

CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H01 ELECTRIC ELEMENTS

(NOTES omitted)

H01J ELECTRIC DISCHARGE TUBES OR DISCHARGE LAMPS (spark-gaps [H01T](#); arc lamps with consumable electrodes [H05B](#); particle accelerators [H05H](#))

NOTES

1. This subclass covers only devices for producing, influencing, or using a flow of electrons or ions, e.g. for controlling, indicating, or switching of electric current, counting electric pulses, producing light or other electromagnetic oscillations, such as X-rays, or for separating or analysing radiation or particles, and having a closed or substantially closed casing containing a chosen gas, vapour, or vacuum, upon the pressure and nature of which the characteristics of the device depend. Light sources using a combination (other than covered by group [H01J 61/96](#) of this subclass) of discharge and other kinds of light generation are dealt with in [H05B 35/00](#).
2. In this subclass, groups [H01J 1/00](#) - [H01J 7/00](#) relate only to:
 - i. details of an unspecified kind of discharge tube or lamp, or
 - ii. details mentioned in a specification as applicable to two or more kinds of tubes or lamps as defined by groups [H01J 11/00](#), [H01J 13/00](#), [H01J 15/00](#), [H01J 17/00](#), [H01J 21/00](#), [H01J 25/00](#), [H01J 27/00](#), [H01J 31/00](#), [H01J 33/00](#), [H01J 35/00](#), [H01J 37/00](#), [H01J 40/00](#), [H01J 41/00](#), [H01J 47/00](#), [H01J 49/00](#), [H01J 61/00](#), [H01J 63/00](#) or [H01J 65/00](#), hereinafter called basic kinds. A detail only described with reference to, or clearly only applicable to, tubes or lamps of a single basic kind is classified in the detail group appropriate to tubes or lamps of that basic kind, e.g. [H01J 17/04](#).
3. In this subclass, the following term is used with the meaning indicated:
 - "lamp" includes tubes emitting ultraviolet or infrared light.
4. Attention is drawn to the definition of the expression "spark gaps" given in the Note following the title of subclass [H01T](#).
5. Apparatus or processes specially adapted for the manufacture of electric discharge tubes, discharge lamps, or parts thereof are classified in group [H01J 9/00](#).

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	Details of electrodes, of magnetic control means, of screens, or of the mounting or spacing thereof, common to two or more basic types of discharge tubes or lamps (details of electron-optical arrangements or of ion traps H01J 3/00)	1/144	. . . . with other metal oxides as an emissive material
		1/146	. . . . with metals or alloys as an emissive material
		1/148	. . . . with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material
1/02	. Main electrodes	1/15	. . . Cathodes heated directly by an electric current
1/025	. . { Hollow cathodes }	1/16	. . . . characterised by the shape
1/04	. . Liquid electrodes, e.g. liquid cathode	1/18	. . . . Supports; Vibration-damping arrangements
1/05	. . . characterised by material	1/20	. . . Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
1/06	. . . Containers for liquid-pool electrodes; Arrangement or mounting thereof	1/22	. . . . Heaters
1/08	. . . Positioning or moving the cathode spot on the surface of a liquid-pool cathode	1/24	. . . . Insulating layer or body located between heater and emissive material
1/10	. . . Cooling, heating, circulating, filtering, or controlling level of liquid in a liquid-pool electrode	1/26	. . . . Supports for the emissive material
1/12	. . Cathodes having mercury or liquid alkali metal deposited on the cathode surface during operation of the tube	1/28	. . . . Dispenser-type cathodes, e.g. L-cathode
1/13	. . Solid thermionic cathodes	1/30	. . Cold cathodes, e.g. field-emissive cathode
1/135	. . . { Circuit arrangements therefor, e.g. for temperature control }	1/304	. . . Field-emissive cathodes
1/14	. . . characterised by the material	1/3042	. . . . {microengineered, e.g. Spindt-type }
1/142	. . . . with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material	1/3044	. . . . . {Point emitters }
		1/3046	. . . . . {Edge emitters }
		1/3048	. . . . . {Distributed particle emitters }
		1/308	. . . Semiconductor cathodes, e.g. cathodes with PN junction layers

- 1/312 . . . having an electric field perpendicular to the surface, e.g. tunnel-effect cathodes of metal-insulator-metal [MIM] type ([H01J 1/304-H01J 1/308 take precedence](#))
 - 1/316 . . . having an electric field parallel to the surface, e.g. thin film cathodes
 - 1/32 . . Secondary-electron-emitting electrodes ([H01J 1/35 takes precedence](#))
 - 1/34 . . Photo-emissive cathodes ([H01J 1/35 takes precedence](#))
 - 1/35 . . Electrodes exhibiting both secondary emission and photo-emission
 - 1/36 . . Solid anodes; Solid auxiliary anodes for maintaining a discharge
 - 1/38 . . . characterised by the material
 - 1/40 . . . forming part of the envelope of the tube or lamp
 - 1/42 . . . Cooling of anodes ([cooling rotary anodes H01J 1/44](#)); Heating of anodes
 - 1/44 . . . Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes
 - 1/46 . Control electrodes, e.g. grid ([for igniting arrangements H01J 7/30](#)); Auxiliary electrodes ([auxiliary anodes for maintaining a discharge H01J 1/36](#))
 - 1/48 . . characterised by the material
 - 1/50 . Magnetic means for controlling the discharge
 - 1/52 . Screens for shielding; Guides for influencing the discharge; Masks interposed in the electron stream
 - 1/53 . Electrodes intimately associated with a screen on or from which an image or pattern is formed, picked-up, converted, or stored
 - 1/54 . Screens on or from which an image or pattern is formed, picked-up, converted, or stored; Luminescent coatings on vessels
 - 1/56 . . acting as light valves by shutter operation, e.g. for eidophor
 - 1/58 . . acting by discolouration, e.g. halide screen
 - 1/60 . . Incandescent screens
 - 1/62 . . Luminescent screens; Selection of materials for luminescent coatings on vessels
 - 1/63 . . . characterised by the luminescent material
 - 1/64 . . . characterised by the binder or adhesive for securing the luminescent material to its support
 - 1/66 . . . Supports for luminescent material
 - 1/68 . . . with superimposed luminescent layers
 - 1/70 . . . with protective, conductive, or reflective layers
 - 1/72 . . . with luminescent material discontinuously arranged, e.g. in dots or lines
 - 1/74 with adjacent dots or lines of different luminescent material
 - 1/76 . . . provided with permanent marks or references
 - 1/78 . . Photoelectric screens; Charge-storage screens
 - 1/88 . Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies
 - 1/90 . . Insulation between electrodes or supports within the vacuum space
 - 1/92 . . Mountings for the electrode assembly as a whole
 - 1/94 . . Mountings for individual electrodes
 - 1/96 . . Spacing members extending to the envelope
 - 1/98 . . . without fixed connection between spacing member and envelope
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- 3/00 Details of electron-optical or ion-optical arrangements or of ion traps common to two or more basic types of discharge tubes or lamps**
 - 3/02 . Electron guns
 - 3/021 . . {Electron guns using a field emission, photo emission, or secondary emission electron source}
 - 3/022 . . . {with microengineered cathode, e.g. Spindt-type}
 - 3/023 . . {Electron guns using electron multiplication}
 - 3/024 . . {Electron guns using thermionic emission of cathode heated by electron or ion bombardment or by irradiation by other energetic beams, e.g. by laser}
 - 3/025 . . {Electron guns using a discharge in a gas or a vapour as electron source ([gas-filled discharge tubes with gaseous cathodes H01J 15/00](#))}
 - 3/026 . . {Eliminating deleterious effects due to thermal effects, electric or magnetic field ([H01J 3/021 - H01J 3/025 take precedence](#))}
 - 3/027 . . {Construction of the gun or parts thereof ([H01J 3/021 - H01J 3/025, H01J 3/026 and H01J 3/028 take precedence](#))}
 - 3/028 . . {Replacing parts of the gun; Relative adjustment ([H01J 3/021 - H01J 3/025 take precedence](#))}
 - 3/029 . . {Schematic arrangements for beam forming}
 - 3/04 . Ion guns
 - 3/06 . two or more guns being arranged in a single vacuum space, e.g. for plural-ray tubes ([H01J 3/07 takes precedence](#))
 - 3/07 . Arrangements for controlling convergence of a plurality of beams
 - 3/08 . Arrangements for controlling intensity of ray or beam ([H01J 3/02, H01J 3/04 take precedence](#))
 - 3/10 . Arrangements for centring ray or beam ([H01J 3/02, H01J 3/04 take precedence](#))
 - 3/12 . Arrangements for controlling cross-section of ray or beam; Arrangements for correcting aberration of beam, e.g. due to lenses ([H01J 3/02, H01J 3/04 take precedence](#))
 - 3/14 . Arrangements for focusing or reflecting ray or beam ([H01J 3/02, H01J 3/04 take precedence](#))
 - 3/16 . . Mirrors
 - 3/18 . . Electrostatic lenses
 - 3/20 . . Magnetic lenses
 - 3/22 . . . using electromagnetic means only
 - 3/24 . . . using permanent magnets only
 - 3/26 . Arrangements for deflecting ray or beam
 - 3/28 . . along one straight line or along two perpendicular straight lines
 - 3/30 . . . by electric fields only
 - 3/32 . . . by magnetic fields only
 - 3/34 . . along a circle, spiral, or rotating radial line
 - 3/36 . Arrangements for controlling the ray or beam after passing the main deflection system, e.g. for post-acceleration or post-concentration
 - 3/38 . Mounting, supporting, spacing, or insulating electron-optical or ion-optical arrangements
 - 3/40 . Traps for removing or diverting unwanted particles, e.g. negative ions, fringing electrons; Arrangements for velocity or mass selection ([see provisionally also H01J 29/46 - H01J 29/84](#))

5/00	Details relating to vessels or to leading-in conductors common to two or more basic types of discharge tubes or lamps	7/06	. . having helium, argon, neon, krypton, or xenon as the principal constituent
5/02	. Vessels; Containers; Shields associated therewith; Vacuum locks	7/08	. . having a metallic vapour as the principal constituent
5/03	. . Arrangements for preventing or mitigating effects of implosion of vessels or containers	7/10	. . . mercury vapour
5/04	. . Vessels or containers characterised by the material thereof	7/12	. . . vapour of an alkali metal
5/06	. . Vessels or containers specially adapted for operation at high tension, e.g. by improved potential distribution over surface of vessel	7/14	. Means for obtaining or maintaining the desired pressure within the vessel
5/08	. . provided with coatings on the walls thereof; Selection of materials for the coatings (luminescent coatings H01J 1/62)	7/16	. . Means for permitting pumping during operation of the tube or lamp
5/10	. . . on internal surfaces	7/18	. . Means for absorbing or adsorbing gas, e.g. by gettering
5/12	. . Double-wall vessels or containers	7/183	. . . {Composition or manufacture of getters}
5/125	. . . {with a gas tight space between both walls}	7/186	. . . {Getter supports}
5/14	. . Dismountable vessels or containers, e.g. for replacing cathode heater	7/20	. . Means for producing, introducing, or replenishing gas or vapour during operation of the tube or lamp
5/16	. . Optical or photographic arrangements structurally combined with the vessel	7/22	. . Tubulations therefor, e.g. for exhausting; Closures therefor
5/18	. . Windows permeable to X-rays, gamma-rays, or particles	7/24	. Cooling arrangements; Heating arrangements; Means for circulating gas or vapour within the discharge space
5/20	. Seals between parts of vessels	7/26	. . by flow of fluid through passages associated with tube or lamp
5/22	. . Vacuum-tight joints between parts of vessel	7/28	. . by latent heat or evaporation of cooling liquid
5/24	. . . between insulating parts of vessel	7/30	. Igniting arrangements
5/26	. . . between insulating and conductive parts of vessel	7/32	. . having resistive or capacitive igniter
5/28	. . . between conductive parts of vessel	7/34	. . . having resistive igniter only
5/30	. . . using packing-material, e.g. sealing-liquid or elastic insert	7/36	. . Igniting by movement of a solid electrode
5/32	. Seals for leading-in conductors	7/38	. . Igniting by movement of vessel as a whole, e.g. tilting
5/34	. . for an individual conductor (pinched-stem seals H01J 5/38 ; end-disc seals H01J 5/40 ; annular seals H01J 5/44)	7/40	. . Igniting by associated radioactive materials or fillings
5/36	. . . using intermediate part	7/42	. Means structurally associated with the tube or lamp for indicating defects or previous use
5/38	. . Pinched-stem or analogous seals	7/44	. One or more circuit elements structurally associated with the tube or lamp
5/40	. . End-disc seals, e.g. flat header	7/46	. . Structurally associated resonator having distributed inductance and capacitance
5/42	. . . using intermediate part	9/00	Apparatus or processes specially adapted for the manufacture {, installation, removal, maintenance} of electric discharge tubes, discharge lamps, or parts thereof; Recovery of material from discharge tubes or lamps
5/44	. . Annular seals disposed between the ends of the vessel	9/003	. {Auxiliary devices for installing or removing discharge tubes or lamps}
5/46	. Leading-in conductors	9/006	. . {for fluorescent lamps}
5/48	. Means forming part of the tube or lamp for the purpose of supporting it	9/02	. Manufacture of electrodes or electrode systems
5/50	. Means forming part of the tube or lamps for the purpose of providing electrical connection to it	9/022	. . {of cold cathodes}
5/52	. . directly applied to or forming part of the vessel	9/025	. . . {of field emission cathodes}
5/54	. . supported by a separate part, e.g. base	9/027	. . . {of thin film cathodes}
5/56	. . . Shape of the separate part	9/04	. . of thermionic cathodes
5/565	. . . . {Bases for circular lamps}	9/042	. . . {Manufacture, activation of the emissive part}
5/58	. . . Means for fastening the separate part to the vessel, e.g. by cement	9/045	. . . . {Activation of assembled cathode}
5/60	. . . . for fastening by mechanical means	9/047	. . . . {Cathodes having impregnated bodies (H01J 9/045 takes precedence)}
5/62	. . . Connection of wires protruding from the vessel to connectors carried by the separate part	9/06	. . . Machines therefor
7/00	Details not provided for in the preceding groups and common to two or more basic types of discharge tubes or lamps	9/08	. . Manufacture of heaters for indirectly-heated cathodes
7/02	. Selection of substances for gas fillings; Specified operating pressure or temperature	9/10	. . . Machines therefor
7/04	. . having one or more carbon compounds as the principal constituent	9/12	. . of photo-emissive cathodes; of secondary-emission electrodes
		9/125	. . . {of secondary emission electrodes}

- 9/14 . . of non-emitting electrodes
 - 9/142 . . . {of shadow-masks for colour television tubes}
 - 9/144 {Mask treatment related to the process of dot deposition during manufacture of luminescent screen}
 - 9/146 {Surface treatment, e.g. blackening, coating ([H01J 9/144](#) takes precedence)}
 - 9/148 . . . {of electron emission flat panels, e.g. gate electrodes, focusing electrodes or anode electrodes}
 - 9/16 . . . Machines for making wire grids
 - 9/18 . . Assembling together the component parts of electrode systems
 - 9/185 . . . {of flat panel display devices, e.g. by using spacers}
 - 9/20 . Manufacture of screens on or from which an image or pattern is formed, picked up, converted or stored; Applying coatings to the vessel
 - 9/205 . . {Applying optical coatings or shielding coatings to the vessel of flat panel displays, e.g. applying filter layers, electromagnetic interference shielding layers, anti-reflection coatings or anti-glare coatings}
 - 9/22 . . Applying luminescent coatings
 - 9/221 . . . {in continuous layers}
 - 9/222 {constituted by coated granules emitting light of different colour}
 - 9/223 {by uniformly dispersing of liquid}
 - 9/224 {by precipitation}
 - 9/225 {by electrostatic or electrophoretic processes}
 - 9/227 . . . with luminescent material discontinuously arranged, e.g. in dots or lines
 - 9/2271 {by photographic processes (final treatment of shadow-mask prior to or after dot deposition [H01J 9/144](#))}
 - 9/2272 {Devices for carrying out the processes, e.g. light houses}
 - 9/2273 {Auxiliary lenses and filters}
 - 9/2274 {Light sources particularly adapted therefor}
 - 9/2275 {including the exposition of a substance responsive to a particular radiation}
 - 9/2276 {Development of latent electrostatic images ([per se G03G 15/06](#))}
 - 9/2277 {by other processes, e.g. serigraphy, decalomania}
 - 9/2278 {Application of light absorbing material, e.g. between the luminescent areas}
 - 9/233 . . Manufacture of photoelectric screens or charge-storage screens
 - 9/236 . . Manufacture of magnetic deflecting devices for cathode-ray tubes
 - 9/24 . . Manufacture or joining of vessels, leading-in conductors or bases
 - 9/241 . . {the vessel being for a flat panel display ([H01J 9/261](#) takes precedence; flat discharge lamps [H01J 9/248](#))}
 - 9/242 . . . {Spacers between faceplate and backplate}
 - 9/244 . . {specially adapted for cathode ray tubes ([H01J 9/241](#), [H01J 9/26](#) take precedence)}
 - 9/245 . . {specially adapted for gas discharge tubes or lamps ([H01J 9/241](#), [H01J 9/26](#) take precedence)}
 - 9/247 . . . {specially adapted for gas-discharge lamps}
 - 9/248 {the vessel being flat}
 - 9/26 . . Sealing together parts of vessels
 - 9/261 . . . {the vessel being for a flat panel display (for flat discharge lamps [H01J 9/268](#))}
 - 9/263 . . . {specially adapted for cathode-ray tubes ([H01J 9/261](#) takes precedence)}
 - 9/265 . . . {specially adapted for gas-discharge tubes or lamps ([H01J 9/261](#) takes precedence)}
 - 9/266 {specially adapted for gas-discharge lamps}
 - 9/268 {the vessel being flat}
 - 9/28 . . Manufacture of leading-in conductors
 - 9/30 . . Manufacture of bases
 - 9/32 . . Sealing leading-in conductors
 - 9/323 . . . {Sealing leading-in conductors into a discharge lamp or a gas-filled discharge device}
 - 9/326 {making pinched-stem or analogous seals}
 - 9/34 . . Joining base to vessel
 - 9/36 . . Joining connectors to internal electrode system
 - 9/38 . . Exhausting, degassing, filling, or cleaning vessels
 - 9/385 . . Exhausting vessels
 - 9/39 . . Degassing vessels
 - 9/395 . . Filling vessels
 - 9/40 . . Closing vessels
 - 9/42 . . Measurement or testing during manufacture
 - 9/44 . . Factory adjustment of completed discharge tubes or lamps to comply with desired tolerances
 - 9/445 . . {Aging of tubes or lamps, e.g. by "spot knocking" ([cathode activation H01J 9/045](#))}
 - 9/46 . . Machines having sequentially arranged operating stations
 - 9/48 . . with automatic transfer of workpieces between operating stations
 - 9/50 . . Repairing or regenerating used or defective discharge tubes or lamps
 - 9/505 . . {Regeneration of cathodes}
 - 9/52 . . Recovery of material from discharge tubes or lamps ([H01J 9/50](#) takes precedence)
 - 11/00 Gas-filled discharge tubes with alternating current induction of the discharge, e.g. alternating current plasma display panels [AC-PDP] (circuits or methods for driving PDPs [G09G 3/28](#)); Gas-filled discharge tubes without any main electrode inside the vessel; Gas-filled discharge tubes with at least one main electrode outside the vessel**
- NOTES**
1. When classifying in this group, classification is made in all appropriate places.
 2. In this group, the following term is used with the meaning indicated:
 - "main electrode" means any of a sustain electrode, scan electrode or address electrode.
- 11/10 . . AC-PDPs with at least one main electrode being out of contact with the plasma
 - 11/12 . . with main electrodes provided on both sides of the discharge space
 - 11/14 . . with main electrodes provided only on one side of the discharge space
 - 11/16 . . with main electrodes provided inside or on the side face of the spacers
 - 11/18 . . containing a plurality of independent closed structures for containing the gas, e.g. plasma tube array [PTA] display panels

11/20	• Constructional details	13/32	• • Cooling arrangements; Heating arrangements (for cathodes H01J 13/14 ; for anodes H01J 13/18)
11/22	• • Electrodes, e.g. special shape, material or configuration	13/34	• • Igniting arrangements
11/24	• • • Sustain electrodes or scan electrodes	13/36	• • • having resistive or capacitive igniter
11/26	• • • Address electrodes	13/38	• • • • having resistive igniter only
11/28	• • • Auxiliary electrodes, e.g. priming electrodes or trigger electrodes	13/40	• • • Igniting by movement of a solid electrode
11/30	• • • Floating electrodes	13/405	• • • • {Interrupting contact with liquid cathode}
11/32	• • • Disposition of the electrodes	13/42	• • • Igniting by movement of vessel as a whole, e.g. tilting
11/34	• • Vessels, containers or parts thereof, e.g. substrates	13/44	• • Devices for preventing or eliminating arcing-back
11/36	• • • Spacers, barriers, ribs, partitions or the like	13/46	• • One or more circuit elements structurally associated with the tube
11/38	• • • Dielectric or insulating layers	13/48	• • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
11/40	• • • Layers for protecting or enhancing the electron emission, e.g. MgO layers	13/50	• Tubes having a single main anode
11/42	• • • Fluorescent layers	13/52	• • with control by one or more intermediate control electrodes
11/44	• • • Optical arrangements or shielding arrangements, e.g. filters, black matrices, light reflecting means or electromagnetic shielding means	13/54	• • with control by igniter, e.g. single-anode ignitron
11/46	• • Connecting or feeding means, e.g. leading-in conductors	13/56	• Tubes having two or more main anodes
11/48	• • Sealing, e.g. seals specially adapted for leading-in conductors	13/58	• • with control by one or more intermediate control electrodes
11/50	• • Filling, e.g. selection of gas mixture	15/00	Gas-filled discharge tubes with gaseous cathodes, e.g. plasma cathode
11/52	• • Means for absorbing or adsorbing the gas mixture, e.g. by gettering	15/02	• Details, e.g. electrode, gas filling, shape of vessel
11/54	• • Means for exhausting the gas	15/04	• • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
13/00	Discharge tubes with liquid-pool cathodes, e.g. metal-vapour rectifying tubes	17/00	Gas-filled discharge tubes with solid cathode (H01J 25/00 , H01J 27/00 , H01J 31/00 - H01J 41/00 {, H01J 11/00 } take precedence; gas filled spark gaps H01T ; Marx converters H02M 7/26)
13/02	• Details	17/005	• {specially adapted as noise generators (electronic circuits for generation of noise currents or voltages H03B 29/00)}
13/04	• • Main electrodes; Auxiliary anodes	17/02	• Details
13/06	• • • Cathodes	17/04	• • Electrodes; Screens
13/08	• • • • characterised by the material	17/06	• • • Cathodes
13/10	• • • • Containers for the liquid pool; Arrangements or mounting thereof	17/063	• • • • {Indirectly heated cathodes, e.g. by the discharge itself}
13/12	• • • • Positioning or moving the cathode spot on the surface of the pool	17/066	• • • • {Cold cathodes}
13/14	• • • • Cooling, heating, circulating, filtering, or controlling level of the liquid	17/08	• • • • having mercury or liquid alkali metal deposited on the cathode surface during operation of the tube
13/16	• • • Anodes; Auxiliary anodes for maintaining the discharge	17/10	• • • Anodes
13/18	• • • • Cooling or heating of anodes	17/12	• • • Control electrodes
13/20	• • Control electrodes, e.g. grid (for igniting arrangements H01J 13/34)	17/14	• • Magnetic means for controlling the discharge
13/22	• • Screens, e.g. for preventing or eliminating arcing-back	17/16	• • Vessels; Containers
13/24	• • Vessels; Containers	17/18	• • Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors
13/242	• • • {characterised by the material}	17/183	• • • {Seals between parts of vessel}
13/244	• • • {characterised by the shape}	17/186	• • • {Seals between leading-in conductors and vessel}
13/246	• • • {Treatment of, or coating on interior parts of vessel}	17/20	• • Selection of substances for gas fillings; Specified operating pressures or temperatures
13/248	• • • {Envelope means outside vessel, i.e. screens, reflectors, filters}	17/22	• • Means for obtaining or maintaining the desired pressure within the tube
13/26	• • Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors	17/24	• • • Means for absorbing or adsorbing gas, e.g. by gettering
13/263	• • • {Leading-in conductors to the liquid electrode}	17/26	• • • Means for producing, introducing, or replenishing gas or vapour during operation of the tube
13/266	• • • {Leading-in conductors to the anode}		
13/28	• • Selection of substances for gas filling; Means for obtaining the desired pressure within the tube		
13/30	• • • Means for permitting pumping during operation of the tube		

17/28	. . Cooling arrangements	19/066	. . . . with metals or alloys as an emissive material
17/30	. . Igniting arrangements	19/068	. . . . with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material
17/32	. . . Igniting by associated radioactive materials or fillings	19/08	. . . Cathodes heated directly by an electric current
17/325	. . . . {Current stabilising tubes, e.g. curpistors}	19/10	. . . characterised by the shape
17/34	. . One or more circuit elements structurally associated with the tube	19/12	. . . . Supports; Vibration-damping arrangements
17/36	. . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for	19/14	. . . Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
17/38	. Cold-cathode tubes	19/16	. . . . Heaters
17/40	. . with one cathode and one anode, e.g. glow tubes, tuning-indicator glow tubes, voltage-stabiliser tubes, voltage-indicator tubes, (cathode-glow lamps H01J 61/04)	19/18	. . . . Insulating layer or body located between heater and emissive material
17/42	. . . having one or more probe electrodes, e.g. for potential dividing	19/20	. . . . Supports for the emissive material
17/44	. . . having one or more control electrodes	19/22	. . . . Dispenser-type cathodes, e.g. L-cathode
17/46	. . . . for preventing and then permitting ignition but thereafter having no control	19/24	. . Cold cathodes, e.g. field-emissive cathode
17/48	. . with more than one cathode or anode, e.g. sequence-discharge tube, counting tube, dekatron	19/28	. Non-electron-emitting electrodes; Screens
17/485	. . . {Plasma addressed liquid crystal displays [PALC]}	19/30	. . characterised by the material
17/49	. . . Display panels, e.g. with crossed electrodes {, e.g. making use of direct current (display panels making use of alternating current H01J 11/00)}	19/32	. . Anodes
17/491	. . . . {with electrodes arranged side by side and substantially in the same plane, e.g. for displaying alphanumeric characters}	19/34	. . . forming part of the envelope
17/492	. . . . {with crossed electrodes}	19/36	. . . Cooling of anodes
17/494	. . . . {using sequential transfer of the discharges, e.g. of the self-scan type (addressing circuits therefor G09G 3/29)}	19/38	. . Control electrodes, e.g. grid
17/495	. . . . . {display panels using sequential transfer of the discharge along dielectric storage elements}	19/40	. . Screens for shielding
17/497	. . . . . {for several colours}	19/42	. Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies
17/498	. . . . {with a gas discharge space and a post acceleration space for electrons}	19/44	. . Insulation between electrodes or supports within the vacuum space
17/50	. Thermionic-cathode tubes	19/46	. . Mountings for the electrode assembly as a whole
17/52	. . with one cathode and one anode	19/48	. . Mountings for individual electrodes
17/54	. . . having one or more control electrodes	19/50	. . Spacing members extending to the envelope
17/56	. . . . for preventing and then permitting ignition, but thereafter having no control	19/52	. . . without fixed connection between spacing member and envelope
17/58	. . with more than one cathode or anode	19/54	. Vessels; Containers; Shields associated therewith
17/60	. . . the discharge paths priming each other in a predetermined sequence, e.g. counting tube	19/56	. . characterised by the material of the vessel or container
17/62	. . . with independent discharge paths controlled by intermediate electrodes, e.g. polyphase rectifier	19/57	. . provided with coatings on the walls thereof; Selection of materials for the coatings
17/64	. Tubes specially designed for switching or modulating in a waveguide, e.g. TR box	19/58	. Seals between parts of vessels
19/00	Details of vacuum tubes of the types covered by group H01J 21/00	19/60	. Seals for leading-in conductors
19/02	. Electron-emitting electrodes; Cathodes	19/62	. Leading-in conductors
19/04	. . Thermionic cathodes	19/64	. Means forming part of the tube for the purpose supporting it
19/06	. . . characterised by the material	19/66	. Means forming part of the tube for the purpose of providing electrical connection to it {(H01J 5/46 - H01J 5/62 take precedence)}
19/062	. . . . with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material	19/68	. Specified gas introduced into the tube at low pressure, e.g. for reducing or influencing space charge
19/064	. . . . with other metal oxides as an emissive material	19/70	. Means for obtaining or maintaining the vacuum, e.g. by gettering
		19/72	. . Tubulations therefor, e.g. for exhausting; Closures therefor
		19/74	. Cooling arrangements (cooling of anodes H01J 19/36)
		19/76	. Means structurally associated with the tube for indicating defects or previous use
		19/78	. One or more circuit elements structurally associated with the tube
		19/80	. . Structurally associated resonator having distributed inductance and capacitance
		19/82	. Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

21/00	Vacuum tubes (H01J 25/00 , H01J 31/00 - H01J 40/00 , H01J 43/00 , H01J 47/00 , H01J 49/00 take precedence; details of vacuum tubes H01J 19/00)	23/10	<ul style="list-style-type: none"> • • Magnet systems for directing or deflecting the discharge along a desired path, e.g. a spiral path (magnetic focusing arrangements H01J 23/08)
21/02	<ul style="list-style-type: none"> • Tubes with a single discharge path 	23/11	<ul style="list-style-type: none"> • • Means for reducing noise (in electron or ion gun H01J 23/06)
21/04	<ul style="list-style-type: none"> • • without control means, i.e. diodes 	23/12	<ul style="list-style-type: none"> • Vessels; Containers
21/06	<ul style="list-style-type: none"> • • having electrostatic control means only 	23/14	<ul style="list-style-type: none"> • Leading-in arrangements; Seals therefor
21/065	<ul style="list-style-type: none"> • • • {Devices for short wave tubes} 	23/15	<ul style="list-style-type: none"> • • Means for preventing wave energy leakage structurally associated with tube leading-in arrangements, e.g. filters, chokes, attenuating devices
21/08	<ul style="list-style-type: none"> • • • with movable electrode or electrodes 	23/16	<ul style="list-style-type: none"> • Circuit elements, having distributed capacitance and inductance, structurally associated with the tube and interacting with the discharge
21/10	<ul style="list-style-type: none"> • • • with one or more immovable internal control electrodes, e.g. triode, pentode, octode 	23/165	<ul style="list-style-type: none"> • • {Manufacturing processes or apparatus therefore}
21/105	<ul style="list-style-type: none"> • • • • {with microengineered cathode and control electrodes, e.g. Spindt-type} 	23/18	<ul style="list-style-type: none"> • • Resonators
21/12	<ul style="list-style-type: none"> • • • • Tubes with variable amplification factor 	23/20	<ul style="list-style-type: none"> • • • Cavity resonators; Adjustment or tuning thereof
21/14	<ul style="list-style-type: none"> • • • • Tubes with means for concentrating the electron stream, e.g. beam tetrode 	23/207	<ul style="list-style-type: none"> • • • • Tuning of single resonator
21/16	<ul style="list-style-type: none"> • • • with external electrostatic control means and with or without internal control electrodes 	23/213	<ul style="list-style-type: none"> • • • • Simultaneous tuning of more than one resonator, e.g. resonant cavities of a magnetron
21/18	<ul style="list-style-type: none"> • • having magnetic control means; having both magnetic and electrostatic control means 	23/22	<ul style="list-style-type: none"> • • • Connections between resonators, e.g. strapping for connecting resonators of a magnetron
21/20	<ul style="list-style-type: none"> • Tubes with more than one discharge path; Multiple tubes, e.g. double diode, triode-hexode 	23/24	<ul style="list-style-type: none"> • • Slow-wave structures {, e.g. delay systems}
21/22	<ul style="list-style-type: none"> • • with movable electrode or electrodes 	23/26	<ul style="list-style-type: none"> • • • Helical slow-wave structures; Adjustment therefor
21/24	<ul style="list-style-type: none"> • • with variable amplification factor 	23/27	<ul style="list-style-type: none"> • • • • Helix-derived slow-wave structures
21/26	<ul style="list-style-type: none"> • • with means for concentrating the electron stream 	23/28	<ul style="list-style-type: none"> • • • Interdigital slow-wave structures; Adjustment therefor
21/34	<ul style="list-style-type: none"> • Tubes with electrode system arranged or dimensioned so as to eliminate transit-time effect (with flat electrodes H01J 21/36) 	23/30	<ul style="list-style-type: none"> • • • Damping arrangements associated with slow-wave structures, e.g. for suppression of unwanted oscillations
21/36	<ul style="list-style-type: none"> • Tubes with flat electrodes, e.g. disc electrode 	23/34	<ul style="list-style-type: none"> • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
23/00	Details of transit-time tubes of the types covered by group H01J 25/00	23/36	<ul style="list-style-type: none"> • Coupling devices having distributed capacitance and inductance, structurally associated with the tube, for introducing or removing wave energy
23/005	<ul style="list-style-type: none"> • {Cooling methods or arrangements (H01J 23/033 takes precedence)} 	23/38	<ul style="list-style-type: none"> • • to or from the discharge
23/02	<ul style="list-style-type: none"> • Electrodes; Magnetic control means; Screens (associated with resonator or delay system H01J 23/16) 	23/40	<ul style="list-style-type: none"> • • to or from the interaction circuit
23/027	<ul style="list-style-type: none"> • • Collectors 	23/42	<ul style="list-style-type: none"> • • • the interaction circuit being a helix or a helix-derived slow-wave structure (H01J 23/44 - H01J 23/48 take precedence)
23/0275	<ul style="list-style-type: none"> • • • {Multistage collectors} 	23/44	<ul style="list-style-type: none"> • • • Rod-type coupling devices (H01J 23/46, H01J 23/48, H01J 23/54 take precedence)
23/033	<ul style="list-style-type: none"> • • • Collector cooling devices 	23/46	<ul style="list-style-type: none"> • • • Loop coupling devices
23/04	<ul style="list-style-type: none"> • • Cathodes 	23/48	<ul style="list-style-type: none"> • • • for linking interaction circuit with coaxial lines; Devices of the coupled helices type (H01J 23/46 takes precedence)
23/05	<ul style="list-style-type: none"> • • • having a cylindrical emissive surface, e.g. cathodes for magnetrons 	23/50	<ul style="list-style-type: none"> • • • • the interaction circuit being a helix or derived from a helix (H01J 23/52 takes precedence)
23/06	<ul style="list-style-type: none"> • • Electron or ion guns 	23/52	<ul style="list-style-type: none"> • • • • the coupled helices being disposed coaxially around one another
23/065	<ul style="list-style-type: none"> • • • producing a solid cylindrical beam (H01J 23/075 takes precedence) 	23/54	<ul style="list-style-type: none"> • • Filtering devices preventing unwanted frequencies or modes to be coupled to, or out of, the interaction circuit; Prevention of high frequency leakage in the environment
23/07	<ul style="list-style-type: none"> • • • producing a hollow cylindrical beam (H01J 23/075 takes precedence) 	25/00	Transit-time tubes, e.g. klystrons, travelling-wave tubes, magnetrons (details of transit-time tubes H01J 23/00 ; particle accelerators H05H)
23/075	<ul style="list-style-type: none"> • • • Magnetron injection guns 	25/005	<ul style="list-style-type: none"> • {Gas-filled transit-time tubes}
23/08	<ul style="list-style-type: none"> • • Focusing arrangements, e.g. for concentrating stream of electrons, for preventing spreading of stream 		
23/083	<ul style="list-style-type: none"> • • • Electrostatic focusing arrangements 		
23/087	<ul style="list-style-type: none"> • • • Magnetic focusing arrangements 		
23/0873	<ul style="list-style-type: none"> • • • • {with at least one axial-field reversal along the interaction space, e.g. P.P.M. focusing} 		
23/0876	<ul style="list-style-type: none"> • • • • {with arrangements improving the linearity and homogeneity of the axial field, e.g. field straightener} 		
23/09	<ul style="list-style-type: none"> • • Electric systems for directing or deflecting the discharge along a desired path, e.g. E-type (focusing arrangements H01J 23/08) 		

- 25/02 . Tubes with electron stream modulated in velocity or density in a modulator zone and thereafter giving up energy in an inducing zone, the zones being associated with one or more resonators
- 25/025 . . {with an electron stream following a helical path}
- 25/04 . . Tubes having one or more resonators, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly density modulation, e.g. Heaff tube
- 25/06 . . Tubes having only one resonator, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly velocity modulation, e.g. Lüdi-Klystron
- 25/08 . . . with electron stream perpendicular to the axis of the resonator
- 25/10 . . Klystrons, i.e. tubes having two or more resonators, without reflection of the electron stream, and in which the stream is modulated mainly by velocity in the zone of the input resonator
- 25/11 . . . Extended interaction klystrons
- 25/12 . . . with pencil-like electron stream in the axis of the resonators
- 25/14 . . . with tube-like electron stream coaxial with the axis of the resonators
- 25/16 . . . with pencil-like electron stream perpendicular to the axis of the resonators
- 25/18 . . . with radial or disc-like electron stream perpendicular to the axis of the resonators
- 25/20 . . . having special arrangements in the space between resonators, e.g. resistive-wall amplifier tube, space-charge amplifier tube, velocity-jump tube
- 25/22 . . Reflex klystrons, i.e. tubes having one or more resonators, with a single reflection of the electron stream, and in which the stream is modulated mainly by velocity in the modulator zone
- 25/24 . . . in which the electron stream is in the axis of the resonator or resonators and is pencil-like before reflection
- 25/26 . . . in which the electron stream is coaxial with the axis of the resonator or resonators and is tube-like before reflection
- 25/28 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is pencil-like before reflection
- 25/30 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is radial or disc-like before reflection
- 25/32 . . Tubes with plural reflection, e.g. Coeterier tube
- 25/34 . Travelling-wave tubes; Tubes in which a travelling wave is simulated at spaced gaps
- 25/36 . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and without magnet system producing an H-field crossing the E-field
- 25/38 . . . the forward travelling wave being utilised
- 25/40 . . . the backward travelling wave being utilised
- 25/42 . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and with a magnet system producing an H-field crossing the E-field (with travelling wave moving completely around the electron space [H01J 25/50](#))
- 25/44 . . . the forward travelling wave being utilised
- 25/46 . . . the backward travelling wave being utilised
- 25/48 . . Tubes in which two electron streams of different velocities interact with one another, e.g. electron-wave tube
- 25/49 . . Tubes using the parametric principle, e.g. for parametric amplification
- 25/50 . Magnetrons, i.e. tubes with a magnet system producing an H-field crossing the E-field (with travelling wave not moving completely around the electron space [H01J 25/42](#); functioning with plural reflection or with reversed cyclotron action [H01J 25/62](#), [H01J 25/64](#))
- 25/52 . . with an electron space having a shape that does not prevent any electron from moving completely around the cathode or guide electrode
- 25/54 . . . having only one cavity or other resonator, e.g. neutrode tubes
- 25/55 Coaxial cavity magnetrons
- 25/56 with interdigital arrangements of anodes, e.g. turbator tube
- 25/58 . . . having a number of resonators; having a composite resonator, e.g. a helix
- 25/587 Multi-cavity magnetrons
- 25/593 Rising-sun magnetrons
- 25/60 . . with an electron space having a shape that prevents any electron from moving completely around the cathode or guide electrode; Linear magnetrons
- 25/61 . Hybrid tubes, i.e. tubes comprising a klystron section and a travelling-wave section
- 25/62 . Strophotrons, i.e. tubes with H-field crossing the E-field and functioning with plural reflection
- 25/64 . Turbine tubes, i.e. tubes with H-field crossing the E-field and functioning with reversed cyclotron action
- 25/66 . Tubes with electron stream crossing itself and thereby interacting or interfering with itself
- 25/68 . Tubes specially designed to act as oscillator with positive grid and retarding field, e.g. for Barkhausen-Kurz oscillators (with secondary emission [H01J 25/76](#))
- 25/70 . . with resonator having distributed inductance with capacitance, e.g. Pintsch tube
- 25/72 . . in which a standing wave or a considerable part thereof is produced along an electrode, e.g. Clavier tube (with resonator having distributed inductance and capacitance [H01J 25/70](#))
- 25/74 . Tubes specially designed to act as transit-time diode oscillators, e.g. monotrons
- 25/76 . Dynamic electron-multiplier tubes, e.g. Farnsworth multiplier tube, multipactor
- 25/78 . Tubes with electron stream modulated by deflection in a resonator
- 27/00 **Ion beam tubes** ([H01J 25/00](#), [H01J 33/00](#), [H01J 37/00](#) take precedence; particle accelerators [H05H](#))
- 27/02 . Ion sources; Ion guns (for examination or processing discharge tubes [H01J 37/08](#); ion sources, ion guns for particle spectrometer or separator tubes [H01J 49/10](#); ion propulsion [F03H 1/00](#))
- 27/022 . . {Details}
- 27/024 . . . {Extraction optics, e.g. grids}
- 27/026 . . {Cluster ion sources}
- 27/028 . . {Negative ion sources}

- 27/04 . . using reflex discharge, e.g. Penning ion sources {(electron bombardment ion sources [H01J 27/08](#))}
- 27/06 . . . without applied magnetic field
- 27/08 . . using arc discharge
- 27/10 . . . Duoplasmatrons {; [Duopigatrons](#)}
- 27/12 provided with an expansion cup
- 27/14 . . . Other arc discharge ion sources using an applied magnetic field
- 27/143 {Hall-effect ion sources with closed electron drift}
- 27/146 {End-Hall type ion sources, wherein the magnetic field confines the electrons in a central cylinder}
- 27/16 . . using high-frequency excitation, e.g. microwave excitation
- 27/18 . . . with an applied axial magnetic field
- 27/20 . . using particle {beam} bombardment, e.g. ionisers
- 27/205 . . . {with electrons, e.g. electron impact ionisation, electron attachment}
- 27/22 . . . Metal ion sources
- 27/24 . . using photo-ionisation, e.g. using laser beam
- 27/26 . . using surface ionisation, e.g. field effect ion sources, thermionic ion sources ([H01J 27/20](#), [H01J 27/24](#) take precedence)
- 29/00 Details of cathode-ray tubes or of electron-beam tubes of the types covered by group [H01J 31/00](#)**
- 29/003 . {Arrangements for eliminating unwanted electromagnetic effects, e.g. demagnetisation arrangements, shielding coils ([H01J 29/06](#), [H01J 29/867](#) take precedence; demagnetisation in general [H01F 13/00](#); circuit arrangements therefor [H04N 9/29](#); screening of apparatus against electric or magnetic fields [H05K 9/00](#))}
- 29/006 . {Arrangements for eliminating unwanted temperature effects}
- 29/02 . Electrodes; Screens; Mounting, supporting, spacing or insulating thereof
- 29/021 . . {arrangements for eliminating interferences in the tube ([H01J 29/484](#) takes precedence)}
- 29/023 . . {secondary-electron emitting electrode arrangements (secondary-emission tubes [H01J 43/00](#))}
- 29/025 . . {Mounting or supporting arrangements for grids ([H01J 29/028](#) takes precedence)}
- 29/026 . . {Mounting or supporting arrangements for charge storage screens not deposited on the frontplate}
- 29/028 . . {Mounting or supporting arrangements for flat panel cathode ray tubes, e.g. spacers particularly relating to electrodes}
- 29/04 . . Cathodes
- 29/06 . . Screens for shielding; Masks interposed in the electron stream
- 29/07 . . . Shadow masks for colour television tubes
- 29/073 {Mounting arrangements associated with shadow masks}
- 29/076 {characterised by the shape or distribution of beam-passing apertures}
- 29/08 . . Electrodes intimately associated with a screen on or from which an image or pattern is formed, picked-up, converted or stored, e.g. backing-plates for storage tubes or collecting secondary electrons
- 29/085 . . . {Anode plates, e.g. for screens of flat panel displays}
- 29/10 . . Screens on or from which an image or pattern is formed, picked up, converted or stored
- 29/12 . . . acting as light valves by shutter operation, e.g. for eidophor
- 29/14 . . . acting by discoloration, e.g. halide screen
- 29/16 . . . Incandescent screens
- 29/18 . . . Luminescent screens
- 29/182 {acting upon the lighting-up of the luminescent material other than by the composition of the luminescent material, e.g. by infra red or UV radiation, heating or electric fields}
- 29/185 {measures against halo-phenomena}
- 29/187 {screens with more than one luminescent material (as mixtures for the treatment of the screens) (for several superimposed luminescent layers [H01J 29/26](#); for adjacent dots or lines of different luminescent material [H01J 29/32](#))}
- 29/20 characterised by the luminescent material
- 29/22 characterised by the binder or adhesive for securing the luminescent material to its support, e.g. vessel
- 29/225 {photosensitive adhesive}
- 29/24 Supports for luminescent material
- 29/26 with superimposed luminescent layers
- 29/28 with protective, conductive or reflective layers
- 29/30 with luminescent material discontinuously arranged, e.g. in dots, in lines
- 29/32 with adjacent dots or lines of different luminescent material, e.g. for colour television
- 29/322 {with adjacent dots}
- 29/325 {with adjacent lines}
- 29/327 {Black matrix materials}
- 29/34 provided with permanent marks or references
- 29/36 . . . Photoelectric screens; Charge-storage screens
- 29/38 not using charge storage, e.g. photo-emissive screen, extended cathode {(electrodes using photo-emission in general [H01J 1/34](#))}
- 29/385 {Photocathodes comprising a layer which modified the wave length of impinging radiation}
- 29/39 Charge-storage screens
- 29/395 {charge-storage grids exhibiting triode effect}
- 29/41 using secondary emission, e.g. for supericonoscope {(electrodes using secondary emission in general [H01J 1/32](#); secondary emission tubes [H01J 43/00](#))}
- 29/413 {for writing and reading of charge pattern on opposite sides of the target, e.g. for superorthicon}
- 29/416 {with a matrix of electrical conductors traversing the target}
- 29/43 using photo-emissive mosaic, e.g. for orthicon, for iconoscope
- 29/435 {with a matrix of conductors traversing the target}

- 29/44 exhibiting internal electric effects caused by particle radiation, e.g. bombardment-induced conductivity {(particle detectors exhibiting internal electric effects G01T 1/26)}
- 29/45 exhibiting internal electric effects caused by electromagnetic radiation, e.g. photoconductive screen, photodielectric screen, photovoltaic screen {(photoconductive layers for electrography G03G 5/00)}
- 29/451 {with photosensitive junctions}
- 29/453 {provided with diode arrays}
- 29/455 {formed on a silicon substrate}
- 29/456 {exhibiting no discontinuities, e.g. consisting of uniform layers}
- 29/458 {pyroelectrical targets; targets for infrared or ultraviolet or X-ray radiations}
- 29/46 Arrangements of electrodes and associated parts for generating or controlling the ray or beam, e.g. electron-optical arrangement {(transit time tubes H01J 23/00, H01J 25/00; X-ray tubes H01J 35/00; beam tubes for examining ions, e.g. electron or ion microscopes, or processing of objects or materials, e.g. electron or ion beam tubes H01J 37/04; electron multipliers H01J 43/04; handling of radiation or particles, e.g. focusing, deviating, not otherwise provided for G21K 1/00)}
- NOTE**
H01J 29/48 takes precedence over groups H01J 29/52 - H01J 29/58.
- 29/462 . . . {arrangements for interrupting the beam during inoperative periods}
- 29/465 . . . {for simultaneous focalisation and deflection of ray or beam}
- 29/467 . . . {Control electrodes for flat display tubes, e.g. of the type covered by group H01J 31/123}
- 29/48 . . . Electron guns
- 29/481 . . . {Electron guns using field-emission, photo-emission, or secondary-emission electron source}
- 29/482 . . . {Electron guns using electron multiplication}
- 29/484 . . . {Eliminating deleterious effects due to thermal effects, electrical or magnetic fields; Preventing unwanted emission (H01J 29/481 and H01J 29/482 take precedence)}
- 29/485 . . . {Construction of the gun or of parts thereof (H01J 29/481, H01J 29/482, H01J 29/484 and H01J 29/487 take precedence)}
- 29/487 . . . {Replacing parts of the gun; Relative adjustment of the electrodes (H01J 29/481 and H01J 29/482 take precedence; vacuum locks H01J 29/865)}
- 29/488 . . . {Schematic arrangements of the electrodes for beam forming; Place and form of the electrodes}
- 29/50 . . . two or more guns in a single vacuum space, e.g. for plural-ray tube (H01J 29/51 takes precedence)
- 29/503 {Three or more guns, the axes of which lay in a common plane}
- 29/506 {guns in delta or circular configuration}
- 29/51 Arrangements for controlling convergence of a plurality of beams {by means of electric field only}
- 29/52 Arrangements for controlling intensity of ray or beam, e.g. for modulation {(H01J 29/467 takes precedence)}
- 29/525 {Digitally controlled systems, e.g. Digisplay}
- 29/54 Arrangements for centring ray or beam {(H01J 29/467 takes precedence)}
- 29/56 Arrangements for controlling cross-section of ray or beam; Arrangements for correcting aberration of beam, e.g. due to lenses {(H01J 29/467 takes precedence)}
- 29/563 {for controlling cross-section}
- 29/566 {for correcting aberration}
- 29/58 Arrangements for focusing or reflecting ray or beam
- 29/585 {in which the transit time of the electrons has to be taken into account}
- 29/60 Mirrors
- 29/62 Electrostatic lenses
- 29/622 {producing fields exhibiting symmetry of revolution}
- 29/624 {co-operating with or closely associated to an electron gun}
- 29/626 {producing fields exhibiting periodic axial symmetry, e.g. multipolar fields}
- 29/628 {co-operating with or closely associated to an electron gun}
- 29/64 Magnetic lenses
- 29/66 using electromagnetic means only
- 29/68 using permanent magnets only
- 29/70 Arrangements for deflecting ray or beam {(H01J 29/467, H01J 29/525 take precedence)}
- 29/701 {Systems for correcting deviation or convergence of a plurality of beams by means of magnetic fields at least}
- 29/702 {Convergence correction arrangements therefor}
- 29/703 {Static convergence systems}
- 29/705 {Dynamic convergence systems}
- 29/706 {Deviation correction devices, i.e. having the same action on each beam}
- 29/707 {Arrangements intimately associated with parts of the gun and co-operating with external magnetic excitation devices}
- 29/708 {in which the transit time of the electrons has to be taken into account}
- 29/72 along one straight line or along two perpendicular straight lines
- 29/74 Deflecting by electric fields only
- 29/76 Deflecting by magnetic fields only
- 29/762 {using saddle coils or printed windings (coils per se H01F)}
- 29/764 {using toroidal windings}
- 29/766 {using a combination of saddle coils and toroidal windings}
- 29/768 {using printed windings (printed windings in general H01F 27/2804; manufacturing printed coils per se H01F 41/04; printed circuits and apparatus or processes for manufacturing printed circuits in general H05K 1/00, e.g. H05K 1/16, and H05K 3/00)}

- 29/78 . . . along a circle, spiral or rotating radial line, e.g. for radar display
- 29/80 . . Arrangements for controlling the ray or beam after passing the main deflection system, e.g. for post-acceleration or post-concentration, for colour switching [{\(H01J 29/701 takes precedence\)}](#)
- 29/803 . . . {for post-acceleration or post-deflection, e.g. for colour switching}
- 29/806 {Electron lens mosaics, e.g. fly's eye lenses, colour selection lenses}
- 29/81 . . . using shadow masks
- 29/82 . . Mounting, supporting, spacing, or insulating electron-optical or ion-optical arrangements
- 29/823 . . . {around the neck of the tube}
- 29/826 {Deflection arrangements}
- 29/84 . Traps for removing or diverting unwanted particles, e.g. negative ions, fringing electrons; Arrangements for velocity or mass selection
- 29/845 . . {by means of magnetic systems}
- 29/86 . Vessels; Containers; Vacuum locks
- 29/861 . . {Vessels or containers characterised by the form or the structure thereof}
- 29/862 . . . {of flat panel cathode ray tubes}
- 29/863 . . {Vessels or containers characterised by the material thereof}
- 29/864 . . {Spacers between faceplate and backplate of flat panel cathode ray tubes}
- 29/865 . . {Vacuum locks}
- 29/866 . . . {Devices for introducing a recording support into the vessel}
- 29/867 . . {Means associated with the outside of the vessel for shielding, e.g. magnetic shields [\(screens for shielding inside the vessel H01J 29/06; magnetic shielding in general H05K 9/00\)}](#)
- 29/868 . . . {Screens covering the input or output face of the vessel, e.g. transparent anti-static coatings, X-ray absorbing layers}
- 29/87 . . Arrangements for preventing or limiting effects of implosion of vessels or containers
- 29/88 . . provided with coatings on the walls thereof; Selection of materials for the coatings [{\(H01J 29/868 and H01J 29/89 take precedence\)}](#)
- 29/89 . . Optical or photographic arrangements structurally combined {or co-operating} with the vessel [{\(H01J 29/866 and H01J 29/868 take precedence\)}](#)
- 29/892 . . . {using fibre optics}
- 29/894 . . . {Arrangements combined with the vessel for the purpose of image projection on a screen [\(projection arrangements for image reproduction, e.g. using eidophor H04N 5/74\)}](#)
- 29/896 . . . {Anti-reflection means, e.g. eliminating glare due to ambient light}
- 29/898 . . . {Spectral filters}
- 29/90 . Leading-in arrangements; Seals therefor
- 29/92 . Means forming part of the tube for the purpose of providing electrical connection to it
- 29/925 . . {High voltage anode feedthrough connectors for display tubes}
- 29/94 . Selection of substances for gas fillings; Means for obtaining or maintaining the desired pressure within the tube, e.g. by gettering [{\(exhausting, degassing, gettering of electric discharge tubes in general H01J 9/38\)}](#)
- 29/96 . One or more circuit elements structurally associated with the tube
- 29/98 . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- 31/00 Cathode ray tubes; Electron beam tubes**
[\(H01J 25/00, H01J 33/00, H01J 35/00, H01J 37/00 take precedence; details of cathode ray tubes or of electron beam tubes H01J 29/00\)](#)
- 31/02 . having one or more output electrodes which may be impacted selectively by the ray or beam, and onto, from, or over which the ray or beam may be deflected or de-focused [{\(pulse counting circuits therewith H03K 29/06\)}](#)
- 31/04 . . with only one or two output electrodes [{with only two electrically independant groups or electrodes}](#)
- 31/06 . . with more than two output electrodes, e.g. for multiple switching or counting
- 31/065 . . . {for electrography or electrophotography, for transferring a charge pattern through the faceplate [\(leading-in arrangements H01J 29/90; Lenard tubes H01J 33/00; electrography or electrophotography per se G03C\)}](#)
- 31/08 . having a screen on or from which an image or pattern is formed, picked up, converted, or stored
- 31/10 . . Image or pattern display tubes, i.e. having electrical input and optical output; Flying-spot tubes for scanning purposes
- 31/12 . . . with luminescent screen
- 31/121 {tubes for oscillography [\(colour display tubes H01J 31/20; cathode ray oscillography G01R 13/20\)}](#)
- 31/122 {Direct viewing storage tubes without storage grid [\(with storage grid H01J 31/18\)}](#)
- 31/123 {Flat display tubes}
- 31/124 {using electron beam scanning}
- 31/125 {provided with control means permitting the electron beam to reach selected parts of the screen, e.g. digital selection}
- 31/126 {using line sources}
- 31/127 {using large area or array sources, i.e. essentially a source for each pixel group}
- 31/128 {provided with control means permitting the electron beam to reach selected parts of the screen, e.g. digitally controlled display tubes [\(H01J 31/123 takes precedence\)}](#)
- 31/14 Magic-eye or analogous tuning indicators [{\(mounting of visual indicators in a radio set H03J 1/04; circuits for timing indicators H03J 3/14\)}](#)
- 31/15 with ray or beam selectively directed to luminescent anode segments [{\(printing by application of radiation B41J 2/447\)}](#)
- 31/16 with mask carrying a number of selectively displayable signs, e.g. charactron, numeroscope [{\(tubes with a mask carrying a matrix of openings, a selection of which permits a sign to be displayed H01J 31/128\)}](#)

- 31/18 with image written by a ray or beam on a grid-like charge-accumulating screen, and with a ray or beam passing through and influenced by this screen before striking the luminescent screen, e.g. direct-view storage tube [{\(charge storage grids exhibiting triode effect H01J 29/395\)}](#)
- 31/20 for displaying images or patterns in two or more colours [{\(circuits for colour television H04N 9/16 - H04N 9/28\)}](#)
- 31/201 {using a colour-selection electrode}
- 31/203 {with more than one electron beam}
- 31/205 {with three electron beams in delta configuration}
- 31/206 {with three coplanar electron beams}
- 31/208 {using variable penetration depth of the electron beam in the luminescent layer, e.g. penetrons}
- 31/22 for stereoscopic displays
- 31/24 with screen acting as light valve by shutter operation, e.g. eidophor [{\(projection arrangements for image reproduction, e.g. using eidophor H04N 5/74\)}](#)
- 31/26 Image pick-up tubes having an input of visible light and electric output [\(tubes without defined electron beams and having a light ray scanning photo-emissive screen H01J 40/20\)](#)
- 31/265 {with light spot scanning}
- 31/28 with electron ray scanning the image screen
- 31/283 {with a target comprising semiconductor junctions}
- 31/286 {correlater tubes}
- 31/30 having regulation of screen potential at anode potential, e.g. iconoscope
- 31/32 Tubes with image amplification section, e.g. image-iconoscope, supericonoscope
- 31/34 having regulation of screen potential at cathode potential, e.g. orthicon
- 31/36 Tubes with image amplification section, e.g. image-orthicon
- 31/38 Tubes with photoconductive screen, e.g. vidicon
- 31/40 having grid-like image screen through which the electron ray passes and by which the ray is influenced before striking the output electrode, i.e. having "triode action"
- 31/42 with image screen generating a composite electron beam which is deflected as a whole past a stationary probe to simulate a scanning effect, e.g. Farnsworth pick-up tube
- 31/44 Tubes with image amplification section
- 31/46 Tubes in which electrical output represents both intensity and colour of image [{\(colour television cameras with only one tube H04N 23/12\)}](#)
- 31/48 Tubes with amplification of output effected by electron multiplier arrangements within the vacuum space
- 31/49 Pick-up adapted for an input of electromagnetic radiation other than visible light and having an electric output, e.g. for an input of X-rays, for an input of infrared radiation
- 31/495 Pick-up tubes adapted for an input of sonic, ultrasonic, or mechanical vibrations and having an electric output
- 31/50 Image-conversion or image-amplification tubes, i.e. having optical, X-ray, or analogous input, and optical output
- 31/501 {with an electrostatic electron optic system [\(H01J 31/52 - H01J 31/56 take precedence\)}](#)
- 31/502 {with means to interrupt the beam, e.g. shutter for high speed photography [\(circuits using electron-beam shutters G03B 27/725\)}](#)
- 31/503 {with an electromagnetic electron-optic system [\(H01J 31/52 - H01J 31/56 take precedence\)}](#)
- 31/505 {flat tubes, e.g. proximity focusing tubes}
- 31/506 {tubes using secondary emission effect}
- 31/507 {using a large number of channels, e.g. microchannel plates}
- 31/508 {Multistage converters}
- 31/52 having grid-like image screen through which the electron ray or beam passes and by which the ray or beam is influenced before striking the luminescent output screen, i.e. having "triode action"
- 31/54 in which the electron ray or beam is reflected by the image input screen on to the image output screen
- 31/56 for converting or amplifying images in two or more colours
- 31/58 Tubes for storage of image or information pattern or for conversion of definition of television or like images, i.e. having electrical input and electrical output [{\(electrostatic memories using electron beam tubes G11C 11/23\)}](#)
- 31/585 {Monoscopes [\(H01J 31/60 takes precedence\)}](#)
- 31/60 having means for deflecting, either selectively or sequentially, an electron ray on to separate surface elements of the screen [\(by circuitry alone H01J 29/08\)](#)
- 31/62 with separate reading and writing rays
- 31/64 on opposite sides of screen, e.g. for conversion of definition
- 31/66 having means for allowing all but selected cross-section elements of a homogeneous electron beam to reach corresponding elements of the screen, e.g. selectron
- 31/68 in which the information pattern represents two or more colours
- 33/00 Discharge tubes with provision for emergence of electrons or ions from the vessel [{\(irradiation devices G21K\) ; particle accelerators H05H\); Lenard tubes}](#)**
- 33/02 Details [{\(vessels for operation at high tension H01J 5/06\)}](#)
- 33/04 Windows
- 35/00 X-ray tubes**
- 35/02 Details
- 35/025 {X-ray tubes with structurally associated circuit elements}
- 35/04 Electrodes [{; Mutual position thereof; Constructional adaptations therefor}](#)
- 35/045 {Electrodes for controlling the current of the cathode ray, e.g. control grids}
- 35/06 Cathodes
- 35/064 {Details of the emitter, e.g. material or structure [\(H01J 35/065 takes precedence\)}](#)

- 35/065 {Field emission, photo emission or secondary emission cathodes}
- 35/066 {Details of electron optical components, e.g. cathode cups}
- 35/08 . . . Anodes; Anti cathodes
- 35/10 Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes
- 35/101 {Arrangements for rotating anodes, e.g. supporting means, means for greasing, means for sealing the axle or means for shielding or protecting the driving}
- 35/1017 {Bearings for rotating anodes}
- 35/1024 {Rolling bearings}
- 35/103 {Magnetic bearings}
- 35/104 {Fluid bearings}
- 35/105 {Cooling of rotating anodes, e.g. heat emitting layers or structures}
- 35/106 {Active cooling, e.g. fluid flow, heat pipes}
- 35/107 {Cooling of the bearing assemblies}
- 35/108 {Substrates for and bonding of emissive target, e.g. composite structures}
- 35/112 {Non-rotating anodes ([H01J 35/12](#) takes precedence)}
- 35/116 {Transmissive anodes (acting as a window [H01J 35/186](#))}
- 35/12 Cooling non-rotary anodes
- 35/13 {Active cooling, e.g. fluid flow, heat pipes}
- 35/14 . . Arrangements for concentrating, focusing, or directing the cathode ray
- 35/147 . . . {Spot size control}
- 35/153 . . . {Spot position control}
- 35/16 . . Vessels; Containers; Shields associated therewith
- 35/165 . . . {joining connectors to the tube}
- 35/18 . . . Windows
- 35/186 {used as targets or X-ray converters}
- 35/20 . . Selection of substances for gas fillings; Means for obtaining or maintaining the desired pressure within the tube, e.g. by gettering
- 35/22 . specially designed for passing a very high current for a very short time, e.g. for flash operation
- 35/24 . Tubes wherein the point of impact of the cathode ray on the anode or anticathode is movable relative to the surface thereof
- 35/26 . . by rotation of the anode or anticathode
- 35/28 . . by vibration, oscillation, reciprocation, or swash-plate motion of the anode or anticathode
- 35/30 . . by deflection of the cathode ray
- 35/305 . . . {by using a rotating X-ray tube in conjunction therewith}
- 35/32 . Tubes wherein the X-rays are produced at or near the end of the tube or a part thereof which tube or part has a small cross-section to facilitate introduction into a small hole or cavity
- 37/00 Discharge tubes with provision for introducing objects or material to be exposed to the discharge, e.g. for the purpose of examination or processing thereof ([H01J 33/00](#), [H01J 40/00](#), [H01J 41/00](#), [H01J 47/00](#), [H01J 49/00](#) take precedence)**
- 37/02 . Details
- 37/023 . . {Means for mechanically adjusting components not otherwise provided for ([mechanically adjusting from the outside of electron or ion-optical components \[H01J 37/067\]\(#\)](#); positioning the object or material [H01J 37/20](#); vacuum locks, means for obtaining or maintaining the desired pressure within the tube [H01J 37/18](#); other manipulating devices [H01L 21/48](#), [G21F](#))}
- 37/026 . . {Means for avoiding or neutralising unwanted electrical charges on tube components}
- 37/04 . . Arrangements of electrodes and associated parts for generating or controlling the discharge, e.g. electron-optical arrangement, ion-optical arrangement {([electron or ion-optical systems for localised treatment of materials \[H01J 37/3007\]\(#\)](#); discharge control means in gas filled discharge tubes [H01J 37/32009](#))}
- 37/045 . . . {Beam blanking or chopping, i.e. arrangements for momentarily interrupting exposure to the discharge}
- 37/05 . . . Electron or ion-optical arrangements for separating electrons or ions according to their energy {or mass}(particle separator tubes [H01J 49/00](#))
- 37/06 . . . Electron sources; Electron guns {(electron sources in general [H01J 1/02](#), [H01J 19/02](#); electron guns in general [H01J 3/02](#))}
- 37/061 {Electron guns using electron multiplication}
- 37/063 Geometrical arrangement of electrodes for beam-forming
- 37/065 Construction of guns or parts thereof ([H01J 37/067](#) - [H01J 37/077](#) take precedence)
- 37/067 Replacing parts of guns; Mutual adjustment of electrodes ([H01J 37/073](#) - [H01J 37/077](#) take precedence; vacuum locks [H01J 37/18](#))
- 37/07 Eliminating deleterious effects due to thermal effects or electric or magnetic fields ([H01J 37/073](#) - [H01J 37/077](#) take precedence)
- 37/073 Electron guns using field emission, photo emission, or secondary emission electron sources
- 37/075 Electron guns using thermionic emission from cathodes heated by particle bombardment or by irradiation, e.g. by laser
- 37/077 Electron guns using discharge in gases or vapours as electron sources
- 37/08 . . . Ion sources; Ion guns
- 37/09 . . . Diaphragms; Shields associated with electron or ion-optical arrangements; Compensation of disturbing fields
- 37/10 . . . Lenses
- 37/12 electrostatic
- 37/14 magnetic
- 37/141 Electromagnetic lenses
- 37/1413 {Means for interchanging parts of the lens, e.g. pole pieces, within the tube ([mechanically adjusting electron \(ion\) optical components \[H01J 37/15\]\(#\)](#))}
- 37/1416 {with superconducting coils}
- 37/143 Permanent magnetic lenses
- 37/145 Combinations of electrostatic and magnetic lenses

- 37/147 . . . Arrangements for directing or deflecting the discharge along a desired path ([H01J 37/045](#) take precedence; [lenses H01J 37/10](#))
- 37/1471 {for centering, aligning or positioning of ray or beam}
- 37/1472 {Deflecting along given lines}
- 37/1474 {Scanning means}
- 37/1475 {magnetic}
- 37/1477 {electrostatic}
- 37/1478 {Beam tilting means, i.e. for stereoscopy or for beam channelling}
- 37/15 External mechanical adjustment of electron or ion optical components ([H01J 37/067](#), [H01J 37/20](#) take precedence)
- 37/153 . . . Electron-optical or ion-optical arrangements for the correction of image defects, e.g. stigmators
- 37/16 . . Vessels; Containers
- 37/165 . . . {Means associated with the vessel for preventing the generation of or for shielding unwanted radiation, e.g. X-rays}
- 37/18 . . Vacuum locks {; Means for obtaining or maintaining the desired pressure within the vessel (vacuum locks for electron-beam tubes in general [H01J 29/865](#))}
- 37/185 . . . {Means for transferring objects between different enclosures of different pressure or atmosphere}
- 37/20 . . Means for supporting or positioning the objects or the material; Means for adjusting diaphragms or lenses associated with the support ({[introducing the objects H01J 37/18](#)})
- 37/21 . . Means for adjusting the focus ({[adjusting the focus while observing the image by photographic or optical means H01J 37/22](#); means for observing the object or the point of impact on the object in tubes for the localised treatment of materials [H01J 37/3005](#)})
- 37/22 . . Optical or photographic arrangements associated with the tube ({[using a CRT for the display of the image in a scanning electron microscope H01J 37/28](#); observing the object or the point of impact on the object in tubes for the localised treatment of materials [H01J 37/3007](#)})
- 37/222 . . . {Image processing arrangements associated with the tube (image data processing or generation, in general [G06T](#))}
- 37/224 . . . {Luminescent screens or photographic plates for imaging (photosensitive materials for photographic purposes [G03C](#)); Apparatus specially adapted therefor, e.g. cameras, TV-cameras, photographic equipment, exposure control; Optical subsystems specially adapted therefor, e.g. microscopes for observing image on luminescent screen}
- 37/226 . . . {Optical arrangements for illuminating the object; optical arrangements for collecting light from the object}
- 37/228 {whereby illumination and light collection take place in the same area of the discharge}
- 37/24 . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- 37/241 . . . {High voltage power supply or regulation circuits (components [H01J 37/248](#))}
- 37/242 {Filament heating power supply or regulation circuits ([H01J 37/241](#) takes precedence)}
- 37/243 {Beam current control or regulation circuits ([H01J 37/241](#) takes precedence)}
- 37/244 . . Detectors; Associated components or circuits therefor
- 37/248 . . Components associated with high voltage supply ({[means for measuring the high voltage per se G01R 15/00](#)})
- 37/252 . Tubes for spot-analysing by electron or ion beams; Microanalysers
- 37/256 . . using scanning beams
- 37/26 . Electron or ion microscopes; Electron or ion diffraction tubes
- 37/261 . . {Details}
- 37/263 . . . {Contrast, resolution or power of penetration}
- 37/265 . . . {Controlling the tube; circuit arrangements adapted to a particular application not otherwise provided, e.g. bright-field-dark-field illumination}
- 37/266 . . {Measurement of magnetic- or electric fields in the object; Lorentz microscopy (emission microscopes [H01J 37/285](#); reflecting microscopes [H01J 37/29](#); spot analysing [H01J 37/252](#))}
- 37/268 . . . {with scanning beams}
- 37/27 . Shadow microscopy
- 37/28 . . with scanning beams ({[H01J 37/268](#), [H01J 37/292](#), [H01J 37/2955](#) take precedence})
- 37/285 . . Emission microscopes, e.g. field-emission microscopes
- 37/29 . . Reflection microscopes
- 37/292 . . . {using scanning ray}
- 37/295 . . Electron or ion diffraction tubes
- 37/2955 . . . {using scanning ray}
- 37/30 . Electron-beam or ion-beam tubes for localised treatment of objects
- 37/3002 . . {Details}
- 37/3005 . . . {Observing the objects or the point of impact on the object}
- 37/3007 . . . {Electron or ion-optical systems (electron or ion-optical details [H01J 37/06](#) - [H01J 37/153](#))}
- 37/301 . . Arrangements enabling beams to pass between regions of different pressure
- 37/302 . . Controlling tubes by external information, e.g. programme control ([H01J 37/304](#) takes precedence)
- 37/3023 . . . {Programme control}
- 37/3026 {Patterning strategy}
- 37/304 . . Controlling tubes by information coming from the objects {or from the beam}, e.g. correction signals
- 37/3045 . . . {Object or beam position registration}
- 37/305 . . for casting, melting, evaporating or etching ({[methods for casting or melting of metals with electron beam or gas discharges C22B 9/22](#)})
- 37/3053 . . . {for evaporating or etching}
- 37/3056 {for microworking, e.g. etching of gratings, trimming of electrical components (trimming of resistors [H01C 17/22](#))}
- 37/31 . . for cutting or drilling ({[methods for cutting or drilling metals with electron beams B23K 15/00](#)})
- 37/315 . . for welding ({[methods for welding metals with electron beams B23K 15/00](#)})

- 37/317 . . . for changing properties of the objects or for applying thin layers thereon, e.g. for ion implantation ([H01J 37/36](#) takes precedence)
- 37/3171 . . . {for ion implantation (plasma immersion ion implantation [H01J 37/32412](#))}
- 37/3172 {Maskless patterned ion implantation}
- 37/3174 . . . {Particle-beam lithography, e.g. electron beam lithography}
- 37/3175 {Projection methods, i.e. transfer substantially complete pattern to substrate}
- 37/3177 {Multi-beam, e.g. fly's eye, comb probe}
- 37/3178 . . . {for applying thin layers on objects}
- 37/32 . Gas-filled discharge tubes (heating by discharge [H05B](#))
- 37/32009 . . {Arrangements for generation of plasma specially adapted for examination or treatment of objects, e.g. plasma sources (plasma generation in general [H05H 1/24](#))}
- 37/32018 . . . {Glow discharge}
- 37/32027 {DC powered}
- 37/32036 {AC powered}
- 37/32045 {Circuits specially adapted for controlling the glow discharge}
- 37/32055 . . . {Arc discharge}
- 37/32064 {Circuits specially adapted for controlling the arc discharge (for plasma torches [H01H 1/36](#))}
- 37/32073 . . . {Corona discharge}
- 37/32082 . . . {Radio frequency generated discharge ([H01J 37/32357](#), [H01J 37/32366](#), [H01J 37/32394](#) and [H01J 37/32403](#) take precedence)}
- 37/32091 {the radio frequency energy being capacitively coupled to the plasma}
- 37/321 {the radio frequency energy being inductively coupled to the plasma}
- 37/3211 {Antennas, e.g. particular shapes of coils}
- 37/32119 {Windows}
- 37/32128 {using particular waveforms, e.g. polarised waves}
- 37/32137 {controlling of the discharge by modulation of energy}
- 37/32146 {Amplitude modulation, includes pulsing}
- 37/32155 {Frequency modulation}
- 37/32165 {Plural frequencies}
- 37/32174 {Circuits specially adapted for controlling the RF discharge}
- 37/32183 {Matching circuits}
- 37/32192 . . . {Microwave generated discharge ([H01J 37/32357](#), [H01J 37/32366](#), [H01J 37/32394](#), [H01J 37/32403](#) take precedence)}
- 37/32201 {Generating means}
- 37/32211 {Means for coupling power to the plasma}
- 37/3222 {Antennas}
- 37/32229 {Waveguides}
- 37/32238 {Windows}
- 37/32247 {Resonators}
- 37/32256 {Tuning means}
- 37/32266 {Means for controlling power transmitted to the plasma}
- 37/32275 {Microwave reflectors}
- 37/32284 {Means for controlling or selecting resonance mode}
- 37/32293 {using particular waveforms, e.g. polarised waves}
- 37/32302 {Plural frequencies}
- 37/32311 {Circuits specially adapted for controlling the microwave discharge}
- 37/32321 {Discharge generated by other radiation ([H01J 37/32055](#), [H01J 37/32073](#), [H01J 37/32082](#), [H01J 37/32192](#), [H01J 37/32348](#) take precedence)}
- 37/3233 {using charged particles}
- 37/32339 {using electromagnetic radiation}
- 37/32348 . . . {Dielectric barrier discharge}
- 37/32357 . . . {Generation remote from the workpiece, e.g. down-stream}
- 37/32366 . . . {Localised processing}
- 37/32376 {Scanning across large workpieces}
- 37/32385 {Treating the edge of the workpieces}
- 37/32394 . . . {Treating interior parts of workpieces}
- 37/32403 . . . {Treating multiple sides of workpieces, e.g. 3D workpieces}
- 37/32412 . . . {Plasma immersion ion implantation}
- 37/32422 . . . {Arrangement for selecting ions or species in the plasma}
- 37/32431 . . . {Constructional details of the reactor}
- 37/3244 {Gas supply means}
- 37/32449 {Gas control, e.g. control of the gas flow}
- 37/32458 {Vessel}
- 37/32467 {Material}
- 37/32477 {characterised by the means for protecting vessels or internal parts, e.g. coatings}
- 37/32486 {Means for reducing recombination coefficient}
- 37/32495 {Means for protecting the vessel against plasma}
- 37/32504 {Means for preventing sputtering of the vessel}
- 37/32513 {Sealing means, e.g. sealing between different parts of the vessel}
- 37/32522 {Temperature}
- 37/32532 . . . {Electrodes}
- 37/32541 {Shape}
- 37/3255 {Material}
- 37/32559 {Protection means, e.g. coatings}
- 37/32568 {Relative arrangement or disposition of electrodes; moving means}
- 37/32577 {Electrical connecting means}
- 37/32587 {Triode systems}
- 37/32596 {Hollow cathodes}
- 37/32605 {Removable or replaceable electrodes or electrode systems}
- 37/32614 {Consumable cathodes for arc discharge}
- 37/32623 . . . {Mechanical discharge control means}
- 37/32633 {Baffles}
- 37/32642 {Focus rings}
- 37/32651 {Shields, e.g. dark space shields, Faraday shields}
- 37/3266 {Magnetic control means}
- 37/32669 {Particular magnets or magnet arrangements for controlling the discharge}
- 37/32678 {Electron cyclotron resonance}
- 37/32688 {Multi-cusp fields}

37/32697	. . . {Electrostatic control}	37/3438	. . . . {Electrodes other than cathode}
37/32706	. . . . {Polarising the substrate}	37/3441	. . . . {Dark space shields}
37/32715	. . . {Workpiece holder}	37/3444	. . . . {Associated circuits}
37/32724	. . . . {Temperature}	37/3447	. . . . {Collimators, shutters, apertures}
37/32733	. . . {Means for moving the material to be treated}	37/345	. . . . {Magnet arrangements in particular for cathodic sputtering apparatus (material of magnets or magnets in general H01F 1/00, H01F 7/00)}
37/32743	. . . . {for introducing the material into processing chamber}	37/3452	. . . . . {Magnet distribution}
37/32752	. . . . {for moving the material across the discharge}	37/3455	. . . . . {Movable magnets}
37/32761	. . . . . {Continuous moving}	37/3458	. . . . . {Electromagnets in particular for cathodic sputtering apparatus (electromagnets in general H01F 7/06)}
37/3277	. . . . . {of continuous material}	37/3461	. . . . {Means for shaping the magnetic field, e.g. magnetic shunts}
37/32779	. . . . . {of batches of workpieces}	37/3464	. . . {Operating strategies}
37/32788	. . . . {for extracting the material from the process chamber}	37/3467	. . . . {Pulsed operation, e.g. HIPIMS}
37/32798	. . . {Further details of plasma apparatus not provided for in groups H01J 37/3244 - H01J 37/32788 ; special provisions for cleaning or maintenance of the apparatus}	37/347	. . . . {Thickness uniformity of coated layers or desired profile of target erosion}
37/32807	. . . . {Construction (includes replacing parts of the apparatus)}	37/3473	. . . . {Composition uniformity or desired gradient}
37/32816	. . . . {Pressure}	37/3476	. . . {Testing and control}
37/32825	. . . . . {Working under atmospheric pressure or higher}	37/3479	. . . . {Detecting exhaustion of target material}
37/32834	. . . . . {Exhausting}	37/3482	. . . . {Detecting or avoiding eroding through}
37/32844	. . . . . {Treating effluent gases}	37/3485	. . . . {Means for avoiding target poisoning}
37/32853	. . . . {Hygiene}	37/3488	. . . {Constructional details of particle beam apparatus not otherwise provided for, e.g. arrangement, mounting, housing, environment; special provisions for cleaning or maintenance of the apparatus}
37/32862	. . . . . {In situ cleaning of vessels and/or internal parts}	37/3491	. . . . {Manufacturing of targets}
37/32871	. . . . . {Means for trapping or directing unwanted particles}	37/3494	. . . . {Adaptation to extreme pressure conditions}
37/3288	. . . . {Maintenance}	37/3497	. . . . {Temperature of target}
37/32889	. . . . {Connection or combination with other apparatus}	37/36	. . for cleaning surfaces while plating with ions of materials introduced into the discharge, e.g. introduced by evaporation (condensing of electrically charged vapour onto a surface for covering materials with metals C23C 14/32)}
37/32899	. . . . {Multiple chambers, e.g. cluster tools}	40/00	Photoelectric discharge tubes not involving the ionisation of a gas (H01J 49/00 takes precedence)
37/32908	. . . . {Utilities}	40/02	. Details
37/32917	. . {Plasma diagnostics}	40/04	. . Electrodes
37/32926	. . . {Software, data control or modelling}	40/06	. . . Photo-emissive cathodes
37/32935	. . . {Monitoring and controlling tubes by information coming from the object and/or discharge}	40/08	. . Magnetic means for controlling discharge
37/32944	. . . . {Arc detection}	40/10	. . Selection of substances for gas fillings
37/32954	. . . . {Electron temperature measurement}	40/12	. . One or more circuit elements structurally associated with the tube
37/32963	. . . . {End-point detection}	40/14	. . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
37/32972	. . . . {Spectral analysis}	40/16	. having photo- emissive cathode, e.g. alkaline photoelectric cell (operating with secondary emission H01J 43/00)
37/32981	. . . . {Gas analysis}	40/18	. . with luminescent coatings for influencing the sensitivity of the tube, e.g. by converting the input wavelength
37/3299	. . . {Feedback systems}	40/20	. . wherein a light-ray scans a photo-emissive screen
37/34	. . operating with cathodic sputtering (H01J 37/36 takes precedence {; methods of cathodic sputtering C23C 14/34 })	41/00	Discharge tubes for measuring pressure of introduced gas {or for detecting presence of gas}; Discharge tubes for evacuation by diffusion of ions
37/3402	. . . {using supplementary magnetic fields}	41/02	. Discharge tubes for measuring pressure of introduced gas {or for detecting presence of gas}
37/3405	. . . . {Magnetron sputtering}		
37/3408	. . . . . {Planar magnetron sputtering}		
37/3411	. . . {Constructional aspects of the reactor}		
37/3414	. . . . {Targets}		
37/3417	. . . . . {Arrangements}		
37/342	. . . . . {Hollow targets}		
37/3423	. . . . . {Shape}		
37/3426	. . . . . {Material}		
37/3429	. . . . . {Plural materials}		
37/3432	. . . . . {Target-material dispenser}		
37/3435	. . . . {Target holders (includes backing plates and endblocks)}		

- 41/04 . . with ionisation by means of thermionic cathodes
- 41/06 . . with ionisation by means of cold cathodes
- 41/08 . . with ionisation by means of radioactive substances, e.g. alphas
- 41/10 . . of particle spectrometer type (particle spectrometers per se [H01J 49/00](#))
- 41/12 . Discharge tubes for evacuating by diffusion of ions, e.g. ion pumps, getter ion pumps
- 41/14 . . with ionisation by means of thermionic cathodes
- 41/16 . . . using gettering substances
- 41/18 . . with ionisation by means of cold cathodes
- 41/20 . . . using gettering substances

43/00 Secondary-emission tubes; Electron-multiplier tubes (dynamic electron-multiplier tubes [H01J 25/76](#))

- 43/02 . Tubes in which one or a few electrodes are secondary-electron emitting electrodes
- 43/025 . . {Circuits therefor}
- 43/04 . Electron multipliers {(if forming part of electron gun [H01J 3/023](#))}
- 43/045 . . {Position sensitive electron multipliers}
- 43/06 . . Electrode arrangements
- 43/08 . . . Cathode arrangements (construction of photo cathodes [H01J 40/06](#), [H01J 40/16](#), [H01J 47/00](#), [H01J 49/08](#))
- 43/10 . . . Dynodes ([H01J 43/24](#), [H01J 43/26](#) take precedence)
- 43/12 . . . Anode arrangements
- 43/14 . . . Control of electron beam by magnetic field
- 43/16 . . . Electrode arrangements using essentially one dynode
- 43/18 . . . Electrode arrangements using essentially more than one dynode
- 43/20 Dynodes consisting of sheet material, e.g. plane, bent
- 43/22 Dynodes consisting of electron-permeable material, e.g. foil, grid, tube, venetian blind
- 43/24 Dynodes having potential gradient along their surfaces
- 43/243 {Dynodes consisting of a piling-up of channel-type dynode plates}
- 43/246 {Microchannel plates [MCP] (image amplification tubes using MCP [H01J 31/507](#))}
- 43/26 Box dynodes
- 43/28 . . Vessels {, e.g. wall of the tube}; Windows; Screens; Suppressing undesired discharges or currents
- 43/30 . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

45/00 Discharge tubes functioning as thermionic generators {(structural combination of fuel element with thermoelectric element [G21C 3/40](#); nuclear power plants using thermionic converters [G21D 7/04](#); structural combination of a radioactive source with a thermionic converter, e.g. radioisotope batteries [G21H 1/10](#); generators in which thermal or kinetic energy is converted into electrical energy by ionisation of a fluid and removal of the charge therefrom [H02N 3/00](#))}

- 47/00 Tubes for determining the presence, intensity, density or energy of radiation or particles** ((discharge tubes using igniting by associated radioactive materials or fillings, e.g. current stabilising tubes [H01J 17/32](#)) ; photoelectric discharge tubes not involving the ionisation of a gas [H01J 40/00](#) ; discharge tubes for measuring the pressure, partial pressure of introduced gas or for detecting presence of gas [H01J 41/02](#); ionisation chambers using a solid dielectric [G01T 3/008](#)))
- 47/001 . {Details}
- 47/002 . . {Vessels or containers}
- 47/003 . . . {using tissue-equivalent materials}
- 47/004 . . . {Windows permeable to X-rays, gamma-rays, or particles (windows for discharge tubes with provision for emergence of electrons or ions from the vessel [H01J 33/04](#); windows for X-ray tubes [H01J 35/18](#))}
- 47/005 . . {Gas fillings ([H01J 47/12](#) takes precedence); Maintaining the desired pressure within the tube}
- 47/006 . . . {Tissue equivalent gas fillings}
- 47/007 . {Flash detectors}
- 47/008 . {Drift detectors}
- 47/02 . Ionisation chambers
- 47/022 . . {Calibration thereof}
- 47/024 . . {Well-type ionisation chambers}
- 47/026 . . {Gas flow ionisation chambers}
- 47/028 . . {using a liquid dielectric}
- 47/04 . . Capacitive ionisation chambers, e.g. the electrodes of which are used as electrometers
- 47/06 . Proportional counter tubes
- 47/062 . . {Multiwire proportional counter tubes}
- 47/065 . . {Well-type proportional counter tubes}
- 47/067 . . {Gas flow proportional counter tubes}
- 47/08 . Geiger-Müller counter tubes {(gas filling with very short deionisation times [H01J 17/64](#), [H01T](#))}
- 47/10 . Spark counters ([H01J 47/14](#) takes precedence; spark gaps [H01T](#))
- 47/12 . Neutron detector tubes, e.g. BF₃ tubes
- 47/1205 . . {using nuclear reactions of the type (n, alpha) in solid materials, e.g. Boron-10 (n,alpha) Lithium-7, Lithium-6 (n, alpha)Hydrogen-3}
- 47/1211 . . . {Ionisation chambers}
- 47/1216 {Gamma compensated}
- 47/1222 . . . {Proportional counters}
- 47/1227 . . {Fission detectors}
- 47/1233 . . . {Ionisation chambers}
- 47/1238 . . . {Counters}
- 47/1244 {Multiwire counters}
- 47/125 . . {Helium ionisation detectors}
- 47/1255 . . . {Ionisation chambers}
- 47/1261 . . . {Counters}
- 47/1266 {Multi-wire counters}
- 47/1272 . . {BF₃ tubes}
- 47/1277 . . {Light-nuclei-recoil ionisation detectors, e.g. using protons, alpha-particles}
- 47/1283 . . . {Ionisation chambers}
- 47/1288 . . . {Counters}
- 47/1294 {Multi-wire counters}

- 47/14 . Parallel electrode spark or streamer chambers; Wire spark or streamer chambers [{circuit arrangements with multi-wire or parallel-plate chambers for recording of movements or tracks of particles G01T 5/12}](#)
- 47/16 . . characterised by readout of each individual wire
- 47/18 . . . the readout being electrical [\(H01J 47/20 takes precedence\)](#)
- 47/20 . . . the readout employing electrical or mechanical delay lines, e.g. magnetostrictive delay lines
- 47/22 . . characterised by another type of readout
- 47/24 . . . the readout being acoustical
- 47/26 . . . the readout being optical
- 49/00 Particle spectrometers or separator tubes**
- NOTE**
- In classifying particle separators, no distinction is made between spectrometry and spectrography, the difference being only in the manner of detection which in the first case is electrical and in the second case is by means of a photographic film.
- 49/0004 . {Imaging particle spectrometry}
- 49/0009 . {Calibration of the apparatus}
- 49/0013 . {Miniaturised spectrometers, e.g. having smaller than usual scale, integrated conventional components}
- 49/0018 . . {Microminiaturised spectrometers, e.g. chip-integrated devices, Micro-Electro-Mechanical Systems [MEMS]}
- 49/0022 . {Portable spectrometers, e.g. devices comprising independent power supply, constructional details relating to portability [\(small scale devices per se H01J 49/0013 and H01J 49/0018\)](#)}
- 49/0027 . {Methods for using particle spectrometers}
- 49/0031 . . {Step by step routines describing the use of the apparatus [\(H01J 49/0081 takes precedence\)](#)}
- 49/0036 . . {Step by step routines describing the handling of the data generated during a measurement}
- 49/004 . {Combinations of spectrometers, tandem spectrometers, e.g. MS/MS, MSn}
- 49/0045 . . {characterised by the fragmentation or other specific reaction}
- 49/005 . . . {by collision with gas, e.g. by introducing gas or by accelerating ions with an electric field}
- 49/0054 . . . {by an electron beam, e.g. electron impact dissociation, electron capture dissociation}
- 49/0059 . . . {by a photon beam, photo-dissociation}
- 49/0063 . . . {by applying a resonant excitation voltage}
- 49/0068 . . . {by collision with a surface, e.g. surface induced dissociation}
- 49/0072 . . . {by ion/ion reaction, e.g. electron transfer dissociation, proton transfer dissociation}
- 49/0077 . . . {specific reactions other than fragmentation}
- 49/0081 . . {Tandem in time, i.e. using a single spectrometer}
- 49/0086 . . {Accelerator mass spectrometers}
- 49/009 . . {Spectrometers having multiple channels, parallel analysis}
- 49/0095 . {Particular arrangements for generating, introducing or analyzing both positive and negative analyte ions [\(ion/ion reactions H01J 49/0072\)](#)}
- 49/02 . Details
- 49/022 . . {Circuit arrangements, e.g. for generating deviation currents or voltages [\(regulating electric or magnetic variables in general, e.g. current, magnetic field G05F\)](#); Components associated with high voltage supply [\(high voltage supply per se H02M\)](#)}
- 49/025 . . {Detectors specially adapted to particle spectrometers [\(data acquisition H01J 49/0036; detectors per se G01T, e.g. G01T 1/28, G01T 1/29\)](#)}
- 49/027 . . . {detecting image current induced by the movement of charged particles [\(H01J 49/38 takes precedence\)](#)}
- 49/04 . . Arrangements for introducing or extracting samples to be analysed, e.g. vacuum locks; Arrangements for external adjustment of electron- or ion-optical components
- 49/0404 . . . {Capillaries used for transferring samples or ions [\(electrospray nozzles H01J 49/167\)](#)}
- 49/0409 . . . {Sample holders or containers [\(containers for retaining a material to be analyzed, B01L 3/50, for DNA, C12Q 1/6834, for biological materials, G01N 33/543\)](#)}
- 49/0413 {for automated handling}
- 49/0418 {for laser desorption, e.g. matrix-assisted laser desorption/ionisation [MALDI] plates or surface enhanced laser desorption/ionisation [SELDI] plates}
- 49/0422 . . . {for gaseous samples [\(interfaces to gas chromatographs G01N 30/7206\)](#)}
- 49/0427 {using a membrane permeable to gases}
- 49/0431 . . . {for liquid samples [\(interfaces to liquid chromatographs G01N 30/7233\)](#)}
- 49/0436 {using a membrane permeable to liquids}
- 49/044 {with means for preventing droplets from entering the analyzer; Desolvation of droplets}
- 49/0445 {with means for introducing as a spray, a jet or an aerosol [\(electrospray ion sources H01J 49/165\)](#)}
- 49/045 {with means for using a nebulising gas, i.e. pneumatically assisted}
- 49/0454 {with means for vaporising using mechanical energy, e.g. by ultrasonic vibrations}
- 49/0459 . . . {for solid samples}
- 49/0463 {Desorption by laser or particle beam, followed by ionisation as a separate step [\(sample holder per se H01J 49/0418\)](#)}
- 49/0468 . . . {with means for heating or cooling the sample}
- 49/0472 {with means for pyrolysis}
- 49/0477 {using a hot fluid}
- 49/0481 {with means for collisional cooling}
- 49/0486 {with means for monitoring the sample temperature}
- 49/049 {with means for applying heat to desorb the sample; Evaporation}
- 49/0495 . . . {Vacuum locks; Valves [\(valves per se F16K\)](#)}
- 49/06 . . Electron- or ion-optical arrangements
- 49/061 . . . {Ion deflecting means, e.g. ion gates}
- 49/062 . . . {Ion guides [\(linear ion traps performing mass selection H01J 49/4225, mass filters H01J 49/421\)](#)}
- 49/063 {Multipole ion guides, e.g. quadrupoles, hexapoles}

- 49/065 {having stacked electrodes, e.g. ring stack, plate stack}
- 49/066 {Ion funnels}
- 49/067 . . . {Ion lenses, apertures, skimmers}
- 49/068 . . . {Mounting, supporting, spacing, or insulating electrodes}
- 49/08 . . Electron sources, e.g. for generating photo-electrons, secondary electrons or Auger electrons
- 49/10 . . Ion sources; Ion guns
- 49/102 . . . {using reflex discharge, e.g. Penning ion sources}
- 49/105 . . . {using high-frequency excitation, e.g. microwave excitation, Inductively Coupled Plasma [ICP]}
- 49/107 . . . {Arrangements for using several ion sources}
- 49/12 . . . using an arc discharge, e.g. of the duoplasmatron type
- 49/123 {Duoplasmatrons}
- 49/126 {Other arc discharge ion sources using an applied magnetic field}
- 49/14 . . . using particle bombardment, e.g. ionisation chambers
- 49/142 {using a solid target which is not previously vapourised}
- 49/145 {using chemical ionisation}
- 49/147 {with electrons, e.g. electron impact ionisation, electron attachment ([H01J 49/145 takes precedence](#))}
- 49/16 . . . using surface ionisation, e.g. field-, thermionic- or photo-emission
- 49/161 {using photoionisation, e.g. by laser}
- 49/162 {Direct photo-ionisation, e.g. single photon or multi-photon ionisation}
- 49/164 {Laser desorption/ionisation, e.g. matrix-assisted laser desorption/ionisation [MALDI] ([sample holders H01J 49/0418](#))}
- 49/165 {Electrospray ionisation}
- 49/167 {Capillaries and nozzles specially adapted therefor; ([electrostatic spraying per se B05B 5/00](#))}
- 49/168 {field ionisation, e.g. corona discharge (atmospheric pressure corona discharge [per se H01T 19/00](#))}
- 49/18 . . . using spark ionisation
- 49/20 . . Magnetic deflection
- 49/22 . . Electrostatic deflection
- 49/24 . . Vacuum systems, e.g. maintaining desired pressures
- 49/26 . Mass spectrometers or separator tubes
- 49/28 . . Static spectrometers
- 49/282 . . . {using electrostatic analysers}
- 49/284 . . . {using electrostatic and magnetic sectors with simple focusing, e.g. with parallel fields such as Aston spectrometer}
- 49/286 {with energy analysis, e.g. Castaing filter ([in cathode-ray or electron-beam tubes H01J 29/84](#); [electron- or ion-optical arrangements for separating electrons or ions from an analysing or processing beam H01J 37/05](#); [micro- or spot-analysing tubes H01J 37/252](#))}
- 49/288 {using crossed electric and magnetic fields perpendicular to the beam, e.g. Wien filter}
- 49/30 . . . using magnetic analysers {, e.g. Dempster spectrometer}
- 49/305 {with several sectors in tandem}
- 49/32 . . . using double focusing
- 49/322 {with a magnetic sector of 90 degrees, e.g. Mattauch-Herzog type}
- 49/324 {with an electrostatic section of 90 degrees, e.g. Nier-Johnson type}
- 49/326 {with magnetic and electrostatic sectors of 90 degrees}
- 49/328 {with a cycloidal trajectory by using crossed electric and magnetic fields, e.g. trochoidal type}
- 49/34 . . Dynamic spectrometers
- 49/36 . . . Radio frequency spectrometers, e.g. Bennett-type spectrometers, Redhead-type spectrometers
- 49/38 Omegatrons {; using ion cyclotron resonance}
- 49/40 . . . Time-of-flight spectrometers ([H01J 49/36 takes precedence](#))
- 49/401 {characterised by orthogonal acceleration, e.g. focusing or selecting the ions, pusher electrode}
- 49/403 {characterised by the acceleration optics and/or the extraction fields}
- 49/405 {characterised by the reflectron, e.g. curved field, electrode shapes}
- 49/406 {with multiple reflections}
- 49/408 {with multiple changes of direction, e.g. by using electric or magnetic sectors, closed-loop time-of-flight}
- 49/42 . . . Stability-of-path spectrometers, e.g. monopole, quadrupole, multipole, farvitrons
- 49/4205 {Device types}
- 49/421 {Mass filters, i.e. deviating unwanted ions without trapping}
- 49/4215 {Quadrupole mass filters ([H01J 49/4225 takes precedence](#))}
- 49/422 {Two-dimensional RF ion traps ([ion guides without mass selection H01J 49/062](#))}
- 49/4225 {Multipole linear ion traps, e.g. quadrupoles, hexapoles}
- 49/423 {with radial ejection}
- 49/4235 {Stacked rings or stacked plates}
- 49/424 {Three-dimensional ion traps, i.e. comprising end-cap and ring electrodes}
- 49/4245 {Electrostatic ion traps ([H01J 49/422 takes precedence](#))}
- 49/425 {with a logarithmic radial electric potential, e.g. orbitraps}
- 49/4255 {with particular constructional features}
- 49/426 {Methods for controlling ions}
- 49/4265 {Controlling the number of trapped ions; preventing space charge effects}
- 49/427 {Ejection and selection methods}
- 49/4275 {Applying a non-resonant auxiliary oscillating voltage, e.g. parametric excitation}
- 49/428 {Applying a notched broadband signal}

- 49/4285 {Applying a resonant signal, e.g. selective resonant ejection matching the secular frequency of ions ([H01J 49/429](#), [H01J 49/428](#) take precedence)}
- 49/429 {Scanning an electric parameter, e.g. voltage amplitude or frequency}
- 49/4295 {Storage methods}
- 49/44 Energy spectrometers, e.g. alpha-, beta-spectrometers
- 49/443 {Dynamic spectrometers}
- 49/446 {Time-of-flight spectrometers}
- 49/46 Static spectrometers
- 49/463 {using static magnetic fields}
- 49/466 {using crossed electric and magnetic fields perpendicular to the beam, e.g. Wien filter ([see also H01J 49/288](#))}
- 49/48 using electrostatic analysers, e.g. cylindrical sector, Wien filter
- 49/482 {with cylindrical mirrors}
- 49/484 {with spherical mirrors}
- 49/486 {with plane mirrors, i.e. uniform field}
- 49/488 {with retarding grids}

Discharge lamps

- 61/00 Gas-discharge or vapour-discharge lamps**
(arc lamps with consumable electrodes [H05B](#); electroluminescent lamps [H05B](#))
- 61/02 Details
- 61/025 {Associated optical elements}
- 61/04 Electrodes ([for igniting H01J 61/54](#)); Screens; Shields
- 61/045 {Thermic screens or reflectors ([heat-reflecting coatings on the wall of the vessel H01J 61/35](#))}
- 61/06 Main electrodes
- 61/067 for low-pressure discharge lamps
- 61/0672 {characterised by the construction of the electrode}
- 61/0675 {characterised by the material of the electrode}
- 61/0677 {characterised by the electron emissive material}
- 61/073 for high-pressure discharge lamps
- 61/0732 {characterised by the construction of the electrode}
- 61/0735 {characterised by the material of the electrode}
- 61/0737 {characterised by the electron emissive material}
- 61/09 Hollow cathodes
- 61/10 Shields, screens, or guides for influencing the discharge
- 61/103 {Shields, screens or guides arranged to extend the discharge path ([H01J 61/106](#) takes precedence)}
- 61/106 {using magnetic means}
- 61/12 Selection of substances for gas fillings; Specified operating pressure or temperature
- 61/125 {having an halogenide as principal component}
- 61/14 having one or more carbon compounds as the principal constituents
- 61/16 having helium, argon, neon, krypton, or xenon as the principle constituent

- 61/18 having a metallic vapour as the principal constituent
- 61/20 mercury vapour
- 61/22 vapour of an alkali metal
- 61/24 Means for obtaining or maintaining the desired pressure within the vessel
- 61/26 Means for absorbing or adsorbing gas, e.g. by gettering; Means for preventing blackening of the envelope
- 61/28 Means for producing, introducing, or replenishing gas or vapour during operation of the lamp
- 61/30 Vessels; Containers
- 61/302 {characterised by the material of the vessel}
- 61/305 {Flat vessels or containers}
- 61/307 {with folded elongated discharge path}
- 61/32 Special longitudinal shape, e.g. for advertising purposes ([H01J 61/305](#) takes precedence)}
- 61/322 {Circular lamps}
- 61/325 {U-shaped lamps}
- 61/327 {"Compact"-lamps, i.e. lamps having a folded discharge path}
- 61/33 Special shape of cross-section, e.g. for producing cool spot
- 61/34 Double-wall vessels or containers
- 61/35 provided with coatings on the walls thereof; Selection of materials for the coatings ([using coloured coatings H01J 61/40](#); [using luminescent coatings H01J 61/42](#))
- 61/36 Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors
- 61/361 {Seals between parts of vessel}
- 61/363 {End-disc seals or plug seals}
- 61/365 {Annular seals disposed between the ends of the vessel ([H01J 61/363](#) takes precedence)}
- 61/366 {Seals for leading-in conductors}
- 61/368 {Pinched seals or analogous seals}
- 61/38 Devices for influencing the colour or wavelength of the light
- 61/40 by light filters; by coloured coatings in or on the envelope
- 61/42 by transforming the wavelength of the light by luminescence
- 61/44 Devices characterised by the luminescent material
- 61/46 Devices characterised by the binder or other non-luminescent constituent of the luminescent material, e.g. for obtaining desired pouring or drying properties
- 61/48 Separate coatings of different luminous materials
- 61/50 Auxiliary parts or solid material within the envelope for reducing risk of explosion upon breakage of the envelope, e.g. for use in mines
- 61/52 Cooling arrangements; Heating arrangements; Means for circulating gas or vapour within the discharge space ([heating or cooling arrangements to promote ionisation for starting H01J 61/54](#))}
- 61/523 {Heating or cooling particular parts of the lamp}
- 61/526 {heating or cooling of electrodes}
- 61/54 Igniting arrangements, e.g. promoting ionisation for starting

61/541	. . . {using a bimetal switch}	63/08	. Lamps with gas plasma excited by the ray or stream
61/542	. . . . {and an auxiliary electrode inside the vessel}	65/00	Lamps without any electrode inside the vessel; Lamps with at least one main electrode outside the vessel
61/544	. . . . {and an auxiliary electrode outside the vessel}	65/04	. Lamps in which a gas filling is excited to luminesce by an external electromagnetic field or by external corpuscular radiation, e.g. for indicating {plasma display panels}
61/545	. . . {using an auxiliary electrode inside the vessel (H01J 61/542 takes precedence)}	65/042	. . {by an external electromagnetic field}
61/547	. . . {using an auxiliary electrode outside the vessel (H01J 61/544 takes precedence)}	65/044	. . . {the field being produced by a separate microwave unit}
61/548	. . . {using radioactive means to promote ionisation}	65/046	. . . {the field being produced by using capacitive means around the vessel}
61/56	. . One or more circuit elements structurally associated with the lamp	65/048	. . . {the field being produced by using an excitation coil}
61/58	. Lamps with both liquid anode and liquid cathode	65/06	. Lamps in which a gas filling is excited to luminesce by radioactive material structurally associated with the lamp, e.g. inside the vessel
61/60	. Lamps in which the discharge space is substantially filled with mercury before ignition	65/08	. Lamps in which a screen or coating is excited to luminesce by radioactive material located inside the vessel {(direct conversion of radiation energy from radioactive sources into light G21H 3/02)}
61/62	. Lamps with gaseous cathode, e.g. plasma cathode	99/00	Subject matter not provided for in other groups of this subclass
61/64	. Cathode glow lamps		
61/66	. . having one or more specially shaped cathodes, e.g. for advertising purposes {alphanumeric}		
61/68	. Lamps in which the main discharge is between parts of a current-carrying guide, e.g. halo lamp		
61/70	. Lamps with low-pressure unconfined discharge {having a cold pressure < 400 Torr}		
61/72	. . having a main light-emitting filling of easily vaporisable metal vapour, e.g. mercury		
61/74	. . having a main light-emitting filling of difficult vaporisable metal vapour, e.g. sodium		
61/76	. . having a filling of permanent gas or gases only		
61/78	. . . with cold cathode; with cathode heated only by discharge, e.g. high-tension lamp for advertising		
61/80	. . Lamps suitable only for intermittent operation, e.g. flash lamp		
61/82	. Lamps with high-pressure unconfined discharge {having a cold pressure > 400 Torr}		
61/822	. . {High-pressure mercury lamps}		
61/825	. . {High-pressure sodium lamps}		
61/827	. . {Metal halide arc lamps}		
61/84	. Lamps with discharge constricted by high pressure		
61/86	. . with discharge additionally constricted by close spacing of electrodes, e.g. for optical projection		
61/88	. . with discharge additionally constricted by envelope		
61/90	. . Lamps suitable only for intermittent operation, e.g. flash lamp		
61/92	. Lamps with more than one main discharge path		
61/94	. . Paths producing light of different wavelengths, e.g. for simulating daylight		
61/95	. Lamps with control electrode for varying intensity or wavelength of the light, e.g. for producing modulated light		
61/96	. Lamps with light-emitting discharge path and separately-heated incandescent body within a common envelope, e.g. for simulating daylight		
61/98	. Lamps with closely spaced electrodes heated to incandescence by light-emitting discharge, e.g. tungsten arc lamp		
63/00	Cathode-ray or electron-stream lamps		
63/02	. Details, e.g. electrode, gas filling, shape of vessel		
63/04	. . Vessels provided with luminescent coatings; Selection of materials for the coatings		
63/06	. Lamps with luminescent screen excited by the ray or stream		
		2201/00	Electrodes common to discharge tubes
		2201/02	. Arrangements for eliminating deleterious effects
		2201/025	. . charging
		2201/19	. Thermionic cathodes
		2201/193	. . Thin film cathodes
		2201/196	. . Emission assisted by other physical processes, e.g. field- or photo emission
		2201/28	. Heaters for thermionic cathodes
		2201/2803	. . Characterised by the shape or size
		2201/2807	. . . Block
		2201/281	. . . Cage-like construction
		2201/2814	. . . . being a mesh-like network
		2201/2817	. . . Rods
		2201/2821	. . . Envelope or cross-section
		2201/2825	. . . . being oval or elliptic
		2201/2828	. . . . being rectangular or square
		2201/2832	. . . . being circular
		2201/2835	. . . Folded
		2201/2839	. . . . Hair-pin or simple bend
		2201/2842	. . . Conic
		2201/2846	. . . Loop
		2201/285	. . . Plurality of elements
		2201/2853	. . . Serpentine
		2201/2857	. . . . being coiled
		2201/286	. . . . being looped
		2201/2864	. . . Ribbon or bar
		2201/2867	. . . Spiral or helix
		2201/2871	. . . . being flattened
		2201/2875	. . . . being double, reverse helix or interwoven
		2201/2878	. . . Thin film or film-like
		2201/2882	. . . Variable winding density
		2201/2885	. . . Twisted
		2201/2889	. . Characterised by material
		2201/2892	. . Coatings
		2201/2896	. . . Insulating layers

2201/30	. Cold cathodes	2203/0232	. . . . . characterised by the material
2201/304	. . Field emission cathodes	2203/0236	. . . . . Relative position to the emitters, cathodes or substrates
2201/30403	. . . characterised by the emitter shape	2203/024	. . . . . Focusing electrodes
2201/30407	. . . . Microengineered point emitters	2203/0244	. . . . . characterised by the form or structure
2201/30411	. . . . . conical shaped, e.g. Spindt type	2203/0248	. . . . . Shapes or dimensions of focusing electrode openings
2201/30415	. . . . . needle shaped	2203/0252	. . . . . Arrangement of focusing electrode openings
2201/30419	. . . . . Pillar shaped emitters	2203/0256	. . . . . characterised by the material
2201/30423	. . . . . Microengineered edge emitters	2203/026	. . . . . Relative position to the gateelectrodes, emitters, cathodes or substrates
2201/30426	. . . . . Coatings on the emitter surface, e.g. with low work function materials	2203/0264	. . . . . In the same plane as the gate electrodes or cathodes
2201/3043	. . . . . Fibres	2203/0268	. . . . . Insulation layer
2201/30434	. . . . . Nanotubes	2203/0272	. . . . . for gate electrodes
2201/30438	. . . . . Particles	2203/0276	. . . . . for focusing electrodes
2201/30442	. . . . . Whiskers	2203/028	. . . . . characterised by the shape
2201/30446	. . . . . characterised by the emitter material	2203/0284	. . . . . Dimensions of openings
2201/30449	. . . . . Metals and metal alloys	2203/0288	. . . . . characterised by the material
2201/30453	. . . . . Carbon types	2203/0292	. . . . . Potentials applied to the electrodes
2201/30457	. . . . . Diamond	2203/0296	. . . . . Spin-polarised beams
2201/30461	. . . . . Graphite	2203/04	. . . . . Ion guns
2201/30465	. . . . . Fullerenes		
2201/30469	. . . . . Carbon nanotubes (CNTs)	2209/00	Apparatus and processes for manufacture of discharge tubes
2201/30473	. . . . . Amorphous carbon	2209/01	. . . . . Generalised techniques
2201/30476	. . . . . Diamond-like carbon [DLC]	2209/012	. . . . . Coating
2201/3048	. . . . . Semiconductor materials	2209/015	. . . . . Machines therefor
2201/30484	. . . . . Carbides	2209/017	. . . . . Cleaning
2201/30488	. . . . . Nitrides	2209/02	. . . . . Manufacture of cathodes
2201/30492	. . . . . Borides	2209/022	. . . . . Cold cathodes
2201/30496	. . . . . Oxides	2209/0223	. . . . . Field emission cathodes
2201/306	. . . . . Ferroelectric cathodes	2209/0226	. . . . . Sharpening or reshaping of emitting point or edge
2201/308	. . . . . Semiconductor cathodes, e.g. having PN junction layers	2209/18	. . . . . Assembling together the component parts of the discharge tube
2201/312	. . . . . having an electric field perpendicular to the surface thereof	2209/185	. . . . . Machines therefor, e.g. electron gun assembling devices
2201/3125	. . . . . Metal-insulator-Metal [MIM] emission type cathodes	2209/236	. . . . . Manufacture of magnetic deflecting devices
2201/316	. . . . . having an electric field parallel to the surface thereof, e.g. thin film cathodes	2209/2363	. . . . . Coils
2201/3165	. . . . . Surface conduction emission type cathodes	2209/2366	. . . . . Machines therefor, e.g. winding, forming, welding, or the like
2201/317	. . . . . combined with other synergetic effects, e.g. secondary, photo- or thermal emission	2209/26	. . . . . Sealing parts of the vessel to provide a vacuum enclosure
2201/319	. . . . . Circuit elements associated with the emitters by direct integration	2209/261	. . . . . Apparatus used for sealing vessels, e.g. furnaces, machines or the like
2201/3195	. . . . . Resistive members, e.g. resistive layers	2209/262	. . . . . means for applying sealing materials, e.g. frit paste dispensers
2201/32	. . . . . Secondary emission electrodes	2209/264	. . . . . Materials for sealing vessels, e.g. frit glass compounds, resins or structures
2201/34	. . . . . Photoemissive electrodes	2209/265	. . . . . Surfaces for sealing vessels
2201/342	. . . . . Cathodes	2209/267	. . . . . shaped surfaces or flanges
2201/3421	. . . . . Composition of the emitting surface	2209/268	. . . . . treated surfaces and surface preparations, e.g. to improve adhesion
2201/3423	. . . . . Semiconductors, e.g. GaAs, NEA emitters	2209/38	. . . . . Control of maintenance of pressure in the vessel
2201/3425	. . . . . Metals, metal alloys	2209/383	. . . . . Vacuum pumps
2201/3426	. . . . . Alkaline metal compounds, e.g. Na-K-Sb	2209/385	. . . . . Gettering
2201/3428	. . . . . Organo-metallic compounds, e.g. Ferrocene	2209/3855	. . . . . Getter materials
2203/00	Electron or ion optical arrangements common to discharge tubes or lamps	2209/387	. . . . . Gas filling
2203/02	. . . . . Electron guns	2209/389	. . . . . Degassing
2203/0204	. . . . . using cold cathodes, e.g. field emission cathodes	2209/3893	. . . . . by a discharge
2203/0208	. . . . . Control electrodes	2209/3896	. . . . . by heating
2203/0212	. . . . . Gate electrodes		
2203/0216	. . . . . characterised by the form or structure		
2203/022	. . . . . Shapes or dimensions of gate openings		
2203/0224	. . . . . Arrangement of gate openings		
2203/0228	. . . . . Curved/extending upwardly		

- 2209/46 . Handling of tube components during manufacture
- 2209/463 . . Identifying or selecting component pieces
- 2209/466 . . . Marking, e.g. bar-codes
- 2211/00 Plasma display panels with alternate current induction of the discharge, e.g. AC-PDPs**
- 2211/10 . AC-PDPs with at least one main electrode being out of contact with the plasma
- 2211/12 . . with main electrodes provided on both sides of the discharge space
- 2211/14 . . with main electrodes provided only on one side of the discharge space
- 2211/16 . . with main electrodes provided inside or on the side face of the spacers
- 2211/18 . . containing a plurality of independent closed structures for containing the gas, e.g. plasma tube array [PTA] display panels
- 2211/20 . Constructional details
- 2211/22 . . Electrodes
- 2211/225 . . . Material of electrodes
- 2211/24 . . . Sustain electrodes or scan electrodes
- 2211/245 Shape, e.g. cross section or pattern
- 2211/26 . . . Address electrodes
- 2211/265 Shape, e.g. cross section or pattern
- 2211/28 . . . Auxiliary electrodes, e.g. priming electrodes or trigger electrodes
- 2211/30 . . . Floating electrodes
- 2211/32 . . . Disposition of the electrodes
- 2211/323 Mutual disposition of electrodes
- 2211/326 Disposition of electrodes with respect to cell parameters ([H01J 2211/323 takes precedence](#)), e.g. electrodes within the ribs
- 2211/34 . . Vessels, containers or parts thereof, e.g. substrates
- 2211/36 . . . Spacers, barriers, ribs, partitions or the like
- 2211/361 characterized by the shape
- 2211/363 Cross section of the spacers
- 2211/365 Pattern of the spacers
- 2211/366 characterized by the material
- 2211/368 Dummy spacers, e.g. in a non display region
- 2211/38 . . . Dielectric or insulating layers
- 2211/40 . . . Layers for protecting or enhancing the electron emission, e.g. MgO layers
- 2211/42 . . . Fluorescent layers
- 2211/44 . . . Optical arrangements or shielding arrangements, e.g. filters or lenses
- 2211/442 Light reflecting means; Anti-reflection means
- 2211/444 Means for improving contrast or colour purity, e.g. black matrix or light shielding means
- 2211/446 Electromagnetic shielding means; Antistatic means
- 2211/448 Near infrared shielding means
- 2211/46 . . Connecting or feeding means, e.g. leading-in conductors
- 2211/48 . . Sealing, e.g. seals specially adapted for leading-in conductors
- 2211/50 . . Filling, e.g. selection of gas mixture
- 2211/52 . . Means for absorbing or adsorbing the gas mixture, e.g. by gettering
- 2211/54 . . Means for exhausting the gas
- 2211/62 . . Circuit arrangements ([circuits or methods for driving PDP's G09G 3/28](#))
- 2211/66 . . Cooling arrangements ([cooling or supporting means not being part of the tube H05K](#))
- 2217/00 Gas-filled discharge tubes**
- 2217/04 . Electrodes ([for display panels not making use of alternating current H01J 2217/492; for discharge tubes in general H01J 2201/00](#))
- 2217/06 . . Cathodes
- 2217/062 . . . thermionic
- 2217/065 . . . heated by the discharge
- 2217/067 . . . Cold cathodes
- 2217/10 . . Anodes
- 2217/12 . . Control electrodes
- 2217/38 . Cold-cathode tubes
- 2217/40 . . Gas discharge switches
- 2217/402 . . . Multiple switches
- 2217/4025 for addressing electro-optical devices, i.e. LCD's
- 2217/49 . . Display panels, e.g. not making use of alternating current ([H01J 2211/10 takes precedence](#))
- 2217/491 . . . characterised by problems peculiar to plasma displays
- 2217/4915 Luminosity
- 2217/492 . . . Details
- 2217/49207 Electrodes
- 2217/49214 Shape
- 2217/49221 Mutual disposition
- 2217/49228 Crossed electrodes
- 2217/49235 Side-by-side electrodes
- 2217/49242 Auxiliary electrodes
- 2217/4925 Mounting, supporting, spacing
- 2217/49257 Means for isolating electrodes from the discharge, e.g. dielectric layers
- 2217/49264 Vessels
- 2217/49271 Spacers between front and back panels
- 2217/49278 Coatings ([H01J 2217/49292 takes precedence](#))
- 2217/49285 Associated optical means
- 2217/49292 Filters
- 2217/494 . . . A.C. panels
- 2217/498 . . . Hybrid panels (AC and DC)
- 2223/00 Details of transit-time tubes of the types covered by group H01J 2225/00**
- 2223/005 . Cooling methods or arrangements
- 2223/02 . Electrodes; Magnetic control means; Screens
- 2223/027 . . Collectors
- 2223/0275 . . . Multistage collectors
- 2223/033 . . . Collector cooling devices
- 2223/04 . . Cathodes
- 2223/05 . . . having a cylindrical emissive surface, e.g. cathodes for magnetrons
- 2223/06 . . Electron or ion guns
- 2223/065 . . . producing a solid cylindrical beam
- 2223/07 . . . producing a hollow cylindrical beam
- 2223/075 . . . Magnetron injection guns
- 2223/08 . . Focusing arrangements, e.g. for concentrating stream of electrons, for preventing spreading of stream
- 2223/083 . . . Electrostatic focusing arrangements
- 2223/087 . . . Magnetic focusing arrangements
- 2223/0873 with at least one axial- field reversal along the interaction space, e.g. P.P.M. focusing

- 2223/0876 with arrangements improving the linearity and homogeneity of the axial field, e.g. field straightener
- 2223/09 . . Electric system for directing or deflecting the discharge along a desired path, e.g. E-type
- 2223/10 . . Magnet systems for directing or deflecting the discharge along a desired path, e.g. a spiral path
- 2223/11 . . Means for reducing noise
- 2223/12 . Vessels; Containers
- 2223/14 . Leading-in arrangements; Seals therefor
- 2223/15 . . Means for preventing wave energy leakage structurally associated with tube leading-in arrangements, e.g. filters, chokes, attenuating devices
- 2223/16 . Circuit elements, having distributed capacitance and inductance, structurally associated with the tube and interacting with the discharge
- 2223/165 . . Manufacturing processes or apparatus therefore
- 2223/18 . . Resonators
- 2223/20 . . . Cavity resonators; Adjustment or tuning thereof
- 2223/207 Tuning of single resonator
- 2223/213 Simultaneous tuning of more than one resonator, e.g. resonant cavities of a magnetron
- 2223/22 . . . Connections between resonators, e.g. strapping for connecting resonators of a magnetron
- 2223/24 . . Slow-wave structures, e.g. delay systems
- 2223/26 . . . Helical slow-wave structures; Adjustment therefor
- 2223/27 Helix-derived slow-wave structures
- 2223/28 . . . Interdigital slow-wave structures; Adjustment therefor
- 2223/30 . . . Damping arrangements associated with slow-wave structures, e.g. for suppression of unwanted oscillations
- 2223/34 . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- 2223/36 . Coupling devices having distributed capacitance and inductance, structurally associated with the tube, for introducing or removing wave energy
- 2223/38 . . to or from the discharge
- 2223/40 . . to or from the interaction circuit
- 2223/42 . . . the interaction circuit being a helix or a helix-derived slow-wave structure
- 2223/44 . . . Rod-type coupling devices
- 2223/46 . . . Loop coupling devices
- 2223/48 . . . for linking interaction circuit with coaxial lines; Devices of the coupled helices type
- 2223/50 the interaction circuit being a helix or derived from a helix
- 2223/52 the coupled helices being disposed coaxially around one another
- 2223/54 . . Filtering devices preventing unwanted frequencies or modes to be coupled to, or out of, the interaction circuit; Prevention of high frequency leakage in the environment
- 2225/00 Transit-time tubes, e.g. Klystrons, travelling-wave tubes, magnetrons**
- 2225/005 . Gas-filled transit-time tubes
- 2225/02 . Tubes with electron stream modulated in velocity or density in a modulator zone and thereafter giving up energy in an inducing zone, the zones being associated with one or more resonators
- 2225/025 . . with an electron stream following a helical path
- 2225/04 . . Tubes having one or more resonators, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly density modulation, e.g. Heaff tube
- 2225/06 . . Tubes having only one resonator, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly velocity modulation, e.g. Lüdi-Klystron
- 2225/08 . . . with electron stream perpendicular to the axis of the resonator
- 2225/10 . . Klystrons, i.e. tubes having two or more resonators, without reflection of the electron stream, and in which the stream is modulated mainly by velocity in the zone of the input resonator
- 2225/11 . . . Extended interaction Klystrons
- 2225/12 . . . with pencil-like electron stream in the axis of the resonators
- 2225/14 . . . with tube-like electron stream coaxial with the axis of the resonators
- 2225/16 . . . with pencil-like electron stream perpendicular to the axis of the resonators
- 2225/18 . . . with radial or disc-like electron stream perpendicular to the axis of the resonators
- 2225/20 . . . having special arrangements in the space between resonators, e.g. resistive-wall amplifier tube, space-charge amplifier tube, velocity-jump tube
- 2225/22 . . Reflex Klystrons, i.e. tubes having one or more resonators, with a single reflection of the electron stream, and in which the stream is modulated mainly by velocity in the modulator zone
- 2225/24 . . . in which the electron stream is in the axis of the resonator or resonators and is pencil-like before reflection
- 2225/26 . . . in which the electron stream is coaxial with the axis of the resonator or resonators and is tube-like before reflection
- 2225/28 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is pencil-like before reflection
- 2225/30 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is radial or disc-like before reflection
- 2225/32 . . Tubes with plural reflection, e.g. Coeterier tube
- 2225/34 . Travelling-wave tubes; Tubes in which a travelling wave is simulated at spaced gaps
- 2225/36 . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and without magnet system producing an H-field crossing the E-field
- 2225/38 . . . the forward travelling wave being utilised
- 2225/40 . . . the backward travelling wave being utilised
- 2225/42 . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and with a magnet system producing an H-field crossing the E-field
- 2225/44 . . . the forward travelling wave being utilised

- 2225/46 . . . the backward travelling wave being utilised
- 2225/48 . . Tubes in which two electron streams of different velocities interact with one another, e.g. electron-wave tube
- 2225/49 . . Tubes using the parametric principle, e.g. for parametric amplification
- 2225/50 . Magnetrons, i.e. tubes with a magnet system producing an H-field crossing the E-field
- 2225/52 . . with an electron space having a shape that does not prevent any electron from moving completely around the cathode or guide electrode
- 2225/54 . . . having only one cavity or other resonator, e.g. neutrode tube
- 2225/55 Coaxial cavity magnetrons
- 2225/56 with interdigital arrangements of anodes, e.g. turbator tube
- 2225/58 . . . having a number of resonators; having a composite resonator, e.g. a helix
- 2225/587 Multi-cavity magnetrons
- 2225/593 Rising-sun magnetrons
- 2225/60 . . with an electron space having a shape that prevents any electron from moving completely around the cathode or guide electrode; Linear magnetrons
- 2225/61 . Hybrid tubes, i.e. tubes comprising a klystron section and a travelling-wave section
- 2225/62 . Strophotrons, i.e. tubes with H-field crossing the E-field and functioning with plural reflection
- 2225/64 . Turbine tubes, i.e. tubes with H-field crossing the E-field and functioning with reversed cyclotron action
- 2225/66 . Tubes with electron stream crossing itself and thereby interacting or interfering with itself
- 2225/68 . Tubes specially designed to act as oscillator with positive grid and retarding field, e.g. for Barkhausen-Kurz oscillators
- 2225/70 . . with resonator having distributed inductance with capacitance, e.g. Pintsch tube
- 2225/72 . . in which a standing wave or a considerable part thereof is produced along an electrode, e.g. Clavier tube
- 2225/74 . Tubes specially designed to act as transit-time diode oscillators, e.g. monotron
- 2225/76 . Dynamic electron-multiplier tubes, e.g. Farnsworth multiplier tube, multipactor
- 2225/78 . Tubes with electron stream modulated by deflection in a resonator
- 2229/00 Details of cathode ray tubes or electron beam tubes (H01J 2329/00 takes precedence)**
- 2229/0007 . Elimination of unwanted or stray electromagnetic effects
- 2229/0015 . . Preventing or cancelling fields leaving the enclosure
- 2229/0023 . . . Passive means
- 2229/003 . . Preventing or cancelling fields entering the enclosure
- 2229/0038 . . . Active means
- 2229/0046 . . Preventing or cancelling fields within the enclosure
- 2229/0053 . . . Demagnetisation
- 2229/0061 . Cooling arrangements
- 2229/0069 . . Active means, e.g. fluid flow
- 2229/0076 . . . applied to the faceplate
- 2229/0084 Translucent coolant, e.g. flowing across faceplate
- 2229/0092 . . Passive means, e.g. fins, heat conductors
- 2229/07 . Shadow masks
- 2229/0705 . . Mounting arrangement of assembly to vessel
- 2229/0711 . . . Spring and plate (clip) type
- 2229/0716 . . Mounting arrangements of aperture plate to frame or vessel
- 2229/0722 . . Frame
- 2229/0727 . . Aperture plate
- 2229/0733 . . . characterised by the material
- 2229/0738 . . . Mitigating undesirable mechanical effects
- 2229/0744 Vibrations
- 2229/075 . . . Beam passing apertures, e.g. geometrical arrangements
- 2229/0755 characterised by aperture shape
- 2229/0761 Uniaxial masks having parallel slit apertures, i.e. Trinitron type
- 2229/0766 . . . Details of skirt or border
- 2229/0772 Apertures, cut-outs, depressions, or the like
- 2229/0777 . . . Coatings
- 2229/0783 improving thermal radiation properties
- 2229/0788 . . . Parameterised dimensions of aperture plate, e.g. relationships, polynomial expressions
- 2229/0794 . . Geometrical arrangements, e.g. curvature
- 2229/18 . Phosphor screens
- 2229/183 . . multi-layer
- 2229/186 . . Geometrical arrangement of phosphors
- 2229/48 . Electron guns
- 2229/4803 . . Electrodes
- 2229/4806 . . . Shield centering cups
- 2229/481 . . . Focusing electrodes
- 2229/4813 Pre-focusing
- 2229/4817 . . . Accelerating electrodes
- 2229/482 . . . Extraction grids
- 2229/4824 . . Constructional arrangements of electrodes
- 2229/4827 . . . Electrodes formed on surface of common cylindrical support
- 2229/4831 . . . Electrode supports
- 2229/4834 . . Electrical arrangements coupled to electrodes, e.g. potentials
- 2229/4837 . . . characterised by the potentials applied
- 2229/4841 Dynamic potentials
- 2229/4844 . . characterised by beam passing apertures or combinations
- 2229/4848 . . . Aperture shape as viewed along beam axis
- 2229/4851 trapezoidal
- 2229/4855 with rounded end or ends
- 2229/4858 parallelogram
- 2229/4862 square
- 2229/4865 rectangle
- 2229/4868 with rounded end or ends
- 2229/4872 circular
- 2229/4875 oval
- 2229/4879 non-symmetric about field scanning axis
- 2229/4882 non-symmetric about line scanning axis
- 2229/4886 polygonal
- 2229/4889 cross shaped
- 2229/4893 Interconnected apertures
- 2229/4896 complex and not provided for
- 2229/50 . . Plurality of guns or beams
- 2229/502 . . . Three beam guns, e.g. for colour CRTs

2229/505	. . . Arrays	2229/8903	. . Fibre optic components
2229/507	. . . Multi-beam groups, e.g. number of beams greater than number of cathodes	2229/8905	. . Direction sensitive devices for controlled viewing angle
2229/56	. Correction of beam optics	2229/8907	. . Image projection devices
2229/563	. . Aberrations by type	2229/8909	. . Baffles, shutters, apertures or the like against external light
2229/5632	. . . Spherical	2229/8911	. . . Large-scale devices, e.g. foldable screens
2229/5635	. . . Astigmatism	2229/8913	. . Anti-reflection, anti-glare, viewing angle and contrast improving treatments or devices
2229/5637	. . . Colour purity	2229/8915	. . . Surface treatment of vessel or device, e.g. controlled surface roughness
2229/568	. . using supplementary correction devices	2229/8916	. . . inside the vessel
2229/5681	. . . magnetic	2229/8918	. . . by using interference effects
2229/5682	. . . . Permanently magnetised materials, e.g. permanent magnets	2229/892	. . . Effect varying over surface
2229/5684	. . . . Magnetic materials, e.g. soft iron	2229/8922	. . . Apparatus attached to vessel and not integral therewith
2229/5685	. . . . Cross-arms field shaper	2229/8924	. . having particular properties for protecting the vessel, e.g. against abrasion, water or shock
2229/5687	. . . . Auxiliary coils	2229/8926	. . Active components, e.g. LCD's, indicators, illuminators and moving devices
2229/5688	. . . . Velocity modulation	2229/8928	. . Laser CRTs
2229/58	. Electron beam control inside the vessel	2229/893	. . using lenses
2229/581	. . by magnetic means	2229/899	. . Photographic devices (permanent recording of images)
2229/582	. . by electrostatic means	2229/92	. Means providing or assisting electrical connection with or within the tube
2229/583	. . at the source	2229/922	. . within the tube
2229/5835	. . . cooperating with the electron gun	2229/925	. . associated with the high tension [HT], e.g. anode potentials
2229/585	. . at the screen	2229/927	. . associated with digital scanning
2229/587	. . between the source and the screen	2229/94	. Means for obtaining or maintaining the desired pressure within the tube
2229/70	. Electron beam control outside the vessel	2229/96	. Circuit elements other than coils, reactors or the like, associated with the tube
2229/703	. . by magnetic fields	2229/962	. . associated with the HT
2229/7031	. . . Cores for field producing elements, e.g. ferrite	2229/964	. . associated with the deflection system
2229/7032	. . . Conductor design and distribution	2229/966	. . associated with the gun structure
2229/7033	. . . . Winding	2229/968	. . . Resistors
2229/7035	. . . . Wires and conductors	2231/00	Cathode ray tubes or electron beam tubes (H01J 2329/00 takes precedence)
2229/7036	. . . . . Form of conductor	2231/12	. CRTs having luminescent screens
2229/7037	. . . . . flat, e.g. foil, or ribbon type	2231/121	. . Means for indicating the position of the beam, e.g. beam indexing
2229/7038	. . . Coil separators and formers	2231/123	. . . by direct current detection, e.g. collecting electrodes
2229/86	. Vessels and containers	2231/125	. . with a plurality of electron guns within the tube envelope
2229/8603	. . Neck or cone portions of the CRT vessel	2231/1255	. . . two or more neck portions containing one or more guns
2229/8606	. . . characterised by the shape	2231/50	. Imaging and conversion tubes
2229/8609	. . . . Non circular cross-sections	2231/50005	. . characterised by form of illumination
2229/8613	. . Faceplates	2231/5001	. . . Photons
2229/8616	. . . characterised by shape	2231/50015	. . . . Light
2229/862	. . . . Parameterised shape, e.g. expression, relationship or equation	2231/50021	. . . . . Ultraviolet
2229/8623	. . Substrates	2231/50026	. . . . . Infrared
2229/8626	. . Frames	2231/50031	. . . . . High energy photons
2229/863	. Passive shielding means associated with the vessel	2231/50036	. . . . . X-rays
2229/8631	. . Coatings	2231/50042	. . . Particles
2229/8632	. . . characterised by the material	2231/50047	. . . . Charged particles
2229/8633	. . Meshes and patterns	2231/50052	. . . Mechanical vibrations, e.g. sound
2229/8634	. . Magnetic shielding	2231/50057	. . characterised by form of output stage
2229/8635	. . Antistatic shielding	2231/50063	. . . Optical
2229/8636	. . Electromagnetic shielding		
2229/8637	. . Mechanical shielding, e.g. against water or abrasion		
2229/8638	. . Ionising radiation shielding, e.g. X-rays		
2229/87	. Means for avoiding vessel implosion		
2229/875	. . Means substantially covering the output face, e.g. resin layers, protective panels		
2229/88	. Coatings		
2229/882	. . having particular electrical resistive or conductive properties		
2229/885	. . having particular electrical insulation properties		
2229/887	. . having particular X-ray shielding properties		
2229/89	. Optical components associated with the vessel		
2229/8901	. . Fixing of optical components to the vessel		

2231/50068	. . . Electrical	2235/1229	. . . employing layers with high emissivity
2231/50073	. . . . Charge coupled device [CCD]	2235/1233	. . . . characterised by the material
2231/50078	. . . . Resistive anode	2235/1237	. . . . . Oxides
2231/50084	. . . . using light or electron beam scanning	2235/1241	. . . . Bonding layer to substrate
2231/50089	. . . Having optical stage before electrical conversion	2235/1245	. . . Increasing emissive surface area
2231/50094	. . . . Charge coupled device [CCD]	2235/125	. . . . with interdigitated fins or slots
2231/501	. . including multiplication stage	2235/1254	. . . . with microscopic surface features
2231/5013	. . . with secondary emission electrodes	2235/1258	. . . Placing objects in close proximity
2231/5016	. . . . Michrochannel plates [MCP]	2235/1262	. . . Circulating fluids
2231/503	. . with scanning or gating optics	2235/1266	. . . . flow being via moving conduit or shaft
2231/5033	. . . electrostatic	2235/127	. . . . Control of flow
2231/5036	. . . magnetic	2235/1275	. . . . characterised by the fluid
2231/505	. . with non-scanning optics	2235/1279	. . . . . Liquid metals
2231/5053	. . . electrostatic	2235/1283	. . . . in conjunction with extended surfaces (e.g. fins or ridges)
2231/5056	. . . magnetic	2235/1287	. . . . Heat pipes
2235/00	X-ray tubes	2235/1291	. . . Thermal conductivity
2235/02	. Electrical arrangements	2235/1295	. . . . Contact between conducting bodies
2235/023	. . Connecting of signals or tensions to or through the vessel	2235/16	. Vessels
2235/0233	. . . High tension	2235/161	. . Non-stationary vessels
2235/0236	. . . Indirect coupling, e.g. capacitive or inductive	2235/162	. . . Rotation
2235/06	. Cathode assembly	2235/163	. . shaped for a particular application
2235/062	. . Cold cathodes	2235/164	. . . Small cross-section, e.g. for entering in a body cavity
2235/064	. . Movement of cathode	2235/165	. . Shielding arrangements
2235/066	. . . Rotation	2235/166	. . . against electromagnetic radiation
2235/068	. . Multi-cathode assembly	2235/167	. . . against thermal (heat) energy
2235/08	. Targets (anodes) and X-ray converters	2235/168	. . . against charged particles
2235/081	. . Target material	2235/18	. Windows, e.g. for X-ray transmission
2235/082	. . . Fluids, e.g. liquids, gases	2235/183	. . Multi-layer structures
2235/083	. . Bonding or fixing with the support or substrate	2235/20	. Arrangements for controlling gases within the X-ray tube
2235/084	. . . Target-substrate interlayers or structures, e.g. to control or prevent diffusion or improve adhesion	2235/205	. . Gettering
2235/085	. . Target treatment, e.g. ageing, heating	2237/00	Discharge tubes exposing object to beam, e.g. for analysis treatment, etching, imaging
2235/086	. . Target geometry		NOTES
2235/088	. . Laminated targets, e.g. plurality of emitting layers of unique or differing materials		1. For features of general interest which may be found in other types of discharge tubes, an indexing code corresponding to general schemes H01J 2201/00 - H01J 2203/00 is given, e.g. for cathodes, vessels, cooling means or the like
2235/10	. Drive means for anode (target) substrate		2. Same rules apply for manufacturing procedures (H01J 2209/00), unless really specific to the tube concerned.
2235/1006	. . Supports or shafts for target or substrate		3. The codes in this main group are grouped according to the following principle:
2235/1013	. . . Fixing to the target or substrate		details common to gas or plasma discharge of the above mentioned tubes:
2235/102	. . . Materials for the shaft		H01J 2237/00 - H01J 2237/2487
2235/1026	. . Means (motors) for driving the target (anode)		Imaging or analysing:
2235/1033	. . . mounted within the vacuum vessel		H01J 2237/25 - H01J 2237/2857
2235/104	. . . characterised by the shape		particle beam processing:
2235/1046	. . Bearings and bearing contact surfaces		H01J 2237/30 - H01J 2237/31798
2235/1053	. . . Retainers or races		plasma processing:
2235/106	. . . Dynamic pressure bearings, e.g. helical groove type		H01J 2237/32 - H01J 2237/339
2235/1066	. . . Treated contact surfaces, e.g. coatings	2237/002	. Cooling arrangements (of objects being observed or treated H01J 2237/2001)
2235/1073	. . . Magnetic bearings	2237/004	. Charge control of objects or beams
2235/108	. . Lubricants	2237/0041	. . Neutralising arrangements
2235/1086	. . . liquid metals	2237/0042	. . . Deflection of neutralising particles
2235/1093	. . Measures for preventing vibration	2237/0044	. . . of objects being observed or treated
2235/12	. Cooling		
2235/1204	. . of the anode		
2235/1208	. . of the bearing assembly		
2235/1212	. . of the cathode		
2235/1216	. . of the vessel		
2235/122	. . of the window		
2235/1225	. . characterised by method		

- 2237/0045 using secondary electrons
- 2237/0047 using electromagnetic radiations, e.g. UV, X-rays, light
- 2237/0048 . . Charging arrangements
- 2237/006 . . Details of gas supplies, e.g. in an ion source, to a beam line, to a specimen or to a workpiece, ([H01J 37/3244 takes precedence; environmental cells for electron microscopes H01J 2237/2003; microscopes with environmental specimen chamber H01J 2237/2608](#))
- 2237/02 . . Details
- 2237/0203 . . Protection arrangements
- 2237/0206 . . . Extinguishing, preventing or controlling unwanted discharges
- 2237/0209 . . . Avoiding or diminishing effects of eddy currents
- 2237/0213 . . . Avoiding deleterious effects due to interactions between particles and tube elements
- 2237/0216 . . Means for avoiding or correcting vibration effects
- 2237/022 . . Avoiding or removing foreign or contaminating particles, debris or deposits on sample or tube
- 2237/0225 . . . Detecting or monitoring foreign particles
- 2237/024 . . Moving components not otherwise provided for ([diaphragms H01J 2237/0458; objects H01J 2237/02](#))
- 2237/0245 . . . Moving whole optical system relatively to object
- 2237/026 . . Shields
- 2237/0262 . . . electrostatic
- 2237/0264 . . . magnetic
- 2237/0266 . . . electromagnetic
- 2237/0268 . . . Liner tubes
- 2237/028 . . Particle traps
- 2237/03 . . Mounting, supporting, spacing or insulating electrodes
- 2237/032 . . Mounting or supporting
- 2237/036 . . Spacing
- 2237/038 . . Insulating
- 2237/04 . . Means for controlling the discharge
- 2237/041 . . Beam polarising means
- 2237/043 . . Beam blanking
- 2237/0432 . . . High speed and short duration
- 2237/0435 . . . Multi-aperture
- 2237/0437 Semiconductor substrate
- 2237/045 . . Diaphragms
- 2237/0451 . . . with fixed aperture
- 2237/0453 multiple apertures
- 2237/0455 . . . with variable aperture
- 2237/0456 . . . Supports
- 2237/0458 movable, i.e. for changing between differently sized apertures
- 2237/047 . . Changing particle velocity
- 2237/0473 . . . accelerating
- 2237/04732 with magnetic means
- 2237/04735 with electrostatic means
- 2237/04737 radio-frequency quadrupole [RFQ]
- 2237/0475 . . . decelerating
- 2237/04753 with magnetic means
- 2237/04756 with electrostatic means
- 2237/049 . . Focusing means
- 2237/0492 . . . Lens systems ([individual lenses H01J 2237/10](#))
- 2237/04922 electromagnetic
- 2237/04924 electrostatic
- 2237/04926 combined
- 2237/04928 Telecentric systems
- 2237/05 . . Arrangements for energy or mass analysis
- 2237/053 . . electrostatic
- 2237/0535 . . . Mirror analyser
- 2237/055 . . magnetic
- 2237/057 . . Energy or mass filtering
- 2237/06 . . Sources
- 2237/061 . . Construction
- 2237/062 . . . Reducing size of gun
- 2237/063 . . Electron sources
- 2237/06308 . . . Thermionic sources
- 2237/06316 Schottky emission
- 2237/06325 . . . Cold-cathode sources
- 2237/06333 Photo emission
- 2237/06341 Field emission
- 2237/0635 Multiple source, e.g. comb or array
- 2237/06358 Secondary emission
- 2237/06366 Gas discharge electron sources
- 2237/06375 . . . Arrangement of electrodes
- 2237/06383 . . . Spin polarised electron sources
- 2237/06391 . . . Positron sources
- 2237/065 . . Source emittance characteristics
- 2237/0653 . . . Intensity
- 2237/0656 . . . Density
- 2237/08 . . Ion sources
- 2237/0802 . . . Field ionization sources
- 2237/0805 Liquid metal sources
- 2237/0807 Gas field ion sources [GFIS]
- 2237/081 . . Sputtering sources
- 2237/0812 . . . Ionized cluster beam [ICB] sources
- 2237/0815 . . . Methods of ionisation
- 2237/0817 Microwaves
- 2237/082 Electron beam
- 2237/0822 . . . Multiple sources
- 2237/0825 for producing different ions simultaneously
- 2237/0827 for producing different ions sequentially
- 2237/083 . . Beam forming
- 2237/0835 . . . Variable cross-section or shape
- 2237/10 . . Lenses
- 2237/103 . . characterised by lens type
- 2237/1035 . . . Immersion lens
- 2237/12 . . electrostatic
- 2237/1202 . . . Associated circuits
- 2237/1205 . . . Microlenses
- 2237/1207 . . . Einzel lenses
- 2237/121 . . . characterised by shape
- 2237/1215 Annular electrodes
- 2237/14 . . magnetic
- 2237/1405 . . . Constructional details
- 2237/141 Coils ([superconducting H01J 2237/142](#))
- 2237/1415 Bores or yokes, i.e. magnetic circuit in general
- 2237/142 . . . with superconducting coils
- 2237/15 . . Means for deflecting or directing discharge
- 2237/1501 . . Beam alignment means or procedures
- 2237/1502 . . Mechanical adjustments
- 2237/1503 . . . Mechanical scanning
- 2237/1504 . . Associated circuits
- 2237/1505 . . Rotating beam around optical axis

- 2237/1506 . . Tilting or rocking beam around an axis substantially at an angle to optical axis
- 2237/1507 . . . dynamically, e.g. to obtain same impinging angle on whole area
- 2237/1508 . . Combined electrostatic-electromagnetic means
- 2237/151 . . Electrostatic means
- 2237/1512 . . . Travelling wave deflectors
- 2237/1514 . . . Prisms
- 2237/1516 . . . Multipoles
- 2237/1518 . . . for X-Y scanning
- 2237/152 . . Magnetic means
- 2237/1523 . . . Prisms
- 2237/1526 . . . For X-Y scanning
- 2237/153 . . Correcting image defects, e.g. stigmators
- 2237/1532 . . Astigmatism
- 2237/1534 . . Aberrations
- 2237/1536 . . Image distortions due to scanning
- 2237/1538 . . Space charge (Boersch) effect compensation ([neutralising means H01J 2237/0041](#))
- 2237/16 . . Vessels ([liner tubes H01J 2237/0268](#))
- 2237/162 . . Open vessel, i.e. one end sealed by object or workpiece
- 2237/164 . . Particle-permeable windows
- 2237/166 . . Sealing means
- 2237/18 . . Vacuum control means
- 2237/182 . . Obtaining or maintaining desired pressure
- 2237/1825 . . . Evacuating means
- 2237/184 . . Vacuum locks
- 2237/186 . . Valves
- 2237/188 . . Differential pressure
- 2237/20 . . Positioning, supporting, modifying or maintaining the physical state of objects being observed or treated
- 2237/2001 . . Maintaining constant desired temperature
- 2237/2002 . . Controlling environment of sample
- 2237/2003 . . . Environmental cells
- 2237/2004 Biological samples
- 2237/2005 . . Seal mechanisms
- 2237/2006 . . . Vacuum seals
- 2237/2007 . . Holding mechanisms
- 2237/2008 . . specially adapted for studying electrical or magnetical properties of objects
- 2237/201 . . for mounting multiple objects
- 2237/202 . . Movement
- 2237/20207 . . . Tilt
- 2237/20214 . . . Rotation
- 2237/20221 . . . Translation
- 2237/20228 Mechanical X-Y scanning
- 2237/20235 Z movement or adjustment
- 2237/20242 . . . Eucentric movement
- 2237/2025 . . . Sensing velocity of translation or rotation
- 2237/20257 . . . Magnetic coupling
- 2237/20264 . . . Piezoelectric devices
- 2237/20271 . . . Temperature responsive devices
- 2237/20278 . . . Motorised movement
- 2237/20285 computer-controlled
- 2237/20292 . . . Means for position and/or orientation registration
- 2237/204 . . Means for introducing and/or outputting objects ([locks H01J 2237/184](#))
- 2237/206 . . Modifying objects while observing
- 2237/2062 . . . Mechanical constraints
- 2237/2065 . . . Temperature variations ([maintaining constant desired temperature H01J 2237/2001](#))
- 2237/2067 . . . Surface alteration
- 2237/208 . . Elements or methods for movement independent of sample stage for influencing or moving or contacting or transferring the sample or parts thereof, e.g. probe needles or transfer needles in FIB/SEM systems
- 2237/21 . . Focus adjustment ([lenses H01J 2237/10](#))
- 2237/213 . . during electron or ion beam welding or cutting
- 2237/216 . . Automatic focusing methods
- 2237/22 . . Treatment of data ([mixing signals H01J 2237/24495](#))
- 2237/221 . . Image processing
- 2237/223 . . . Fourier techniques
- 2237/225 . . . Displaying image using synthesised colours
- 2237/226 . . Image reconstruction
- 2237/228 . . . Charged particle holography
- 2237/244 . . Detection characterized by the detecting means
- 2237/24405 . . Faraday cages
- 2237/2441 . . Semiconductor detectors, e.g. diodes
- 2237/24415 . . . X-ray
- 2237/2442 Energy-dispersive (Si-Li type) spectrometer
- 2237/24425 Wavelength-dispersive spectrometer
- 2237/2443 . . Scintillation detectors
- 2237/24435 . . Microchannel plates
- 2237/2444 . . Electron Multiplier
- 2237/24445 . . . using avalanche in a gas
- 2237/2445 . . Photon detectors for X-rays, light, e.g. photomultipliers
- 2237/24455 . . Transmitted particle detectors
- 2237/2446 . . Position sensitive detectors
- 2237/24465 . . . Sectored detectors, e.g. quadrants
- 2237/2447 . . . Imaging plates
- 2237/24475 . . Scattered electron detectors
- 2237/2448 . . Secondary particle detectors
- 2237/24485 . . Energy spectrometers
- 2237/2449 . . Detector devices with moving charges in electric or magnetic fields
- 2237/24495 . . Signal processing, e.g. mixing of two or more signals
- 2237/245 . . Detection characterised by the variable being measured
- 2237/24507 . . Intensity, dose or other characteristics of particle beams or electromagnetic radiation
- 2237/24514 . . . Beam diagnostics including control of the parameter or property diagnosed ([H01J 2237/30472 takes precedence](#))
- 2237/24521 Beam diameter
- 2237/24528 Direction of beam or parts thereof in view of the optical axis, e.g. beam angle, angular distribution, beam divergence, beam convergence or beam landing angle on sample or workpiece ([means for deflecting or directing discharge H01J 2237/15](#))
- 2237/24535 Beam current
- 2237/24542 Beam profile
- 2237/2455 . . . Polarisation (electromagnetic beams)
- 2237/24557 . . . Spin polarisation (particles)
- 2237/24564 . . Measurements of electric or magnetic variables, e.g. voltage, current, frequency
- 2237/24571 . . Measurements of non-electric or non-magnetic variables

2237/24578	. . . Spatial variables, e.g. position, distance	2237/2818	. . . Scanning tunnelling microscopes
2237/24585	. . . Other variables, e.g. energy, mass, velocity, time, temperature	2237/282	. . Determination of microscope properties
2237/24592	. . Inspection and quality control of devices	2237/2823	. . . Resolution
2237/248	. Components associated with the control of the tube	2237/2826	. . . Calibration (for object processing apparatus H01J 2237/30433)
2237/2482	. . Optical means	2237/285	. . Emission microscopes
2237/2485	. . Electric or electronic means	2237/2852	. . . Auto-emission (i.e. field-emission)
2237/2487	. . . using digital signal processors	2237/2855	. . . Photo-emission
2237/25	. Tubes for localised analysis using electron or ion beams	2237/2857	. . . Particle bombardment induced emission
2237/2505	. . characterised by their application	2237/30	. Electron or ion beam tubes for processing objects
2237/2511	. . . Auger spectrometers	2237/303	. . Electron or ion optical systems
2237/2516	. . . Secondary particles mass or energy spectrometry	2237/304	. . Controlling tubes
2237/2522	. . . . of electrons (ESCA, XPS)	2237/30405	. . . Details
2237/2527	. . . . Ions [SIMS]	2237/30411	. . . . using digital signal processors [DSP]
2237/2533	. . . . Neutrals [SNMS]	2237/30416	. . . . Handling of data (for lithography H01J 37/3174)
2237/2538	. . . Low energy electron microscopy [LEEM]	2237/30422	. . . . . Data compression
2237/2544	. . . . Diffraction [LEED]	2237/30427	. . . . using neural networks or fuzzy logic
2237/255	. . . . . Reflection diffraction [RHEED]	2237/30433	. . . System calibration (for microscopes H01J 2237/2826)
2237/2555	. . . Microprobes, i.e. particle-induced X-ray spectrometry	2237/30438	. . . . Registration
2237/2561	. . . . electron	2237/30444	. . . . . Calibration grids
2237/2566	. . . . ion	2237/3045	. . . . Deflection calibration (deflecting in general H01J 2237/15 ; specific to material treating H01J 2237/30483)
2237/2572	. . . . proton	2237/30455	. . . Correction during exposure
2237/2577	. . . . atomic	2237/30461	. . . . pre-calculated
2237/2583	. . . using tunnel effects, e.g. STM, AFM	2237/30466	. . . Detecting endpoint of process (for plasma apparatus H01J 37/32963 , for sputtering apparatus H01J 37/3479)
2237/2588	. . . Lorenz microscopy (magnetic field measurement)	2237/30472	. . . Controlling the beam
2237/2594	. . . Measuring electric fields or potentials	2237/30477	. . . . Beam diameter
2237/26	. Electron or ion microscopes	2237/30483	. . . . Scanning
2237/2602	. . Details	2237/30488	. . . . . Raster scan
2237/2605	. . . operating at elevated pressures, e.g. atmosphere	2237/30494	. . . . . Vector scan
2237/2608	. . . . with environmental specimen chamber (environmental cells H01J 2237/2003)	2237/31	. . Processing objects on a macro-scale
2237/2611	. . Stereoscopic measurements and/or imaging	2237/3104	. . . Welding
2237/2614	. . Holography or phase contrast, phase related imaging in general, e.g. phase plates	2237/3109	. . . Cutting
2237/2617	. . Comparison or superposition of transmission images; Moiré	2237/3114	. . . Machining
2237/262	. . Non-scanning techniques	2237/3118	. . . Drilling
2237/2623	. . . Field-emission microscopes	2237/3123	. . . Casting
2237/2626	. . . . Pulsed source	2237/3128	. . . Melting
2237/28	. . Scanning microscopes	2237/3132	. . . Evaporating
2237/2801	. . . Details	2237/3137	. . . . Plasma-assisted co-operation
2237/2802	. . . Transmission microscopes	2237/3142	. . . Ion plating
2237/2803	. . . characterised by the imaging method	2237/3146	. . . . Ion beam bombardment sputtering
2237/2804	. . . . Scattered primary beam	2237/3151	. . . Etching
2237/2805	. . . . . Elastic scattering	2237/3156	. . . Curing
2237/2806	. . . . . Secondary charged particle	2237/316	. . . Changing physical properties
2237/2807	. . . . . X-rays	2237/3165	. . . Changing chemical properties
2237/2808	. . . . . Cathodoluminescence	2237/317	. . Processing objects on a microscale
2237/2809	. . . characterised by the imaging problems involved	2237/31701	. . . Ion implantation
2237/281	. . . . Bottom of trenches or holes	2237/31703	. . . . Dosimetry
2237/2811	. . . . Large objects	2237/31705	. . . . Impurity or contaminant control
2237/2812	. . . Emission microscopes	2237/31706	. . . . characterised by the area treated
2237/2813	. . . characterised by the application	2237/31708	. . . . . unpatterned
2237/2814	. . . . Measurement of surface topography	2237/3171	. . . . . patterned
2237/2815	. . . . . Depth profile	2237/31711	. . . . . using mask
2237/2816	. . . . . Length	2237/31713	. . . . . Focused ion beam
2237/2817	. . . . Pattern inspection	2237/31732	. . . Depositing thin layers on selected microareas (ion plating H01J 2237/3142)
		2237/31733	. . . . using STM

2237/31735	. . . . Direct-write microstructures	2237/3348	. . . . control of ion bombardment energy
2237/31737	. . . . using ions	2237/335	. . . . Cleaning
2237/31738	. . . . using STM	2237/3355	. . . . Holes or apertures, i.e. inprinted circuit boards
2237/3174	. . . . Etching microareas	2237/336	. . . . Changing physical properties of treated surfaces
2237/31742	. . . . for repairing masks	2237/3365	. . . . Plasma source implantation
2237/31744	. . . . . introducing gas in vicinity of workpiece	2237/338	. . . . Changing chemical properties of treated surfaces
2237/31745	. . . . for preparing specimen to be viewed in microscopes or analyzed in microanalysers	2237/3382	. . . . Polymerising
2237/31747	. . . . using STM	2237/3385	. . . . Carburising
2237/31749	. . . Focused ion beam	2237/3387	. . . . Nitriding
2237/3175	. . . Lithography	2237/339	. . . Synthesising components
2237/31752	. . . . using particular beams or near-field effects, e.g. STM-like techniques		
2237/31754	. . . . . using electron beams		
2237/31755	. . . . . using ion beams		
2237/31757	. . . . . hybrid, i.e. charged particles and light, X-rays, plasma		
2237/31759	. . . . . using near-field effects, e.g. STM		
2237/31761	. . . . . Patterning strategy		
2237/31762	. . . . . Computer and memory organisation		
2237/31764	. . . . . Dividing into sub-patterns		
2237/31766	. . . . . Continuous moving of wafer		
2237/31767	. . . . . Step and repeat		
2237/31769	. . . . . Proximity effect correction		
2237/31771	. . . . . using multiple exposure		
2237/31772	. . . . . Flood beam		
2237/31774	. . . . . Multi-beam		
2237/31776	. . . . . Shaped beam		
2237/31777	. . . . . by projection		
2237/31779	. . . . . from patterned photocathode		
2237/31781	. . . . . from patterned cold cathode		
2237/31783	. . . . . M-I-M cathode		
2237/31784	. . . . . Semiconductor cathode		
2237/31786	. . . . . Field-emitting cathode		
2237/31788	. . . . . through mask		
2237/31789	. . . . . Reflection mask		
2237/31791	. . . . . Scattering mask		
2237/31793	. . . . . Problems associated with lithography		
2237/31794	. . . . . affecting masks		
2237/31796	. . . . . affecting resists		
2237/31798	. . . . . detecting pattern defects (with SEM H01J 2237/2817 ; correcting H01J 2237/31735 , H01J 2237/3174)		
2237/32	. Processing objects by plasma generation		
2237/327	. . Arrangements for generating the plasma		
2237/33	. . characterised by the type of processing		
2237/332	. . . Coating		
2237/3321	. . . . CVD [Chemical Vapor Deposition]		
2237/3322	. . . . Problems associated with coating		
2237/3323	. . . . . uniformity		
2237/3325	. . . . . large area		
2237/3326	. . . . . high speed		
2237/3327	. . . . . Coating high aspect ratio workpieces		
2237/3328	. . . . . adhesion, stress, lift-off of deposited films		
2237/334	. . . Etching		
2237/3341	. . . . Reactive etching		
2237/3342	. . . . Resist stripping		
2237/3343	. . . . Problems associated with etching		
2237/3344	. . . . . isotropy		
2237/3345	. . . . . anisotropy		
2237/3346	. . . . . Selectivity		
2237/3347	. . . . . bottom of holes or trenches		
Details			
2261/00	Gas- or vapour-discharge lamps		
2261/02	. Details		
2261/38	. . Devices for influencing the colour or wavelength of the light		
2261/385	. . . Non-chemical aspects of luminescent layers, e.g. thickness profile, shape and distribution of luminescent coatings		
2329/00	Electron emission display panels, e.g. field emission display panels		
2329/002	. Cooling means		
2329/005	. Multi-directional displaying, i.e. with multiple display faces facing in different directions		
2329/007	. Vacuumless display panels, i.e. with phosphor directly applied to emitter without intermediate vacuum space		
2329/02	. Electrodes other than control electrodes		
2329/04	. . Cathode electrodes		
2329/0402	. . . Thermionic cathodes		
2329/0405	. . . Cold cathodes other than those covered by H01J 2329/0407 - H01J 2329/0492		
2329/0407	. . . Field emission cathodes		
2329/041	. . . . characterised by the emitter shape		
2329/0413	. . . . . Microengineered point emitters		
2329/0415	. . . . . conical shaped, e.g. Spindt type		
2329/0418	. . . . . needle shaped		
2329/0421	. . . . . Pillar shaped emitters		
2329/0423	. . . . . Microengineered edge emitters		
2329/0426	. . . . . Coatings on the emitter surface, e.g. with low work function materials		
2329/0428	. . . . . Fibres		
2329/0431	. . . . . Nanotubes		
2329/0434	. . . . . Particles		
2329/0436	. . . . . Whiskers		
2329/0439	. . . . . characterised by the emitter material		
2329/0442	. . . . . Metals or metal alloys		
2329/0444	. . . . . Carbon types		
2329/0447	. . . . . Diamond		
2329/0449	. . . . . Graphite		
2329/0452	. . . . . Fullerenes		
2329/0455	. . . . . Carbon nanotubes (CNTs)		
2329/0457	. . . . . Amorphous carbon		
2329/046	. . . . . Diamond-like carbon [DLC]		
2329/0463	. . . . . Semiconductor materials		
2329/0465	. . . . . Carbides		
2329/0468	. . . . . Nitrides		
2329/0471	. . . . . Borides		

2329/0473	. . . . Oxides	2329/8605	. . Front or back plates
2329/0476	. . . Ferroelectric cathodes	2329/861	. . . characterised by the shape
2329/0478	. . . Semiconductor cathodes, e.g. having PN junction layers	2329/8615	. . . characterised by the material
2329/0481	. . . Cold cathodes having an electric field perpendicular to the surface thereof (H01J 2329/0407 - H01J 2329/0478 take precedence)	2329/862	. . Frames
2329/0484	. . . Metal-Insulator-Metal [MIM] emission type cathodes	2329/8625	. . Spacing members
2329/0486	. . . Cold cathodes having an electric field parallel to the surface thereof, e.g. thin film cathodes	2329/863	. . . characterised by the form or structure
2329/0489	. . . Surface conduction emission type cathodes	2329/8635	. . . . having a corrugated lateral surface
2329/0492	. . . Cold cathodes combined with other synergetic effects, e.g. secondary, photo- or thermal emission	2329/864	. . . characterised by the material
2329/0494	. . . Circuit elements associated with the emitters by direct integration	2329/8645	. . . with coatings on the lateral surfaces thereof
2329/0497	. . . . Resistive members, e.g. resistive layers	2329/865	. . . Connection of the spacing members to the substrates or electrodes
2329/08	. . Anode electrodes	2329/8655	. . . . Conductive or resistive layers
2329/18	. Luminescent screens	2329/866	. . . . Adhesives
2329/20	. . characterised by the luminescent material	2329/8665	. . . Spacer holding means
2329/22	. . characterised by the binder or adhesive for securing the luminescent material to its support, e.g. substrate	2329/867	. . Seals between parts of vessels
2329/28	. . with protective, conductive or reflective layers	2329/8675	. . . Seals between the frame and the front and/or back plate
2329/30	. . Shape or geometrical arrangement of the luminescent material	2329/868	. . Passive shielding means of vessels
2329/32	. . Means associated with discontinuous arrangements of the luminescent material	2329/8685	. . . Antistatic shielding
2329/323	. . . Black matrix	2329/869	. . . Electromagnetic shielding
2329/326	. . . Color filters structurally combined with the luminescent material	2329/8695	. . . Mechanical shielding, e.g. against water or abrasion
2329/46	. Arrangements of electrodes and associated parts for generating or controlling the electron beams	2329/88	. . Coatings on walls of the vessels (H01J 2329/18 , H01J 2329/868 , H01J 2329/89 take precedence)
2329/4604	. . Control electrodes	2329/89	. . Optical components structurally combined with the vessel
2329/4608	. . . Gate electrodes	2329/892	. . . Anti-reflection, anti-glare, viewing angle and contrast improving means
2329/4613	. . . . characterised by the form or structure	2329/895	. . . Spectral filters
2329/4617	. . . . Shapes or dimensions of gate openings	2329/897	. . . Lenses
2329/4621	. . . . Arrangement of gate openings	2329/90	. Leading-in arrangements; seals therefor
2329/4626	. . . . Curved or extending upwardly	2329/92	. Means forming part of the display panel for the purpose of providing electrical connection to it
2329/463	. . . . characterised by the material	2329/94	. Means for exhausting the vessel or maintaining vacuum within the vessel
2329/4634	. . . . Relative position to the emitters, cathodes or substrates	2329/941	. . Means for exhausting the vessel
2329/4639	. . . Focusing electrodes	2329/943	. . Means for maintaining vacuum within the vessel
2329/4643	. . . . characterised by the form or structure	2329/945	. . . by gettering
2329/4647	. . . . Shapes or dimensions of focusing electrode openings	2329/946	. . . . characterised by the position or form of the getter
2329/4652	. . . . Arrangement of focusing electrode openings	2329/948	. . . . characterised by the material of the getter
2329/4656	. . . . characterised by the material	2329/96	. Circuit elements structurally associated with the display panels (H01J 2329/0494 takes precedence)
2329/466	. . . . Relative position to the gate electrodes, emitters, cathodes or substrates		
2329/4665	. . . . In the same plane as the gate electrodes or cathodes	2893/00	Discharge tubes and lamps
2329/4669	. . Insulation layers	2893/0001	. Electrodes and electrode systems suitable for discharge tubes or lamps
2329/4673	. . . for gate electrodes	2893/0002	. . Construction arrangements of electrode systems
2329/4678	. . . for focusing electrodes	2893/0003	. . . Anodes forming part of vessel walls
2329/4682	. . . characterised by the shape	2893/0004	. . . . Anodes formed in central part
2329/4686	. . . . Dimensions of openings	2893/0005	. . . Fixing of electrodes
2329/4691	. . . characterised by the material	2893/0006	. . . . Mounting
2329/4695	. . Potentials applied to the electrodes	2893/0007	. . . . Machines for assembly
2329/86	. Vessels	2893/0008	. . . . Supply leads; Electrode supports via rigid connection to vessel
		2893/0009	. . . . Electrode system pressing against vessel wall
		2893/001	. . Non-constructive schematic arrangements
		2893/0011	. . Non-emitting electrodes
		2893/0012	. . Constructional arrangements
		2893/0013	. . . Sealed electrodes
		2893/0015	. . . Non-sealed electrodes
		2893/0016	. . . . Planar grids
		2893/0017	. . . . Cylindrical, helical or annular grids

2893/0018	. . . . Bar or cage-like grids	2893/0067	. . . Electrode assembly without control electrodes, e.g. including a screen
2893/0019	. . . Chemical composition and manufacture	2893/0068	. . . electrode assembly with control electrodes, e.g. including a screen
2893/002	. . . . chemical	2893/0069	. Tubes for displaying characters
2893/0021	. . . . . carbon	2893/007	. Sequential discharge tubes
2893/0022	. . . . Manufacture	2893/0072	. Disassembly or repair of discharge tubes
2893/0023	. . . . . carbonising and other surface treatments	2893/0073	. . Discharge tubes with liquid poolcathodes; constructional details
2893/0024	. . . . . Planar grids	2893/0074	. . . Cathodic cups; Screens; Reflectors; Filters; Windows; Protection against mercury deposition; Returning condensed electrode material to the cathodic cup; Liquid electrode level control
2893/0025	. . . . . by winding wire upon a support	2893/0075	. . . . Cathodic cups
2893/0026	. . . Machines for manufacture of grids or anodes	2893/0076	. . . . . Liquid electrode materials
2893/0027	. . . Mitigation of temperature effects	2893/0077	. . . . . Cathodic cup construction; Cathodic spot control
2893/0029	. Electron beam tubes	2893/0078	. . . . . Mounting cathodic cups in the discharge tube
2893/003	. Tubes with plural electrode systems	2893/0079	. . . . . Means for limiting the cathodic spot movement
2893/0031	. Tubes with material luminescing under electron bombardment	2893/008	. . . . . Means for stabilising the cathodic spot
2893/0032	. Tubes with variable amplification factor	2893/0081	. . . . . Cooling means
2893/0033	. Vacuum connection techniques applicable to discharge tubes and lamps	2893/0082	. . . . . Returning condensed electrode material to the cathodic cup, e.g. including cleaning
2893/0034	. . Lamp bases	2893/0083	. . . . . Liquid electrode level control
2893/0035	. . . shaped as flat plates, in particular metallic	2893/0084	. . . . . Protection against mercury deposition
2893/0036	. . . having wires, ribbons or tubes placed between two vessel walls and being perpendicular to at least one of said walls	2893/0086	. . . . . Gas fill; Maintaining or maintaining desired pressure; Producing, introducing or replenishing gas or vapour during operation of the tube; Getters; Gas cleaning; Electrode cleaning
2893/0037	. . Solid sealing members other than lamp bases	2893/0087	. . . . . Igniting means; Cathode spot maintaining or extinguishing means
2893/0038	. . . Direct connection between two insulating elements, in particular via glass material	2893/0088	. . Tubes with at least a solid principal cathode and solid anodes
2893/0039	. . . . Glass-to-glass connection, e.g. by soldering	2893/0089	. . . Electrode systems
2893/004	. . . . Quartz-to-quartz connection	2893/009	. . . Anode systems; Screens
2893/0041	. . . Direct connection between insulating and metal elements, in particular via glass material	2893/0091	. . . . Anode supporting means
2893/0043	. . . . Glass-to-metal or quartz-to-metal, e.g. by soldering	2893/0092	. . . . Anodic screens or grids
2893/0044	. . . Direct connection between two metal elements, in particular via material a connecting material	2893/0093	. . . . Anodic arms
2893/0045	. . Non-solid connections, e.g. liquid or rubber	2893/0094	. . . Electrode arrangements; Auxiliary electrodes
2893/0046	. . Lamp base with closure	2893/0095	. . Tubes with exclusively liquid main electrodes
2893/0047	. . Closure other than lamp base	2893/0096	. Transport of discharge tube components during manufacture, e.g. wires, coils, lamps, contacts, etc.
2893/0048	. Tubes with a main cathode	2893/0097	. . Incandescent wires of coils
2893/0049	. . Internal parts	2893/0098	. . Vessels
2893/005	. . Cathodes		
2893/0051	. . Anode assemblies; screens for influencing the discharge		
2893/0052	. . . Anode supporting means		
2893/0053	. . . Leading in for anodes; Protecting means for anode supports		
2893/0054	. . . Cooling means		
2893/0055	. . Movable screens		
2893/0056	. . Parts inside tubes brought to incandescence by the discharge		
2893/0058	. . Grids; Auxiliary internal or external electrodes		
2893/0059	. Arc discharge tubes		
2893/006	. Tubes with electron bombarded gas (e.g. with plasma filter)		
2893/0061	. Tubes with discharge used as electron source		
2893/0062	. Tubes with temperature ionized gas as electron source		
2893/0063	. Plasma light sources		
2893/0064	. Tubes with cold main electrodes (including cold cathodes)		
2893/0065	. . Electrode systems		
2893/0066	. . . Construction, material, support, protection and temperature regulation of electrodes; Electrode cups		