CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H05 ELECTRIC TECHNIQUES NOT OTHERWISE PROVIDED FOR

H05H PLASMA TECHNIQUE (apparatus or processes specially adapted for producing X-rays H05G 2/00); PRODUCTION OF ACCELERATED ELECTRICALLY-CHARGED PARTICLES OR OF NEUTRONS; PRODUCTION OR ACCELERATION OF NEUTRAL MOLECULAR OR ATOMIC BEAMS

NOTES

1. This subclass covers:
   a. generating or handling plasma;
   b. devices for accelerating electrons, ion beams or neutral particles;
   c. devices for producing neutral particle beams;
   d. targets for (a), (b) or (c).
2. This subclass does not cover devices for producing, accelerating, influencing or using a flow of electrons or ions within electric discharge tubes or discharge lamps, which are covered by subclass H01J.

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

1/0006 . {Investigating plasma, e.g. measuring the degree of ionisation or the electron temperature}
1/0012 . . {using electromagnetic or particle radiation, e.g. interferometry}
1/0018 . . . {Details}
1/0025 . . . {by using photoelectric means (H05H 1/0031 - H05H 1/0043 take precedence)}
1/0031 . . . {by interferrometry}
1/0037 . . . {by spectrometry}
1/0043 . . . {by using infrared or ultraviolet radiation}
1/005 . . . {by using X-rays or alpha rays}
1/0056 . . . {by using neutrons}
1/0062 . . . {by using microwaves}
1/0068 . . {by thermal means}
1/0075 . . . {Langmuir probes}
1/0081 . . {by electric means}
1/0087 . . {by magnetic means}
1/0093 . . {by acoustic means, e.g. ultrasonic}
1/01 . {Handling plasma, e.g. of subatomic particles}
1/02 . Arrangements for confining plasma by electric or magnetic fields; Arrangements for heating plasma ({G21B 1/00 takes precedence;} electron optics H01J)
1/03 . . using electrostatic fields
1/04 . . using magnetic fields substantially generated by the discharge in the plasma
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)}
1/14 . . . wherein the containment vessel is straight and has magnetic mirrors
1/16 . . using externally-applied electric and magnetic fields
1/18 . . . wherein the fields oscillate at very high frequency, e.g. in the microwave range {, e.g. using cyclotron resonance}
1/20 . . Ohmic heating
1/22 . . for injection heating {(G21B 1/15 takes precedence)}
1/24 . Generating plasma {(nuclear fusion reactors G21B 1/00; gas-filled discharge reactors H01J 37/32)}
1/2406 . . {using dielectric barrier discharges, i.e. with a dielectric interposed between the electrodes}
1/2418 . . . {the electrodes being embedded in the dielectric}
1/2425 . . . {the electrodes being flush with the dielectric}
1/2431 . . . {using cylindrical electrodes, e.g. rotary drums}
1/2437 . . . {Multilayer systems}
1/2439 . . . {Surface discharges, e.g. air flow control}
1/2441 . . . {characterised by the physical-chemical properties of the dielectric, e.g. porous dielectric}
1/2443 . . . {the plasma fluid flowing through a dielectric tube}
1/245 . . . . {the plasma being activated using internal electrodes}

1/246 . . . . {the plasma being activated using external electrodes (H05H 1/245 takes precedence)}
1/2465 . . . . {the plasma being activated by inductive coupling, e.g. using coiled electrodes}
1/247 . . {using discharges in liquid media}
1/2475 . . {using acoustic pressure discharges}
1/2481 . . . {the plasma being activated using piezoelectric actuators}
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 or liquid {(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)
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)
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, e.g. resonant beam generation
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
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
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