

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.

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}
- 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 {or rhodotrons}
- 15/00 Methods or devices for acceleration of charged particles not otherwise provided for {, e.g. wakefield accelerators}**
- 2240/00 Testing**
- 2240/10 . at atmospheric pressure
- 2240/20 . Non-thermal plasma
- 2242/00 Auxiliary systems**
- 2242/10 . Cooling arrangements
- 2242/20 . Power circuits
- 2242/22 . . DC, AC or pulsed generators
- 2242/24 . . Radiofrequency or microwave generators
- 2242/26 . . Matching networks
- 2245/00 Applications of plasma devices**
- 2245/10 . Treatment of gases
- 2245/15 . . Ambient air; Ozonisers
- 2245/17 . . Exhaust gases
- 2245/20 . Treatment of liquids
- 2245/30 . Medical applications
- 2245/32 . . Surgery, e.g. scalpels, blades or bistoury; Treatments inside the body
- 2245/34 . . Skin treatments, e.g. disinfection or wound treatment
- 2245/36 . . Sterilisation of objects, liquids, volumes or surfaces
- 2245/40 . Surface treatments
- 2245/42 . . Coating or etching of large items
- 2245/50 . Production of nanostructures
- 2245/60 . Portable devices
- 2245/70 . Automotive applications, e.g. engines
- 2245/80 . Burners or furnaces for heat generation, for fuel combustion or for incineration of wastes
- 2277/00 Applications of particle accelerators**
- 2277/10 . Medical devices
- 2277/11 . . Radiotherapy
- 2277/113 . . . Diagnostic systems
- 2277/116 . . . Isotope production
- 2277/12 . Ion implantation
- 2277/13 . Nuclear physics, e.g. spallation sources, accelerator driven systems, search or generation of exotic elements
- 2277/14 . Portable devices
- 2277/1405 . . Detection systems, e.g. for safety