; cf. [B23K 9/324](#), [B05B 7/22](#)})
- 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](#))
- 1/461 . . . {Microwave discharges}
- 1/4615 . . . {using surface waves}
- 1/4622 . . . {using waveguides}
- 1/463 . . . {using antennas or applicators}
- 1/4637 . . . {using cables}
- 1/4645 . . . {Radiofrequency discharges}
- 1/4652 . . . {using inductive coupling means, e.g. coils}
- 1/466 . . . {using capacitive coupling means, e.g. electrodes}
- 1/4697 . . {using glow discharges}
- 1/47 . . . {using corona discharges}
- 1/471 . . . {Pointed electrodes}
- 1/473 . . . {Cylindrical electrodes, e.g. rotary drums}
- 1/475 . . . {Filamentary electrodes}
- 1/477 . . . {Segmented electrodes}
- 1/48 . . using an arc ([H05H 1/26 takes precedence](#))
- 1/481 . . . {Hollow cathodes}
- 1/482 . . . {Arrangements to provide gliding arc discharges}
- 1/484 . . . {Arrangements to provide plasma curtains or plasma showers}
- 1/486 . . . {Arrangements to provide capillary discharges}
- 1/488 . . . {Liquid 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](#)**
- 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}	13/00	Magnetic resonance accelerators; Cyclotrons {(strophotrons, turbine tubes H01J 25/62)}
2007/005	. . {for modifying beam emittance, e.g. stochastic cooling devices, stripper foils}	13/005	. {Cyclotrons}
2007/007	. . {for focusing the beam to irradiation target}	13/02	. Synchrocyclotrons, i.e. frequency modulated cyclotrons
2007/008	. . {for measuring beam parameters}	13/04	. Synchrotrons
7/02	. Circuits or systems for supplying or feeding radio-frequency energy (radio-frequency generators H03B)	13/06	. Air-cored magnetic resonance accelerators
2007/022	. . {Pulsed systems}	13/08	. Alternating-gradient magnetic resonance accelerators
2007/025	. . {Radiofrequency systems}	13/085	. . {Fixed-field alternating gradient accelerators [FFAG]}
2007/027	. . {Microwave systems}	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 {or rhodotrons}
7/04	. Magnet systems {, e.g. undulators, wigglers (free-electron laser H01S 3/0903)}; Energisation thereof	15/00	Methods or devices for acceleration of charged particles not otherwise provided for {, e.g. wakefield accelerators}
2007/041	. . {for beam bunching, e.g. undulators}	2240/00	Testing
2007/043	. . {for beam focusing}	2240/10	. at atmospheric pressure
2007/045	. . {for beam bending}	2240/20	. Non-thermal plasma
2007/046	. . {for beam deflection}	2242/00	Auxiliary systems
2007/048	. . {for modifying beam trajectory, e.g. gantry systems}	2242/10	. Cooling arrangements
7/06	. Two-beam arrangements; Multi-beam arrangements {storage rings}; Electron rings	2242/20	. Power circuits
2007/065	. . {Multi-beam merging, e.g. funneling}	2242/22	. . DC, AC or pulsed generators
7/08	. Arrangements for injecting particles into orbits	2242/24	. . Radiofrequency or microwave generators
2007/081	. . {Sources}	2242/26	. . Matching networks
2007/082	. . . {Ion sources, e.g. ECR, duoplasmatron, PIG, laser sources}	2245/00	Applications of plasma devices
2007/084	. . . {Electron sources}	2245/10	. Treatment of gases
2007/085	. . {by electrostatic means}	2245/15	. . Ambient air; Ozonisers
2007/087	. . {by magnetic means}	2245/17	. . Exhaust gases
2007/088	. . {by mechanical means, e.g. stripping foils}	2245/20	. Treatment of liquids
7/10	. Arrangements for ejecting particles from orbits	2245/30	. Medical applications
7/12	. Arrangements for varying final energy of beam	2245/32	. . Surgery, e.g. scalpels, blades or bistoury; Treatments inside the body
2007/122	. . {by electromagnetic means, e.g. RF cavities}	2245/34	. . Skin treatments, e.g. disinfection or wound treatment
2007/125	. . {by mechanical means, e.g. stripping foils}	2245/36	. . Sterilisation of objects, liquids, volumes or surfaces
2007/127	. . {by emittance variation, e.g. stochastic cooling}	2245/40	. Surface treatments
7/14	. Vacuum chambers (H05H 5/03 takes precedence)	2245/42	. . Coating or etching of large items
7/16	. . of the waveguide type	2245/50	. Production of nanostructures
7/18	. . Cavities; Resonators {(travelling-wave tubes H01J 23/18 ; hyperfrequency cavities in general H01P 7/04 , H01P 7/06)}	2245/60	. Portable devices
7/20	. . . with superconductive walls	2245/70	. Automotive applications, e.g. engines
7/22	. Details of linear accelerators, e.g. drift tubes (H05H 7/02 - H05H 7/20 take precedence)	2245/80	. Burners or furnaces for heat generation, for fuel combustion or for incineration of wastes
2007/222	. . {drift tubes}	2277/00	Applications of particle accelerators
2007/225	. . {coupled cavities arrangements}	2277/10	. Medical devices
2007/227	. . {power coupling, e.g. coupling loops}	2277/11	. . Radiotherapy
9/00	Linear accelerators	2277/113	. . . Diagnostic systems
9/005	. {Dielectric wall accelerators}	2277/116	. . . Isotope production
9/02	. Travelling-wave linear accelerators {(travelling-wave tubes H01J 25/34)}	2277/12	. Ion implantation
9/04	. Standing-wave linear accelerators	2277/13	. Nuclear physics, e.g. spallation sources, accelerator driven systems, search or generation of exotic elements
9/041	. . {Hadron LINACS}	2277/14	. Portable devices
9/042	. . . {Drift tube LINACS}	2277/1405	. . Detection systems, e.g. for safety
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		