

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

## H01 BASIC ELECTRIC ELEMENTS

(NOTE 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 ultra-violet or infra-red 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](#).

<b>1/00</b>	<b>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 <a href="#">H01J 3/00</a>)</b>	<b>1/148</b>	. . . . 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 (filaments for incandescent lamps <a href="#">H01K 1/02</a> )
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}
1/144	. . . . with other metal oxides as an emissive material	1/3046	. . . . . {Edge emitters}
1/146	. . . . with metals or alloys as an emissive material	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 {( <a href="#">H01J 1/304</a> - <a href="#">H01J 1/308</a> 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; luminescent screens [H01J 1/62](#); charge storage screens in general [H01J 1/78](#); charge storage screens using secondary emission for image tubes [H01J 29/41](#); dynodes for secondary emission tubes [H01J 43/10](#); secondary-emission detectors for measurement of nuclear or X-radiation [G01T 1/28](#))
- 1/34 . . Photo-emissive cathodes ([H01J 1/35](#) takes precedence; photoelectric screens [H01J 1/78](#))
- 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 ([screens acting as control electrodes H01J 1/46](#)); 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 ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/54 . Screens on or from which an image or pattern is formed, picked up, converted, or stored; Luminescent coatings on vessels ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/56 . . acting as light valves by shutter operation, e.g. for eidophor ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/58 . . acting by discolouration, e.g. halide screen ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/60 . . Incandescent screens ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/62 . . Luminescent screens; Selection of materials for luminescent coatings on vessels ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/63 . . . characterised by the luminescent material (luminescent materials or compositions [C09K 11/00](#) [see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/64 . . . characterised by the binder or adhesive for securing the luminescent material to its supports ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/66 . . . Supports for luminescent material (vessels [H01J 5/02](#) [see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/68 . . . with superimposed luminescent layers ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/70 . . . with protective, conductive, or reflective layers ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/72 . . . with luminescent material discontinuously arranged, e.g. in dots or lines ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/74 . . . with adjacent dots or lines of different luminescent material ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/76 . . . provided with permanent marks or references ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/78 . . Photoelectric screens; Charge-storage screens ([see provisionally also H01J 29/08 - H01J 29/36](#))
- 1/88 . Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies
- 1/90 . . Insulation between electrodes or supports within the vacuum space ([leading-in conductors H01J 5/46](#))
- 1/92 . . Mountings for the electrode assembly as a whole
- 1/94 . . Mountings for individual electrodes ([for directly-heated cathodes H01J 1/15](#))
- 1/96 . . Spacing members extending to the envelope
- 1/98 . . . without fixed connection between spacing member and envelope
- 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 ([electron guns for discharge tubes with provision for introducing objects or material to be exposed to the discharge H01J 37/06](#); for cathode ray tubes [H01J 29/48](#))
- 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 ([see provisionally also H01J 27/00](#))
- 3/06 . two or more guns being arranged in a single vacuum space, e.g. for plural-ray tubes ([H01J 3/07](#) takes precedence [see provisionally also H01J 29/46 - H01J 29/84](#))
- 3/07 . Arrangements for controlling convergence of a plurality of beams ([see provisionally also H01J 29/46 - H01J 29/84](#))
- 3/08 . Arrangements for controlling intensity of ray or beam ([H01J 3/02, H01J 3/04](#) take precedence [see provisionally also H01J 29/46 - H01J 29/84](#))

- 3/10 . Arrangements for centering ray or beam ([H01J 3/02](#), [H01J 3/04](#) take precedence {see provisionally also [H01J 29/46](#) - [H01J 29/84](#)})
- 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 {see provisionally also [H01J 29/46](#) - [H01J 29/84](#)})
- 3/14 . Arrangements for focusing or reflecting ray or beam ([H01J 3/02](#), [H01J 3/04](#) take precedence {see provisionally also [H01J 29/46](#) - [H01J 29/84](#)})
- 3/16 . . Mirrors {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/18 . . Electrostatic lenses {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/20 . . Magnetic lenses {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/22 . . . using electromagnetic means only {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/24 . . . using permanent magnets only {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/26 . Arrangements for deflecting ray or beam (circuit arrangements for producing saw-tooth pulses or other deflecting voltages or currents [H03K](#); ([H01J 29/46](#) - [H01J 29/84](#) and [H01J 37/147](#) take precedence))
- 3/28 . . along one straight line or along two perpendicular straight lines {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/30 . . . by electric fields only {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/32 . . . by magnetic fields only {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/34 . . along a circle, spiral, or rotating radial line {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/36 . Arrangements for controlling the ray or beam after passing the main deflection system, e.g. for post-acceleration or post-concentration {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/38 . Mounting, supporting, spacing, or insulating electron-optical or ion-optical arrangements {(see provisionally also [H01J 29/46](#) - [H01J 29/84](#))}
- 3/381 . . {Dispersed generators}
- 3/383 . . . {the generators exploiting regenerative energy}
- 3/385 . . . . {Solar energy (generation of electric power by conversion of light [H02S](#))}
- 3/386 . . . . {Wind energy (wind motors [F03D](#))}
- 3/388 . . . {using fuel cells (fuel cells per se [H01M 8/00](#))}
- 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**
- 5/02 . Vessels; Containers; Shields associated therewith; Vacuum locks
- 5/03 . . Arrangements for preventing or mitigating effects of implosion of vessels or containers
- 5/04 . . Vessels or containers characterised by the material thereof (selection of the material of the coating [H01J 5/08](#))
- 5/06 . . Vessels or containers specially adapted for operation at high tension, e.g. by improved potential distribution over surface of vessel
- 5/08 . . provided with coatings on the walls thereof; Selection of materials for the coatings ([luminescent coatings](#) [H01J 1/62](#))
- 5/10 . . . on internal surfaces
- 5/12 . . Double-wall vessels or containers
- 5/125 . . . {with a gas tight space between both walls}
- 5/14 . . Dismountable vessels or containers, e.g. for replacing cathode heater
- 5/16 . . Optical or photographic arrangements structurally combined with the vessel ([luminescent coatings](#) [H01J 1/62](#) {see provisionally [H01J 29/84](#)})
- 5/18 . . Windows permeable to X-rays, gamma-rays, or particles
- 5/20 . Seals between parts of vessels
- 5/22 . . Vacuum-tight joints between parts of vessel
- 5/24 . . . between insulating parts of vessel
- 5/26 . . . between insulating and conductive parts of vessel
- 5/28 . . . between conductive parts of vessel
- 5/30 . . . using packing-material, e.g. sealing-liquid or elastic insert
- 5/32 . Seals for leading-in conductors
- 5/34 . . for an individual conductor ([pinched-stem seals](#) [H01J 5/38](#); [end-disc seals](#) [H01J 5/40](#); [annular seals](#) [H01J 5/44](#))
- 5/36 . . . using intermediate part
- 5/38 . . Pinched-stem or analogous seals
- 5/40 . . End-disc seals, e.g. flat header
- 5/42 . . . using intermediate part
- 5/44 . . Annular seals disposed between the ends of the vessel
- 5/46 . Leading-in conductors
- 5/48 . Means forming part of the tube or lamp for the purpose of supporting it ([associated with electrical connecting means](#) [H01J 5/50](#))
- 5/50 . Means forming part of the tube or lamps for the purpose of providing electrical connection to it ([construction of connectors](#) [H01R](#))
- 5/52 . . directly applied to or forming part of the vessel
- 5/54 . . supported by a separate part, e.g. base
- 5/56 . . . Shape of the separate part
- 5/565 . . . . {Bases for circular lamps}
- 5/58 . . . Means for fastening the separate part to the vessel, e.g. by cement
- 5/60 . . . . for fastening by mechanical means
- 5/62 . . . Connection of wires protruding from the vessel to connectors carried by the separate part
- 7/00 Details not provided for in the preceding groups and common to two or more basic types of discharge tubes or lamps**
- 7/02 . Selection of substances for gas fillings; Specified operating pressure or temperature ([radioactive fillings](#) [H01J 7/40](#))
- 7/04 . . having one or more carbon compounds as the principal constituent
- 7/06 . . having helium, argon, neon, krypton, or xenon as the principal constituent
- 7/08 . . having a metallic vapour as the principal constituent
- 7/10 . . . mercury vapour

- 7/12 . . . vapour of an alkali metal
- 7/14 . Means for obtaining or maintaining the desired pressure within the vessel
- 7/16 . . Means for permitting pumping during operation of the tube or lamp
- 7/18 . . Means for absorbing or adsorbing gas, e.g. by gettering
- 7/183 . . . {Composition or manufacture of getters}
- 7/186 . . . {Getter supports}
- 7/20 . . Means for producing, introducing, or replenishing gas or vapour during operation of the tube or lamp
- 7/22 . . Tubulations therefor, e.g. for exhausting; Closures therefor
- 7/24 . Cooling arrangements ([for main electrodes H01J 1/02](#)); Heating arrangements ([for main electrodes H01J 1/02](#)); Means for circulating gas or vapour within the discharge space
- 7/26 . . by flow of fluid through passages associated with tube or lamp
- 7/28 . . by latent heat or evaporation of cooling liquid
- 7/30 . Igniting arrangements ([circuit arrangements H02M 1/02](#), [H05B](#))
- 7/32 . . having resistive or capacitive igniter
- 7/34 . . . having resistive igniter only
- 7/36 . . Igniting by movement of a solid electrode
- 7/38 . . Igniting by movement of vessel as a whole, e.g. tilting
- 7/40 . . Igniting by associated radioactive materials or fillings
- 7/42 . Means structurally associated with the tube or lamp for indicating defects or previous use
- 7/44 . One or more circuit elements structurally associated with the tube or lamp
- 7/46 . . Structurally associated resonator having distributed inductance and capacitance
- 9/00 Apparatus or processes specially adapted for the manufacture, {installation, removal, maintenance} of electric discharge tubes, discharge lamps, or parts thereof (manufacture of vessels or containers from metal [B21](#), e.g. [B21D 51/00](#), from glass [C03B](#)); Recovery of material from discharge tubes or lamps**
- 9/003 . {Auxiliary devices for installing or removing discharge tubes or lamps}
- 9/006 . . {for fluorescent lamps}
- 9/02 . Manufacture of electrodes or electrode systems
- 9/022 . . {of cold cathodes}
- 9/025 . . . {of field emission cathodes}
- 9/027 . . . {of thin film cathodes}
- 9/04 . . of thermionic cathodes
- 9/042 . . . {Manufacture, activation of the emissive part}
- 9/045 . . . . {Activation of assembled cathode ([regeneration H01J 9/505](#))}
- 9/047 . . . . {Cathodes having impregnated bodies ([H01J 9/045](#) takes precedence)}
- 9/06 . . . Machines therefor
- 9/08 . . Manufacture of heaters for indirectly-heated cathodes
- 9/10 . . . Machines therefor
- 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, decalcomania}
- 9/2278 . . . . . {Application of light absorbing material, e.g. between the luminescent areas}
- 9/233 . . Manufacture of photoelectric screens or charge-storage screens ({[no documents, see H01J 29/36](#)})
- 9/236 . Manufacture of magnetic deflecting devices for cathode-ray tubes ([manufacturing coils for transformers, inductances, reactors or choke coils H01F 41/04](#))
- 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 ( <a href="#">H01J 9/241</a> , <a href="#">H01J 9/26</a> take precedence)}	11/12	. . with main electrodes provided on both sides of the discharge space
9/247	. . . {specially adapted for gas-discharge lamps}	11/14	. . with main electrodes provided only on one side of the discharge space
9/248	. . . . {the vessel being flat}	11/16	. . with main electrodes provided inside or on the side face of the spacers
9/26	. . Sealing together parts of vessels	11/18	. . containing a plurality of independent closed structures for containing the gas, e.g. plasma tube array [PTA] display panels
9/261	. . . {the vessel being for a flat panel display (for flat discharge lamps <a href="#">H01J 9/268</a> )}	11/20	. Constructional details
9/263	. . . {specially adapted for cathode-ray tubes ( <a href="#">H01J 9/261</a> takes precedence)}	11/22	. . Electrodes, e.g. special shape, material or configuration
9/265	. . . {specially adapted for gas-discharge tubes or lamps ( <a href="#">H01J 9/261</a> takes precedence)}	11/24	. . . Sustain electrodes or scan electrodes
9/266	. . . . {specially adapted for gas-discharge lamps}	11/26	. . . Address electrodes
9/268	. . . . . {the vessel being flat}	11/28	. . . Auxiliary electrodes, e.g. priming electrodes or trigger electrodes
9/28	. . Manufacture of leading-in conductors	11/30	. . . Floating electrodes
9/30	. . Manufacture of bases	11/32	. . . Disposition of the electrodes
9/32	. . Sealing leading-in conductors	11/34	. . Vessels, containers or parts thereof, e.g. substrates
9/323	. . . {Sealing leading-in conductors into a discharge lamp or a gas-filled discharge device (for incandescent lamps <a href="#">H01K 3/20</a> , joining glass to metal <a href="#">C03C 27/00</a> )}	11/36	. . . Spacers, barriers, ribs, partitions or the like
9/326	. . . . {making pinched-stem or analogous seals}	11/38	. . . Dielectric or insulating layers
9/34	. . Joining base to vessel	11/40	. . . Layers for protecting or enhancing the electron emission, e.g. MgO layers
9/36	. . Joining connectors to internal electrode system	11/42	. . . Fluorescent layers
9/38	. Exhausting, degassing, filling, or cleaning vessels	11/44	. . . Optical arrangements or shielding arrangements, e.g. filters, black matrices, light reflecting means or electromagnetic shielding means
9/385	. . Exhausting vessels	11/46	. . Connecting or feeding means, e.g. leading-in conductors
9/39	. . Degassing vessels	11/48	. . Sealing, e.g. seals specially adapted for leading-in conductors
9/395	. . Filling vessels	11/50	. . Filling, e.g. selection of gas mixture
9/40	. Closing vessels	11/52	. . Means for absorbing or adsorbing the gas mixture, e.g. by gettering
9/42	. Measurement or testing during manufacture	11/54	. . Means for exhausting the gas
9/44	. Factory adjustment of completed discharge tubes or lamps to comply with desired tolerances	<b>13/00</b>	<b>Discharge tubes with liquid-pool cathodes, e.g. metal-vapour rectifying tubes (<a href="#">lamps H01J 61/00</a>)</b>
9/445	. . {Aging of tubes or lamps, e.g. by "spot knocking" (cathode activation <a href="#">H01J 9/045</a> )}	13/02	. Details
9/46	. Machines having sequentially arranged operating stations	13/04	. . Main electrodes; Auxiliary anodes
9/48	. . with automatic transfer of workpieces between operating stations	13/06	. . . Cathodes
9/50	. Repairing or regenerating used or defective discharge tubes or lamps	13/08	. . . . characterised by the material
9/505	. . {Regeneration of cathodes (activation <a href="#">H01J 9/045</a> )}	13/10	. . . . Containers for the liquid pool; Arrangements or mounting thereof
9/52	. Recovery of material from discharge tubes or lamps ( <a href="#">H01J 9/50</a> takes precedence)	13/12	. . . . Positioning or moving the cathode spot on the surface of the pool
<b>11/00</b>	<b>Gas-filled discharge tubes with alternating current induction of the discharge, e.g. AC-PDPs [Alternating Current Plasma Display Panels] (<a href="#">circuits or methods for driving PDPs G09G 3/28</a>); Gas-filled discharge tubes without any main electrode inside the vessel; Gas-filled discharge tubes with at least one main electrode outside the vessel (<a href="#">discharge lamps H01J 65/00</a> {<a href="#">H01J 61/00</a>, <a href="#">H01J 63/00</a>})</b>	13/14	. . . . Cooling, heating, circulating, filtering, or controlling level of the liquid
	<b>NOTES</b>	13/16	. . . Anodes; Auxiliary anodes for maintaining the discharge ( <a href="#">screens H01J 13/22</a> )
	1. When classifying in this group, classification is made in all appropriate places.	13/18	. . . . Cooling or heating of anodes
	2. In this group, the following term is used with the meaning indicated:	13/20	. . Control electrodes, e.g. grid ( <a href="#">for igniting arrangements H01J 13/34</a> )
	– "main electrode" means any of a sustain electrode, scan electrode or address electrode.	13/22	. . Screens, e.g. for preventing or eliminating arcing-back
11/10	. AC-PDPs with at least one main electrode being out of contact with the plasma	13/24	. . Vessels; Containers
		13/242	. . . {characterised by the material}
		13/244	. . . {characterised by the shape}
		13/246	. . . {Treatment of, or coating on interior parts of vessel}
		13/248	. . . {Envelope means outside vessel, i.e. screens, reflectors, filters}

13/26	. . Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors	17/18	. . Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors
13/263	. . . {Leading-in conductors to the liquid electrode}	17/183	. . . {Seals between parts of vessel}
13/266	. . . {Leading-in conductors to the anode}	17/186	. . . {Seals between leading-in conductors and vessel}
13/28	. . Selection of substances for gas filling; Means for obtaining the desired pressure within the tube	17/20	. . Selection of substances for gas fillings; Specified operating pressures or temperature ( <a href="#">radioactive fillings H01J 17/32</a> )
13/30	. . . Means for permitting pumping during operation of the tube	17/22	. . Means for obtaining or maintaining the desired pressure within the tube
13/32	. . Cooling arrangements; Heating arrangements ( <a href="#">for cathodes H01J 13/14</a> ; <a href="#">for anodes H01J 13/18</a> )	17/24	. . . Means for absorbing or adsorbing gas, e.g. by gettering
13/34	. . Igniting arrangements ( <a href="#">circuits arrangements H02M 1/02</a> )	17/26	. . . Means for producing, introducing, or replenishing gas or vapour during operation of the tube
13/36	. . . having resistive or capacitive igniter	17/28	. . Cooling arrangements
13/38	. . . . having resistive igniter only	17/30	. . Igniting arrangements
13/40	. . . Igniting by movement of a solid electrode	17/32	. . . Igniting by associated radioactive materials or fillings
13/405	. . . . {Interrupting contact with liquid cathode}	17/325	. . . . {Current stabilising tubes, e.g. curpistors}
13/42	. . . Igniting by movement of vessel as a whole, e.g. tilting	17/34	. . One or more circuit elements structurally associated with the tube
13/44	. . Devices for preventing or eliminating arcing-back ( <a href="#">screens therefor H01J 13/22</a> )	17/36	. . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
13/46	. . One or more circuit elements structurally associated with the tube	17/38	. Cold-cathode tubes ( <a href="#">TR boxes H01J 17/64</a> )
13/48	. . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for	17/40	. . with one cathode and one anode, e.g. glow tubes, tuning-indicator glow tubes, voltage-stabiliser tubes, voltage-indicator tubes, ( <a href="#">cathode-glow lamps H01J 61/04</a> )
13/50	. Tubes having a single main anode	17/42	. . . having one or more probe electrodes, e.g. for potential dividing
13/52	. . with control by one or more intermediate control electrodes	17/44	. . . having one or more control electrodes
13/54	. . with control by igniter, e.g. single-anode ignitron	17/46	. . . . for preventing and then permitting ignition but thereafter having no control
13/56	. Tubes having two or more main anodes	17/48	. . with more than one cathode or anode, e.g. sequence-discharge tube, counting tube, dekatron
13/58	. . with control by one or more intermediate control electrodes	17/485	. . . {Plasma addressed liquid crystal displays [PALC]}
<b>15/00</b>	<b>Gas-filled discharge tubes with gaseous cathodes, e.g. plasma cathode (<a href="#">lamps H01J 61/62</a>)</b>	17/49	. . . Display panels, e.g. with crossed electrodes {, e.g. making use of direct current} ( <a href="#">gas discharge type indicating arrangements effected by the combination of a number of individual lamps G09F 9/313</a> {display panels making use of alternating current <a href="#">H01J 11/00</a> })
15/02	. Details, e.g. electrode, gas filling, shape of vessel	17/491	. . . . {with electrodes arranged side by side and substantially in the same plane, e.g. for displaying alphanumeric characters}
15/04	. . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for	17/492	. . . . {with crossed electrodes}
<b>17/00</b>	<b>Gas-filled discharge tubes with solid cathode (<a href="#">H01J 25/00</a>, <a href="#">H01J 27/00</a>, <a href="#">H01J 31/00</a> - <a href="#">H01J 41/00</a> {<a href="#">H01J 11/00</a>} take precedence; gas or vapour discharge lamps <a href="#">H01J 61/00</a>; gas filled spark gaps <a href="#">H01T</a>; Marx converters <a href="#">H02M 7/26</a>; tubes for generating potential differences by charges carried in a gas stream <a href="#">H02N</a>)</b>	17/494	. . . . {using sequential transfer of the discharges, e.g. of the self-scan type ( <a href="#">addressing circuits therefor G09G 3/29</a> )}
17/005	. {specially adapted as noise generators ( <a href="#">electronic circuits for generation of noise currents or voltages H03B 29/00</a> )}	17/495	. . . . . {display panels using sequential transfer of the discharge along dielectric storage elements}
17/02	. Details	17/497	. . . . . {for several colours}
17/04	. . Electrodes; Screens	17/498	. . . . {with a gas discharge space and a post acceleration space for electrons}
17/06	. . . Cathodes	17/50	. Thermionic-cathode tubes ( <a href="#">TR boxes H01J 17/64</a> )
17/063	. . . . {Indirectly heated cathodes, e.g. by the discharge itself}	17/52	. . with one cathode and one anode
17/066	. . . . {Cold cathodes}	17/54	. . . having one or more control electrodes
17/08	. . . . having mercury or liquid alkali metal deposited on the cathode surface during operation of the tube	17/56	. . . . for preventing and then permitting ignition, but thereafter having no control
17/10	. . . Anodes	17/58	. . with more than one cathode or anode
17/12	. . . Control electrodes		
17/14	. . Magnetic means for controlling the discharge		
17/16	. . Vessels; Containers		

- 17/60 . . . the discharge paths priming each other in a predetermined sequence, e.g. counting tube
- 17/62 . . . with independent discharge paths controlled by intermediate electrodes, e.g. polyphase rectifier
- 17/64 . Tubes specially designed for switching or modulating in a waveguide, e.g. TR box
- 19/00 Details of vacuum tubes of the types covered by group [H01J 21/00](#)**
- 19/02 . Electron-emitting electrodes; Cathodes
- 19/04 . . Thermionic cathodes
- 19/06 . . . characterised by the material
- 19/062 . . . . with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material
- 19/064 . . . . with other metal oxides as an emissive material
- 19/066 . . . . with metals or alloys as an emissive material
- 19/068 . . . . with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material
- 19/08 . . . Cathodes heated directly by an electric current
- 19/10 . . . characterised by the shape
- 19/12 . . . . Supports; Vibration-damping arrangements
- 19/14 . . . Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
- 19/16 . . . . Heaters ([filaments for incandescent lamps H01K 1/02](#))
- 19/18 . . . . Insulating layer or body located between heater and emissive material
- 19/20 . . . . Supports for the emissive material
- 19/22 . . . . Dispenser-type cathodes, e.g. L-cathode
- 19/24 . . Cold cathodes, e.g. field-emissive cathode
- 19/28 . Non-electron-emitting electrodes; Screens
- 19/30 . . characterised by the material
- 19/32 . . Anodes
- 19/34 . . . forming part of the envelope
- 19/36 . . . Cooling of anodes
- 19/38 . . Control electrodes, e.g. grid
- 19/40 . . Screens for shielding ([screens acting as control electrodes H01J 19/38](#))
- 19/42 . Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies
- 19/44 . . Insulation between electrodes or supports within the vacuum space ([leading-in conductors H01J 19/62](#))
- 19/46 . . Mountings for the electrode assembly as a whole
- 19/48 . . Mountings for individual electrodes ([for directly-heated cathodes H01J 19/12](#))
- 19/50 . . Spacing members extending to the envelope
- 19/52 . . . without fixed connection between spacing member and envelope
- 19/54 . Vessels; Containers; Shields associated therewith
- 19/56 . . characterised by the material of the vessel or container
- 19/57 . . provided with coatings on the walls thereof; Selection of materials for the coatings
- 19/58 . Seals between parts of vessels
- 19/60 . Seals for leading-in conductors
- 19/62 . Leading-in conductors
- 19/64 . Means forming part of the tube for the purpose supporting it ([associated with electrical connecting means H01J 19/66](#))
- 19/66 . Means forming part of the tube for the purpose of providing electrical connection to it ([construction of connectors H01R {no documents, see H01J 5/46 - H01J 5/62}](#))
- 19/68 . Specified gas introduced into the tube at low pressure, e.g. for reducing or influencing space charge
- 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 37/00](#), [H01J 43/00](#) take precedence; details of vacuum tubes [H01J 19/00](#); cathode ray or electron stream lamps [H01J 63/00](#))**
- 21/02 . Tubes with a single discharge path
- 21/04 . . without control means, i.e. diodes
- 21/06 . . having electrostatic control means only
- 21/065 . . . {[Devices for short wave tubes](#)}
- 21/08 . . . with movable electrode or electrodes
- 21/10 . . . with one or more immovable internal control electrodes, e.g. triode, pentode, octode
- 21/105 . . . . {[with microengineered cathode and control electrodes, e.g. Spindt-type](#)}
- 21/12 . . . . Tubes with variable amplification factor
- 21/14 . . . . Tubes with means for concentrating the electron stream, e.g. beam tetrode
- 21/16 . . . with external electrostatic control means and with or without internal control electrodes
- 21/18 . . having magnetic control means; having both magnetic and electrostatic control means
- 21/20 . Tubes with more than one discharge path; Multiple tubes, e.g. double diode, triode-hexode ([secondary-emission tubes, electron-multiplier tubes H01J 43/00](#))
- 21/22 . . with movable electrode or electrodes
- 21/24 . . with variable amplification factor
- 21/26 . . with means for concentrating the electron stream
- 21/34 . Tubes with electrode system arranged or dimensioned so as to eliminate transit-time effect ([with flat electrodes H01J 21/36](#))
- 21/36 . Tubes with flat electrodes, e.g. disc electrode
- 23/00 Details of transit-time tubes of the types covered by group [H01J 25/00](#)**
- 23/005 . {[Cooling methods or arrangements \(H01J 23/033 takes precedence\)](#)}
- 23/02 . Electrodes; Magnetic control means; Screens ([associated with resonator or delay system H01J 23/16](#))
- 23/027 . . Collectors
- 23/0275 . . . {[Multistage collectors](#)}
- 23/033 . . . Collector cooling devices

- 23/04 . . Cathodes
- 23/05 . . . having a cylindrical emissive surface, e.g. cathodes for magnetrons
- 23/06 . . Electron or ion guns
- 23/065 . . . producing a solid cylindrical beam ([H01J 23/075 takes precedence](#))
- 23/07 . . . producing a hollow cylindrical beam ([H01J 23/075 takes precedence](#))
- 23/075 . . . Magnetron injection guns
- 23/08 . . Focusing arrangements, e.g. for concentrating stream of electrons, for preventing spreading of stream
- 23/083 . . . Electrostatic focusing arrangements
- 23/087 . . . Magnetic focusing arrangements
- 23/0873 . . . . {with at least one axial-field reversal along the interaction space, e.g. P.P.M. focusing}
- 23/0876 . . . . {with arrangements improving the linearity and homogeneity of the axial field, e.g. field straightener}
- 23/09 . . Electric systems for directing or deflecting the discharge along a desired path, e.g. E-type ([focusing arrangements H01J 23/08](#))
- 23/10 . . Magnet systems for directing or deflecting the discharge along a desired path, e.g. a spiral path ([magnetic focusing arrangements H01J 23/08](#))
- 23/11 . . Means for reducing noise ([in electron or ion gun H01J 23/06](#))
- 23/12 . Vessels; Containers
- 23/14 . Leading-in arrangements; Seals therefor
- 23/15 . . Means for preventing wave energy leakage structurally associated with tube leading-in arrangements, e.g. filters, chokes, attenuating devices
- 23/16 . Circuit elements, having distributed capacitance and inductance, structurally associated with the tube and interacting with the discharge ([circuit elements, having distributed capacitance and inductance, in general H01P](#))
- 23/165 . . {[Manufacturing processes or apparatus therefore](#)}
- 23/18 . . Resonators
- 23/20 . . . Cavity resonators; Adjustment or tuning thereof
- 23/207 . . . . Tuning of single resonator
- 23/213 . . . . Simultaneous tuning of more than one resonator, e.g. resonant cavities of a magnetron
- 23/22 . . . Connections between resonators, e.g. strapping for connecting resonators of a magnetron
- 23/24 . . Slow-wave structures{, [e.g. delay systems](#)}
- 23/26 . . . Helical slow-wave structures; Adjustment therefor
- 23/27 . . . . Helix-derived slow-wave structures
- 23/28 . . . Interdigital slow-wave structures; Adjustment therefor
- 23/30 . . . Damping arrangements associated with slow-wave structures, e.g. for suppression of unwanted oscillations
- 23/34 . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- 23/36 . Coupling devices having distributed capacitance and inductance, structurally associated with the tube, for introducing or removing wave energy
- 23/38 . . to or from the discharge
- 23/40 . . to or from the interaction circuit
- 23/42 . . . the interaction circuit being a helix or a helix-derived slow-wave structure ([H01J 23/44 - H01J 23/48 take precedence](#))
- 23/44 . . . Rod-type coupling devices ([H01J 23/46, H01J 23/48, H01J 23/54 take precedence](#))
- 23/46 . . . Loop coupling devices
- 23/48 . . . for linking interaction circuit with coaxial lines; Devices of the coupled helices type ([H01J 23/46 takes precedence](#))
- 23/50 . . . . the interaction circuit being a helix or derived from a helix ([H01J 23/52 takes precedence](#))
- 23/52 . . . . the coupled helices being disposed coaxially around one another
- 23/54 . . 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
- 25/00 Transit-time tubes, e.g. klystrons, travelling-wave tubes, magnetrons (details of transit-time tubes [H01J 23/00](#); particle accelerators [H05H](#))**
- 25/005 . {[Gas-filled transit-time tubes](#)}
- 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 ([tubes in which a travelling-wave is simulated at spaced gaps H01J 25/34](#))
- 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 tube ([having a composite resonator H01J 25/58](#))
- 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. monotron ([with secondary emission H01J 25/76](#))
- 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](#)}; arrangements for handling particles, e.g. focusing, {charge exchanging, polarising} , [G21K 1/00](#); generating ions to be introduced into non-enclosed gases [H01T 23/00](#); generating plasma [H05H 1/24](#))
- 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 ([for use in particle accelerators H05H 7/00](#) {[H05H 7/00](#) not used therefor; 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 (electron guns [H01J 29/48](#))
- 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 tube, for collecting secondary electrons (arrangements for colour switching [H01J 29/80](#))
- 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 {(for luminescent screens for X-ray purposes [G21K 4/00](#))}
- 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 (luminescent layers sensitive to UV and X-rays [C09K 11/00](#), [G21K 4/00](#))}
- 29/39 . . . . Charge-storage screens {(H01J 29/395 takes precedence)}
- 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 infra-red or ultra-violet 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](#))}
- 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](#)}
- NOTE**
- [H01J 29/48](#) - [H01J 29/51](#) take precedence over groups [H01J 29/52](#) - [H01J 29/68](#).
- 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 {([H01J 29/467](#), [H01J 29/585](#) take precedence)}
- 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](#), [H01J 29/701](#), [H01J 29/708](#) take precedence) ; circuit arrangements for producing saw-tooth pulses or other deflecting voltages or currents [H03K](#))
- 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 (shadow masks per se [H01J 29/07](#))
- 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 (particle spectrometer or separator tubes [H01J 49/00](#))
- 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 (for tubes for examining or processing of objects or materials, e.g. electron microscopes [H01J 37/18](#))}
- 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 ) ; luminescent screens [H01J 29/18](#))
- 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 (construction of connectors [H01R](#))
- 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 35/00](#), [H01J 37/00](#) take precedence; cathode ray or electron stream lamps [H01J 63/00](#); 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 [{\(H01J 31/283, H01J 31/286 take precedence\)}](#)
- 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 [{\(colour television cameras with only one tube H04N 9/07\)}](#)
- 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 infra-red 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 (X-ray lasers [H01S 4/00](#); X-ray technique in general [H05G](#), {e.g. apparatus or processes specially adapted for producing X-rays, not involving X-ray tubes, e.g. involving generation of a plasma [H05G 2/00](#)})**
- 35/02 . Details
- 35/025 . . {X-ray tubes with structurally associated circuit elements}
- 35/04 . . Electrodes [{mutual position thereof and constructional adaptations of the electrodes therefor}](#)
- 35/045 . . . {Electrodes for controlling the current of the cathode ray, e.g. control grids}
- 35/06 . . . Cathodes [{\(electron guns in general H01J 3/02\)}](#)
- 35/065 . . . . {Field emission, photo emission or secondary emission cathodes}

- 35/08 . . . Anodes; Anti cathodes [{\(anti-cathodes serving as windows H01J 35/18\)}](#)
- 35/10 . . . . Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes
- 35/101 . . . . . [{Arrangements for rotating anodes, e.g. supporting means; greasing; sealing the axle; shielding or protecting the driving means}](#)
- 35/103 . . . . . [{Rotating anodes with a magnetic bearing}](#)
- 35/105 . . . . . [{Cooling of rotating anode, e.g. heat emitting layers or structures}](#)
- 35/106 . . . . . [{Active cooling, e.g. fluid flow, heat pipes}](#)
- 35/108 . . . . . [{Substrates for and bonding of emissive target, e.g. composite structures}](#)
- 35/12 . . . . Cooling non-rotary anodes [{\(mounting the tube within a closed housing, e.g. for cooling purposes H05G 1/04\)}](#)
- 35/14 . . Arrangements for concentrating, focusing, or directing the cathode ray [{\(for cathode ray tubes in general H01J 29/46\)}](#)
- 35/16 . . Vessels; Containers; Shields associated therewith [{\(vessels for high tension operation in general H01J 5/06; mounting the tube within a closed housing H05G 1/04\)}](#)
- 35/165 . . . [{joining connectors to the tube}](#)
- 35/18 . . . Windows
- 35/20 . . Selection of substances for gas fillings; Means for obtaining or maintaining the desired pressure within the tube, e.g. by gettering [{\(for gas-discharge tubes in general H01J 7/02 - H01J 61/76; evacuating, filling, gettering in general H01J 9/38\)}](#)
- 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 [\(H01J 33/00, H01J 40/00, H01J 41/00, H01J 47/00, H01J 49/00 take precedence; {scanning-probe techniques or apparatus G01Q} ; contactless testing of electronic circuits using electron beams G01R 31/305; {particle accelerators H05H}\)](#)**
- 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 supra-conducting 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 takes 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](#); preparing specimens for investigation [G01N 1/06](#), [G01N 1/28](#))}
- 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 (detectors [per se G01T](#))
- 37/248 . . Components associated with high voltage supply ({Means for measuring the high voltage [per se G01R 15/00](#) } ; high voltage supply [per se H02J, H02M](#))
- 37/252 . Tubes for spot-analysing by electron or ion beams; Microanalysers (investigating or analysing thereby [G01N 23/22](#))
- 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](#) } ; microanalysers using scanning beams [H01J 37/256](#))
- 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, {e.g. for surface treatment of objects such as coating, plating, etching, sterilising or bringing about chemical reactions } ( {general methods or devices for heat treatments of ferrous or non-ferrous metals or alloys by cathodic discharges [C21D 1/38](#); methods of carburising or nitriding of metals in general [C23C 8/00](#); methods for coating, plating or surface treating of or with metallic material [C23C 8/36](#), [C23C 14/32](#), [C23C 16/50](#); methods for coating, plating or surface treating of or with semiconductors [H01L 21/00](#); } 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, impedance matching circuits [per se](#) [H03H 7/38](#) and [H03H 7/40](#) }
- 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}
- 37/32706 . . . . {Polarising the substrate}
- 37/32715 . . . {Workpiece holder}
- 37/32724 . . . . {Temperature}
- 37/32733 . . . {Means for moving the material to be treated}
- 37/32743 . . . . {for introducing the material into processing chamber}
- 37/32752 . . . . {for moving the material across the discharge}
- 37/32761 . . . . . {Continuous moving}
- 37/3277 . . . . . {of continuous material}
- 37/32779 . . . . . {of batches of workpieces}
- 37/32788 . . . . {for extracting the material from the process chamber}
- 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}
- 37/32807 . . . . {Construction (includes replacing parts of the apparatus)}
- 37/32816 . . . . {Pressure}
- 37/32825 . . . . . {Working under atmospheric pressure or higher}
- 37/32834 . . . . . {Exhausting}
- 37/32844 . . . . . {Treating effluent gases}
- 37/32853 . . . . {Hygiene}
- 37/32862 . . . . . {[In situ](#) cleaning of vessels and/or internal parts}
- 37/32871 . . . . . {Means for trapping or directing unwanted particles}
- 37/3288 . . . . {Maintenance}
- 37/32889 . . . . {Connection or combination with other apparatus}
- 37/32899 . . . . {Multiple chambers, e.g. cluster tools}
- 37/32908 . . . . {Utilities}
- 37/32917 . . {Plasma diagnostics}
- 37/32926 . . . {Software, data control or modelling}
- 37/32935 . . . {Monitoring and controlling tubes by information coming from the object and/or discharge}
- 37/32944 . . . . {Arc detection}
- 37/32954 . . . . {Electron temperature measurement}
- 37/32963 . . . . {End-point detection}
- 37/32972 . . . . {Spectral analysis}
- 37/32981 . . . . {Gas analysis}
- 37/3299 . . . {Feedback systems}
- 37/34 . . . operating with cathodic sputtering ([H01J 37/36](#) takes precedence; methods of cathodic sputtering [C23C 14/34](#))
- 37/3402 . . . {using supplementary magnetic fields}
- 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)}
- 37/3438 . . . . {Electrodes other than cathode}
- 37/3441 . . . . {Dark space shields}
- 37/3444 . . . . {Associated circuits}
- 37/3447 . . . . {Collimators, shutters, apertures}
- 37/345 . . . . {Magnet arrangements in particular for cathodic sputtering apparatus ([material of magnets or magnets in general H01F 1/00](#), [H01F 7/00](#))}
- 37/3452 . . . . . {Magnet distribution}
- 37/3455 . . . . . {Movable magnets}
- 37/3458 . . . . . {Electromagnets in particular for cathodic sputtering apparatus ([electromagnets in general H01F 7/06](#))}
- 37/3461 . . . . {Means for shaping the magnetic field, e.g. magnetic shunts}
- 37/3464 . . . {Operating strategies}
- 37/3467 . . . . {Pulsed operation, e.g. HIPIMS}
- 37/347 . . . . {Thickness uniformity of coated layers or desired profile of target erosion}
- 37/3473 . . . . {Composition uniformity or desired gradient}
- 37/3476 . . . {Testing and control}
- 37/3479 . . . . {Detecting exhaustion of target material}
- 37/3482 . . . . {Detecting or avoiding eroding through}
- 37/3485 . . . . {Means for avoiding target poisoning}
- 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}
- 37/3491 . . . . {Manufacturing of targets}
- 37/3494 . . . . {Adaptation to extreme pressure conditions}
- 37/3497 . . . . {Temperature of target}
- 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](#))}
- 40/00 Photoelectric discharge tubes not involving the ionisation of a gas ([H01J 49/00](#) takes precedence; cathode-ray or image-pick-up tubes [H01J 31/26](#))**
- 40/02 . Details
- 40/04 . . Electrodes
- 40/06 . . . Photo-emissive cathodes
- 40/08 . . Magnetic means for controlling discharge
- 40/10 . . Selection of substances for gas fillings

- 40/12 . . One or more circuit elements structurally associated with the tube
- 40/14 . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- 40/16 . having photo- emissive cathode, e.g. alkaline photoelectric cell ([operating with secondary emission H01J 43/00](#))
- 40/18 . . with luminescent coatings for influencing the sensitivity of the tube, e.g. by converting the input wavelength ([image-conversion or image-amplification tubes H01J 31/50](#))
- 40/20 . . wherein a light-ray scans a photo-emissive screen
- 41/00 Discharge tubes for measuring pressure of introduced gas {or for detecting presence of gas}; Discharge tubes for evacuation by diffusion of ions**
- 41/02 . Discharge tubes for measuring pressure of introduced gas {or for detecting presence of gas}
- 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. alphasources
- 41/10 . . of particle spectrometer type ([particle spectrometers per se H01J 49/00](#) {not used, see [G01L 21/30](#)})
- 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](#); secondary-emission detectors for measurement of nuclear or X-radiation [G01T 1/28](#))**
- 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 ({photo-emissive electrodes [H01J 1/34](#), [H01J 1/35](#)}; 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; secondary-electron-emitting electrodes in general [H01J 1/32](#))
- 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 {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. BF<sub>3</sub> 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 . . {BF<sub>3</sub> 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, MicroElectro-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 (recognising patterns in signals [G06K 9/00496](#); bioinformatics [G06F 19/10](#))}
- 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], 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 (isotope separation using these tubes [B01D 59/44](#))
- 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 (electrostatic traps [H01J 49/4245](#))}
- 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; multi-reflection time of flight spectrometers [H01J 49/406](#))}
- 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}
- 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

## Discharge lamps

- 61/00 Gas- or vapour-discharge lamps (use for sterilising milk products [A23C](#); use for medical purposes [A61N 5/00](#); use for disinfecting water [C02F](#); use for lighting [F21](#); use for advertising [G09F](#)) ; circuits therefor [H05B](#); 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

61/44	. . . . Devices characterised by the luminescent material ( <a href="#">luminescent materials C09K 11/00</a> )	61/88	. . with discharge additionally constricted by envelope
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	61/90	. . Lamps suitable only for intermittent operation, e.g. flash lamp
61/48	. . . . Separate coatings of different luminous materials	61/92	. . Lamps with more than one main discharge path
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	61/94	. . Paths producing light of different wavelengths, e.g. for simulating daylight
61/52	. . Cooling arrangements; Heating arrangements; Means for circulating gas or vapour within the discharge space ({ <a href="#">heating or cooling arrangements to promote ionisation for starting H01J 61/54</a> })	61/95	. . Lamps with control electrode for varying intensity or wavelength of the light, e.g. for producing modulated light
61/523	. . . { <a href="#">Heating or cooling particular parts of the lamp</a> }	61/96	. . Lamps with light-emitting discharge path and separately-heated incandescent body within a common envelope, e.g. for simulating daylight ( <a href="#">lamps with filament heated only by non-luminous discharge H01K</a> )
61/526	. . . . { <a href="#">heating or cooling of electrodes</a> }	61/98	. . Lamps with closely spaced electrodes heated to incandescence by light-emitting discharge, e.g. tungsten arc lamp
61/54	. . Igniting arrangements, e.g. promoting ionisation for starting ( <a href="#">circuit arrangements H05B</a> )	<b>63/00</b>	<b>Cathode-ray or electron-stream lamps (<a href="#">flying-spot tubes H01J 31/10</a>; <a href="#">magic-eye tuning indicators H01J 31/14</a>; lamps with incandescent body heated by the ray or stream H01K (see also <a href="#">H01J 29/00</a>))</b>
61/541	. . . { <a href="#">using a bimetal switch</a> }	63/02	. . Details, e.g. electrode, gas filling, shape of vessel
61/542	. . . . { <a href="#">and an auxiliary electrode inside the vessel</a> }	63/04	. . Vessels provided with luminescent coatings; Selection of materials for the coatings
61/544	. . . . { <a href="#">and an auxiliary electrode outside the vessel</a> }	63/06	. . Lamps with luminescent screen excited by the ray or stream
61/545	. . . { <a href="#">using an auxiliary electrode inside the vessel (H01J 61/542 takes precedence)</a> }	63/08	. . Lamps with gas plasma excited by the ray or stream
61/547	. . . { <a href="#">using an auxiliary electrode outside the vessel (H01J 61/544 takes precedence)</a> }	<b>65/00</b>	<b>Lamps without any electrode inside the vessel; Lamps with at least one main electrode outside the vessel</b>
61/548	. . . { <a href="#">using radioactive means to promote ionisation</a> }	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 { <a href="#">plasma display panels</a> }
61/56	. . One or more circuit elements structurally associated with the lamp	65/042	. . { <a href="#">by an external electromagnetic field</a> }
61/58	. Lamps with both liquid anode and liquid cathode	65/044	. . . { <a href="#">the field being produced by a separate microwave unit</a> }
61/60	. Lamps in which the discharge space is substantially filled with mercury before ignition	65/046	. . . { <a href="#">the field being produced by using capacitive means around the vessel</a> }
61/62	. Lamps with gaseous cathode, e.g. plasma cathode	65/048	. . . { <a href="#">the field being produced by using an excitation coil</a> }
61/64	. Cathode glow lamps ( <a href="#">designed as tuning or voltage indicators H01J 17/40</a> )	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
61/66	. . having one or more specially shaped cathodes, e.g. for advertising purposes { <a href="#">alphanumeric</a> }	65/08	. . Lamps in which a screen or coating is excited to luminesce by radioactive material located inside the vessel ({ <a href="#">direct conversion of radiation energy from radioactive sources into light G21H 3/02</a> })
61/68	. Lamps in which the main discharge is between parts of a current-carrying guide, e.g. halo lamp	<b>99/00</b>	<b>Subject matter not provided for in other groups of this subclass</b>
61/70	. Lamps with low-pressure unconstricted discharge { <a href="#">having a cold pressure &lt; 400 Torr</a> }		
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 unconstricted discharge { <a href="#">having a cold pressure &gt; 400 Torr</a> }		
61/822	. . { <a href="#">High-pressure mercury lamps</a> }	<b>2201/00</b>	<b>Electrodes common to discharge tubes</b>
61/825	. . { <a href="#">High-pressure sodium lamps</a> }	2201/02	. Arrangements for eliminating deleterious effects
61/827	. . { <a href="#">Metal halide arc lamps</a> }	2201/025	. . charging
61/84	. Lamps with discharge constricted by high pressure	2201/19	. Thermionic cathodes
61/86	. . with discharge additionally constricted by close spacing of electrodes, e.g. for optical projection	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	2201/316	. .	having an electric field parallel to the surface thereof, e.g. thin film cathodes
2201/281	. . .	Cage-like construction	2201/3165	. . .	Surface conduction emission type cathodes
2201/2814	. . . .	being a mesh-like network	2201/317	. .	combined with other synergetic effects, e.g. secondary, photo- or thermal emission
2201/2817	. . .	Rods	2201/319	. .	Circuit elements associated with the emitters by direct integration
2201/2821	. . .	Envelope or cross-section	2201/3195	. . .	Resistive members, e.g. resistive layers
2201/2825	. . . .	being oval or elliptic	2201/32	. .	Secondary emission electrodes
2201/2828	. . . .	being rectangular or square	2201/34	. .	Photoemissive electrodes
2201/2832	. . . .	being circular	2201/342	. .	Cathodes
2201/2835	. . .	Folded	2201/3421	. . .	Composition of the emitting surface
2201/2839	. . . .	Hair-pin or simple bend	2201/3423	. . . .	Semiconductors, e.g. GaAs, NEA emitters
2201/2842	. . .	Conic	2201/3425	. . . .	Metals, metal alloys
2201/2846	. . .	Loop	2201/3426	. . . .	Alkaline metal compounds, e.g. Na-K-Sb
2201/285	. . .	Plurality of elements	2201/3428	. . . .	Organo-metallic compounds, e.g. Ferrocene
2201/2853	. . .	Serpentine	<b>2203/00</b>		<b>Electron or ion optical arrangements common to discharge tubes or lamps</b>
2201/2857	. . . .	being coiled	2203/02	. .	Electron guns
2201/286	. . . .	being looped	2203/0204	. .	using cold cathodes, e.g. field emission cathodes
2201/2864	. . .	Ribbon or bar	2203/0208	. . .	Control electrodes
2201/2867	. . .	Spiral or helix	2203/0212	. . . .	Gate electrodes
2201/2871	. . . .	being flattened	2203/0216	. . . . .	characterised by the form or structure
2201/2875	. . . .	being double, reverse helix or interwoven	2203/022	. . . . .	Shapes or dimensions of gate openings
2201/2878	. . .	Thin film or film-like	2203/0224	. . . . .	Arrangement of gate openings
2201/2882	. . .	Variable winding density	2203/0228	. . . . .	Curved/extending upwardly
2201/2885	. . .	Twisted	2203/0232	. . . . .	characterised by the material
2201/2889	. .	Characterised by material	2203/0236	. . . . .	Relative position to the emitters, cathodes or substrates
2201/2892	. .	Coatings	2203/024	. . . .	Focusing electrodes
2201/2896	. . .	Insulating layers	2203/0244	. . . . .	characterised by the form or structure
2201/30	. .	Cold cathodes	2203/0248	. . . . .	Shapes or dimensions of focusing electrode openings
2201/304	. .	Field emission cathodes	2203/0252	. . . . .	Arrangement of focusing electrode openings
2201/30403	. . .	characterised by the emitter shape	2203/0256	. . . . .	characterised by the material
2201/30407	. . . .	Microengineered point emitters	2203/026	. . . . .	Relative position to the gateelectrodes, emitters, cathodes or substrates
2201/30411	. . . . .	conical shaped, e.g. Spindt type	2203/0264	. . . . .	In the same plane as the gate electrodes or cathodes
2201/30415	. . . . .	needle shaped	2203/0268	. . .	Insulation layer
2201/30419	. . . .	Pillar shaped emitters	2203/0272	. . . .	for gate electrodes
2201/30423	. . . .	Microengineered edge emitters	2203/0276	. . . .	for focusing electrodes
2201/30426	. . . .	Coatings on the emitter surface, e.g. with low work function materials	2203/028	. . . .	characterised by the shape
2201/3043	. . . .	Fibres	2203/0284	. . . . .	Dimensions of openings
2201/30434	. . . .	Nanotubes	2203/0288	. . . .	characterised by the material
2201/30438	. . . .	Particles	2203/0292	. . .	Potentials applied to the electrodes
2201/30442	. . . .	Whiskers	2203/0296	. .	Spin-polarised beams
2201/30446	. . .	characterised by the emitter material	2203/04	. .	Ion guns
2201/30449	. . . .	Metals and metal alloys	<b>2209/00</b>		<b>Apparatus and processes for manufacture of discharge tubes</b>
2201/30453	. . . .	Carbon types	2209/01	. .	Generalised techniques
2201/30457	. . . . .	Diamond	2209/012	. .	Coating
2201/30461	. . . . .	Graphite	2209/015	. . .	Machines therefor
2201/30465	. . . . .	Fullerenes	2209/017	. .	Cleaning
2201/30469	. . . . .	Carbon nanotubes (CNTs)	2209/02	. .	Manufacture of cathodes
2201/30473	. . . . .	Amorphous carbon	2209/022	. .	Cold cathodes
2201/30476	. . . . .	Diamond-like carbon [DLC]	2209/0223	. . .	Field emission cathodes
2201/3048	. . . .	Semiconductor materials	2209/0226	. . . .	Sharpening or resharpening of emitting point or edge
2201/30484	. . . .	Carbides			
2201/30488	. . . .	Nitrides			
2201/30492	. . . .	Borides			
2201/30496	. . . .	Oxides			
2201/306	. .	Ferroelectric cathodes			
2201/308	. .	Semiconductor cathodes, e.g. having PN junction layers			
2201/312	. .	having an electric field perpendicular to the surface thereof			
2201/3125	. . .	Metal-insulator-Metal [MIM] emission type cathodes			

- 2209/18 . Assembling together the component parts of the discharge tube
- 2209/185 . . Machines therefor, e.g. electron gun assembling devices
- 2209/236 . Manufacture of magnetic deflecting devices
- 2209/2363 . . Coils
- 2209/2366 . . . Machines therefor, e.g. winding, forming, welding, or the like
- 2209/26 . Sealing parts of the vessel to provide a vacuum enclosure
- 2209/261 . . Apparatus used for sealing vessels, e.g. furnaces, machines or the like
- 2209/262 . . . means for applying sealing materials, e.g. frit paste dispensers
- 2209/264 . . Materials for sealing vessels, e.g. frit glass compounds, resins or structures
- 2209/265 . . Surfaces for sealing vessels
- 2209/267 . . . shaped surfaces or flanges
- 2209/268 . . . treated surfaces and surface preparations, e.g. to improve adhesion
- 2209/38 . Control of maintenance of pressure in the vessel
- 2209/383 . . Vacuum pumps
- 2209/385 . . Gettering
- 2209/3855 . . . Getter materials
- 2209/387 . . Gas filling
- 2209/389 . . Degassing
- 2209/3893 . . . by a discharge
- 2209/3896 . . . by heating
- 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**  
(plasma display panels making use of direct current [H01J 2217/00](#))
- 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 ([H01J 2211/00 takes precedence](#))**
- 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 ([combined with electromagnetic screens H01J 2217/49292](#))
- 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	2229/86	. Vessels and containers
2229/4817	. . . Accelerating electrodes	2229/8603	. . Neck or cone portions of the CRT vessel
2229/482	. . . Extraction grids	2229/8606	. . . characterised by the shape
2229/4824	. . Constructional arrangements of electrodes	2229/8609	. . . . Non circular cross-sections
2229/4827	. . . Electrodes formed on surface of common cylindrical support	2229/8613	. . Faceplates
2229/4831	. . . Electrode supports	2229/8616	. . . characterised by shape
2229/4834	. . Electrical arrangements coupled to electrodes, e.g. potentials	2229/862	. . . . Parameterised shape, e.g. expression, relationship or equation
2229/4837	. . . characterised by the potentials applied	2229/8623	. . Substrates
2229/4841	. . . . Dynamic potentials	2229/8626	. . Frames
2229/4844	. . characterised by beam passing apertures or combinations	2229/863	. Passive shielding means associated with the vessel
2229/4848	. . . Aperture shape as viewed along beam axis	2229/8631	. . Coatings
2229/4851	. . . . trapezoidal	2229/8632	. . . characterised by the material
2229/4855	. . . . . with rounded end or ends	2229/8633	. . Meshes and patterns
2229/4858	. . . . parallelogram	2229/8634	. . Magnetic shielding
2229/4862	. . . . . square	2229/8635	. . Antistatic shielding
2229/4865	. . . . . rectangle	2229/8636	. . Electromagnetic shielding
2229/4868	. . . . . with rounded end or ends	2229/8637	. . Mechanical shielding, e.g. against water or abrasion
2229/4872	. . . . circular	2229/8638	. . Ionising radiation shielding, e.g. X-rays
2229/4875	. . . . oval	2229/87	. Means for avoiding vessel implosion
2229/4879	. . . . non-symmetric about field scanning axis	2229/875	. . Means substantially covering the output face, e.g. resin layers, protective panels
2229/4882	. . . . non-symmetric about line scanning axis	2229/88	. Coatings
2229/4886	. . . . polygonal	2229/882	. . having particular electrical resistive or conductive properties
2229/4889	. . . . . cross shaped	2229/885	. . having particular electrical insulation properties
2229/4893	. . . . Interconnected apertures	2229/887	. . having particular X-ray shielding properties
2229/4896	. . . . complex and not provided for	2229/89	. Optical components associated with the vessel
2229/50	. . Plurality of guns or beams	2229/8901	. . Fixing of optical components to the vessel
2229/502	. . . Three beam guns, e.g. for colour CRTs	2229/8903	. . Fibre optic components
2229/505	. . . Arrays	2229/8905	. . Direction sensitive devices for controlled viewing angle
2229/507	. . . Multi-beam groups, e.g. number of beams greater than number of cathodes	2229/8907	. . Image projection devices
2229/56	. Correction of beam optics	2229/8909	. . Baffles, shutters, apertures or the like against external light
2229/563	. . Aberrations by type	2229/8911	. . . Large-scale devices, e.g. foldable screens
2229/5632	. . . Spherical	2229/8913	. . Anti-reflection, anti-glare, viewing angle and contrast improving treatments or devices
2229/5635	. . . Astigmatism	2229/8915	. . . Surface treatment of vessel or device, e.g. controlled surface roughness
2229/5637	. . . Colour purity	2229/8916	. . . inside the vessel
2229/568	. . using supplementary correction devices	2229/8918	. . . by using interference effects
2229/5681	. . . magnetic	2229/892	. . . Effect varying over surface
2229/5682	. . . . Permanently magnetised materials, e.g. permanent magnets	2229/8922	. . . Apparatus attached to vessel and not integral therewith
2229/5684	. . . . Magnetic materials, e.g. soft iron	2229/8924	. . having particular properties for protecting the vessel, e.g. against abrasion, water or shock
2229/5685	. . . . . Cross-arms field shaper	2229/8926	. . Active components, e.g. LCD's, indicators, illuminators and moving devices
2229/5687	. . . . Auxiliary coils	2229/8928	. . Laser CRTs
2229/5688	. . . . . Velocity modulation	2229/893	. . using lenses
2229/58	. Electron beam control inside the vessel	2229/899	. . Photographic devices (permanent recording of images)
2229/581	. . by magnetic means	2229/92	. Means providing or assisting electrical connection with or within the tube
2229/582	. . by electrostatic means	2229/922	. . within the tube
2229/583	. . at the source	2229/925	. . associated with the high tension [HT], e.g. anode potentials
2229/5835	. . . cooperating with the electron gun	2229/927	. . associated with digital scanning
2229/585	. . at the screen	2229/94	. Means for obtaining or maintaining the desired pressure within the tube
2229/587	. . between the source and the screen		
2229/70	. Electron beam control outside the vessel		
2229/703	. . by magnetic fields		
2229/7031	. . . Cores for field producing elements, e.g. ferrite		
2229/7032	. . . Conductor design and distribution		
2229/7033	. . . . Winding		
2229/7035	. . . . Wires and conductors		
2229/7036	. . . . . Form of conductor		
2229/7037	. . . . . flat, e.g. foil, or ribbon type		
2229/7038	. . . Coil separators and formers		

2229/96	. Circuit elements other than coils, reactors or the like, associated with the tube	2235/084	. . . Target-substrate interlayers or structures, e.g. to control or prevent diffusion or improve adhesion
2229/962	. . associated with the HT	2235/085	. . Target treatment, e.g. ageing, heating
2229/964	. . associated with the deflection system	2235/086	. . Target geometry
2229/966	. . associated with the gun structure	2235/087	. . . Transmission type
2229/968	. . . Resistors	2235/088	. . Laminated targets, e.g. plurality of emitting layers of unique or differing materials
<b>2231/00</b>	<b>Cathode ray tubes or electron beam tubes</b> (H01J 2329/00 takes precedence)	2235/10	. Drive means for anode (target) substrate
2231/12	. CRTs having luminescent screens	2235/1006	. . Supports or shafts for target or substrate
2231/121	. . Means for indicating the position of the beam, e.g. beam indexing	2235/1013	. . . Fixing to the target or substrate
2231/123	. . . by direct current detection, e.g. collecting electrodes	2235/102	. . . Materials for the shaft
2231/125	. . with a plurality of electron guns within the tube envelope	2235/1026	. . Means (motors) for driving the target (anode)
2231/1255	. . . two or more neck portions containing one or more guns	2235/1033	. . . mounted within the vacuum vessel
2231/50	. Imaging and conversion tubes	2235/104	. . . characterised by the shape
2231/50005	. . characterised by form of illumination	2235/1046	. . Bearings and bearing contact surfaces
2231/5001	. . . Photons	2235/1053	. . . Retainers or races
2231/50015	. . . . Light	2235/106	. . . Dynamic pressure bearings, e.g. helical groove type
2231/50021	. . . . . Ultra-violet	2235/1066	. . . Treated contact surfaces, e.g. coatings
2231/50026	. . . . . Infra-red	2235/1073	. . . Magnetic bearings
2231/50031	. . . . High energy photons	2235/108	. . Lubricants
2231/50036	. . . . . X-rays	2235/1086	. . . liquid metals
2231/50042	. . . Particles	2235/1093	. . Measures for preventing vibration
2231/50047	. . . . Charged particles	2235/12	. Cooling
2231/50052	. . . Mechanical vibrations, e.g. sound	2235/1204	. . of the anode
2231/50057	. . characterised by form of output stage	2235/1208	. . of the bearing assembly
2231/50063	. . . Optical	2235/1212	. . of the cathode
2231/50068	. . . Electrical	2235/1216	. . of the vessel
2231/50073	. . . . Charge coupled device [CCD]	2235/122	. . of the window
2231/50078	. . . . Resistive anode	2235/1225	. . characterised by method
2231/50084	. . . . using light or electron beam scanning	2235/1229	. . . employing layers with high emissivity
2231/50089	. . . Having optical stage before electrical conversion	2235/1233	. . . . characterised by the material
2231/50094	. . . . Charge coupled device [CCD]	2235/1237	. . . . . Oxides
2231/501	. . including multiplication stage	2235/1241	. . . . Bonding layer to substrate
2231/5013	. . . with secondary emission electrodes	2235/1245	. . . Increasing emissive surface area
2231/5016	. . . . Michrochannel plates [MCP]	2235/125	. . . . with interdigitated fins or slots
2231/503	. . with scanning or gating optics	2235/1254	. . . . with microscopic surface features
2231/5033	. . . electrostatic	2235/1258	. . . Placing objects in close proximity
2231/5036	. . . magnetic	2235/1262	. . . Circulating fluids
2231/505	. . with non-scanning optics	2235/1266	. . . . flow being via moving conduit or shaft
2231/5053	. . . electrostatic	2235/127	. . . . Control of flow
2231/5056	. . . magnetic	2235/1275	. . . . characterised by the fluid
<b>2235/00</b>	<b>X-ray tubes</b>	2235/1279	. . . . . Liquid metals
2235/02	. Electrical arrangements	2235/1283	. . . . in conjunction with extended surfaces (e.g. fins or ridges)
2235/023	. . Connecting of signals or tensions to or through the vessel	2235/1287	. . . . Heat pipes
2235/0233	. . . High tension	2235/1291	. . . Thermal conductivity
2235/0236	. . . Indirect coupling, e.g. capacitive or inductive	2235/1295	. . . . Contact between conducting bodies
2235/06	. Cathode assembly	2235/16	. Vessels
2235/062	. . Cold cathodes	2235/161	. . Non-stationary vessels
2235/064	. . Movement of cathode	2235/162	. . . Rotation
2235/066	. . . Rotation	2235/163	. . shaped for a particular application
2235/068	. . Multi-cathode assembly	2235/164	. . . Small cross-section, e.g. for entering in a body cavity
2235/08	. Targets (anodes) and X-ray converters	2235/165	. . Shielding arrangements
2235/081	. . Target material	2235/166	. . . against electromagnetic radiation
2235/082	. . . Fluids, e.g. liquids, gases	2235/167	. . . against thermal (heat) energy
2235/083	. . Bonding or fixing with the support or substrate	2235/168	. . . against charged particles
		2235/18	. Windows, e.g. for X-ray transmission
		2235/183	. . Multi-layer structures



2235/186	. . . used as target or X-ray converter, e.g. transmission type	2237/0264	. . . . magnetic
2235/20	. Arrangements for controlling gases within the X-ray tube	2237/0266	. . . . electromagnetic
2235/205	. . . Gettering	2237/0268	. . . . Liner tubes
<b>2237/00</b>	<b>Discharge tubes exposing object to beam, e.g. for analysis treatment, etching, imaging</b>	2237/028	. . . Particle traps
<b>NOTES</b>		2237/03	. Mounting, supporting, spacing or insulating electrodes
1. For features of general interest which may be found in other types of discharge tubes, an indexing code corresponding to general schemes <a href="#">H01J 2201/00</a> - <a href="#">H01J 2203/00</a> is given, e.g. for cathodes, vessels, cooling means or the like		2237/032	. . . Mounting or supporting
2. Same rules apply for manufacturing procedures ( <a href="#">H01J 2209/00</a> ), unless really specific to the tube concerned.		2237/036	. . . Spacing
3. The codes in this main group are grouped according to the following principle: details common to gas or plasma discharge of the above mentioned tubes: <a href="#">H01J 2237/00</a> - <a href="#">H01J 2237/2487</a> Imaging or analysing: <a href="#">H01J 2237/25</a> - <a href="#">H01J 2237/2857</a> particle beam processing: <a href="#">H01J 2237/30</a> - <a href="#">H01J 2237/31798</a> plasma processing: <a href="#">H01J 2237/32</a> - <a href="#">H01J 2237/339</a>		2237/038	. . . Insulating
2237/002	. Cooling arrangements (of objects being observed or treated <a href="#">H01J 2237/2001</a> )	2237/04	. Means for controlling the discharge
2237/004	. Charge control of objects or beams	2237/041	. . . Beam polarising means
2237/0041	. . . Neutralising arrangements	2237/043	. . . Beam blanking
2237/0042	. . . . Deflection of neutralising particles	2237/0432	. . . . High speed and short duration
2237/0044	. . . . of objects being observed or treated	2237/0435	. . . . Multi-aperture
2237/0045	. . . . . using secondary electrons	2237/0437	. . . . . Semiconductor substrate
2237/0047	. . . . . using electromagnetic radiations, e.g. UV, X-rays, light	2237/045	. . . Diaphragms
2237/0048	. . . Charging arrangements	2237/0451	. . . . with fixed aperture
2237/006	. Details of gas supplies, e.g. in an ion source, to a beam line, to a specimen or to a workpiece, ( <a href="#">H01J 37/3244</a> takes precedence; environmental cells for electron microscopes <a href="#">H01J 2237/2003</a> ; microscopes with environmental specimen chamber <a href="#">H01J 2237/2608</a> )	2237/0453	. . . . . multiple apertures
2237/02	. Details	2237/0455	. . . . with variable aperture
2237/0203	. . . Protection arrangements	2237/0456	. . . . Supports
2237/0206	. . . . Extinguishing, preventing or controlling unwanted discharges	2237/0458	. . . . . movable, i.e. for changing between differently sized apertures
2237/0209	. . . . Avoiding or diminishing effects of eddy currents	2237/047	. . . Changing particle velocity
2237/0213	. . . . Avoiding deleterious effects due to interactions between particles and tube elements	2237/0473	. . . . accelerating
2237/0216	. . . Means for avoiding or correcting vibration effects	2237/04732	. . . . . with magnetic means
2237/022	. . . Avoiding or removing foreign or contaminating particles, debris or deposits on sample or tube	2237/04735	. . . . . with electrostatic means
2237/0225	. . . . Detecting or monitoring foreign particles	2237/04737	. . . . . radio-frequency quadrupole [RFQ]
2237/024	. . . Moving components not otherwise provided for ( <a href="#">diaphragms</a> <a href="#">H01J 2237/0458</a> ; <a href="#">objects</a> <a href="#">H01J 2237/202</a> )	2237/0475	. . . . decelerating
2237/0245	. . . . Moving whole optical system relatively to object	2237/04753	. . . . . with magnetic means
2237/026	. . . Shields	2237/04756	. . . . . with electrostatic means
2237/0262	. . . . electrostatic	2237/049	. . . Focusing means
		2237/0492	. . . . Lens systems ( <a href="#">individual lenses</a> <a href="#">H01J 2237/10</a> )
		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
- 2237/24585 . . . Other variables, e.g. energy, mass, velocity, time, temperature
- 2237/24592 . . Inspection and quality control of devices
- 2237/248 . . Components associated with the control of the tube
- 2237/2482 . . Optical means
- 2237/2485 . . Electric or electronic means
- 2237/2487 . . . using digital signal processors
- 2237/25 . . Tubes for localised analysis using electron or ion beams
- 2237/2505 . . characterised by their application
- 2237/2511 . . . Auger spectrometers
- 2237/2516 . . . Secondary particles mass or energy spectrometry
- 2237/2522 . . . . of electrons (ESCA, XPS)
- 2237/2527 . . . . Ions [SIMS]
- 2237/2533 . . . . Neutrals [SNMS]
- 2237/2538 . . . Low energy electron microscopy [LEEM]
- 2237/2544 . . . . Diffraction [LEED]
- 2237/255 . . . . Reflection diffraction [RHEED]
- 2237/2555 . . . Microprobes, i.e. particle-induced X-ray spectrometry
- 2237/2561 . . . . electron
- 2237/2566 . . . . ion
- 2237/2572 . . . . proton
- 2237/2577 . . . . atomic
- 2237/2583 . . . using tunnel effects, e.g. STM, AFM
- 2237/2588 . . . . Lorenz microscopy (magnetic field measurement)
- 2237/2594 . . . . Measuring electric fields or potentials
- 2237/26 . . Electron or ion microscopes
- 2237/2602 . . Details
- 2237/2605 . . . operating at elevated pressures, e.g. atmosphere
- 2237/2608 . . . . with environmental specimen chamber ([environmental cells H01J 2237/2003](#))
- 2237/2611 . . Stereoscopic measurements and/or imaging
- 2237/2614 . . Holography or phase contrast, phase related imaging in general, e.g. phase plates
- 2237/2617 . . Comparison or superposition of transmission images; Moiré
- 2237/262 . . Non-scanning techniques
- 2237/2623 . . . Field-emission microscopes
- 2237/2626 . . . . Pulsed source
- 2237/28 . . Scanning microscopes
- 2237/2801 . . . Details
- 2237/2802 . . . Transmission microscopes
- 2237/2803 . . . characterised by the imaging method
- 2237/2804 . . . . Scattered primary beam
- 2237/2805 . . . . . Elastic scattering
- 2237/2806 . . . . Secondary charged particle
- 2237/2807 . . . . X-rays
- 2237/2808 . . . . Cathodoluminescence
- 2237/2809 . . . characterised by the imaging problems involved
- 2237/281 . . . . Bottom of trenches or holes
- 2237/2811 . . . . Large objects
- 2237/2812 . . . Emission microscopes
- 2237/2813 . . . characterised by the application
- 2237/2814 . . . . Measurement of surface topography
- 2237/2815 . . . . . Depth profile
- 2237/2816 . . . . . Length
- 2237/2817 . . . . Pattern inspection
- 2237/2818 . . . Scanning tunnelling microscopes
- 2237/282 . . Determination of microscope properties
- 2237/2823 . . . Resolution
- 2237/2826 . . . Calibration ([for object processing apparatus H01J 2237/30433](#))
- 2237/285 . . Emission microscopes
- 2237/2852 . . . Auto-emission (i.e. field-emission)
- 2237/2855 . . . Photo-emission
- 2237/2857 . . . Particle bombardment induced emission
- 2237/30 . . Electron or ion beam tubes for processing objects
- 2237/303 . . Electron or ion optical systems
- 2237/304 . . Controlling tubes
- 2237/30405 . . . Details
- 2237/30411 . . . . using digital signal processors [DSP]
- 2237/30416 . . . . Handling of data ([for lithography H01J 37/3174](#))
- 2237/30422 . . . . . Data compression
- 2237/30427 . . . . using neural networks or fuzzy logic
- 2237/30433 . . . System calibration ([for microscopes H01J 2237/2826](#))
- 2237/30438 . . . . Registration
- 2237/30444 . . . . Calibration grids
- 2237/3045 . . . . Deflection calibration ([deflecting in general H01J 2237/15; specific to material treating H01J 2237/30483](#))
- 2237/30455 . . . Correction during exposure
- 2237/30461 . . . . pre-calculated

2237/30466	. . .	Detecting endpoint of process ( <a href="#">for plasma apparatus H01J 37/32963</a> , <a href="#">for sputtering apparatus H01J 37/3479</a> )
2237/30472	. . .	Controlling the beam
2237/30477	. . .	Beam diameter
2237/30483	. . .	Scanning
2237/30488	. . .	Raster scan
2237/30494	. . .	Vector scan
2237/31	. .	Processing objects on a macro-scale
2237/3104	. . .	Welding
2237/3109	. . .	Cutting
2237/3114	. . .	Machining
2237/3118	. . .	Drilling
2237/3123	. . .	Casting
2237/3128	. . .	Melting
2237/3132	. . .	Evaporating
2237/3137	. . .	Plasma-assisted co-operation
2237/3142	. . .	Ion plating
2237/3146	. . .	Ion beam bombardment sputtering
2237/3151	. . .	Etching
2237/3156	. . .	Curing
2237/316	. . .	Changing physical properties
2237/3165	. . .	Changing chemical properties
2237/317	. .	Processing objects on a microscale
2237/31701	. . .	Ion implantation
2237/31703	. . .	Dosimetry
2237/31705	. . .	Impurity or contaminant control
2237/31706	. . .	characterised by the area treated
2237/31708	. . .	unpatterned
2237/3171	. . .	patterned
2237/31711	. . .	using mask
2237/31713	. . .	Focused ion beam
2237/31732	. . .	Depositing thin layers on selected microareas ( <a href="#">ion plating H01J 2237/3142</a> )
2237/31733	. . .	using STM
2237/31735	. . .	Direct-write microstructures
2237/31737	. . .	using ions
2237/31738	. . .	using STM
2237/3174	. . .	Etching microareas
2237/31742	. . .	for repairing masks
2237/31744	. . .	introducing gas in vicinity of workpiece
2237/31745	. . .	for preparing specimen to be viewed in microscopes or analyzed in microanalysers
2237/31747	. . .	using STM
2237/31749	. . .	Focused ion beam
2237/3175	. . .	Lithography
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 ( <a href="#">with SEM H01J 2237/2817</a> ; <a href="#">correcting H01J 2237/31735</a> , <a href="#">H01J 2237/3174</a> )
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
2237/3348	. . .	control of ion bombardment energy
2237/335	. . .	Cleaning
2237/3355	. . .	Holes or apertures, i.e. inprinted circuit boards
2237/336	. . .	Changing physical properties of treated surfaces
2237/3365	. . .	Plasma source implantation
2237/338	. . .	Changing chemical properties of treated surfaces
2237/3382	. . .	Polymerising
2237/3385	. . .	Carburising
2237/3387	. . .	Nitriding
2237/339	. . .	Synthesising components
<b>Details</b>		
<b>2261/00</b>	<b>Gas- or vapour-discharge lamps</b>	
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
<b>2329/00</b>	<b>Electron emission display panels, e.g. field emission display panels</b>	
2329/002	. .	Cooling means



2329/005	. Multi-directional displaying, i.e. with multiple display faces facing in different directions	2329/30	. . Shape or geometrical arrangement of the luminescent material
2329/007	. Vacuumless display panels, i.e. with phosphor directly applied to emitter without intermediate vacuum space	2329/32	. . Means associated with discontinuous arrangements of the luminescent material
2329/02	. Electrodes other than control electrodes	2329/323	. . . Black matrix
2329/04	. . Cathode electrodes	2329/326	. . . Color filters structurally combined with the luminescent material
2329/0402	. . . Thermionic cathodes	2329/46	. Arrangements of electrodes and associated parts for generating or controlling the electron beams
2329/0405	. . . Cold cathodes other than those covered by <a href="#">H01J 2329/0407</a> - <a href="#">H01J 2329/0492</a>	2329/4604	. . Control electrodes
2329/0407	. . . Field emission cathodes	2329/4608	. . . Gate electrodes
2329/041	. . . . characterised by the emitter shape	2329/4613	. . . . characterised by the form or structure
2329/0413	. . . . . Microengineered point emitters	2329/4617	. . . . . Shapes or dimensions of gate openings
2329/0415	. . . . . conical shaped, e.g. Spindt type	2329/4621	. . . . . Arrangement of gate openings
2329/0418	. . . . . needle shaped	2329/4626	. . . . . Curved or extending upwardly
2329/0421	. . . . . Pillar shaped emitters	2329/463	. . . . characterised by the material
2329/0423	. . . . . Microengineered edge emitters	2329/4634	. . . . Relative position to the emitters, cathodes or substrates
2329/0426	. . . . . Coatings on the emitter surface, e.g. with low work function materials	2329/4639	. . . Focusing electrodes
2329/0428	. . . . . Fibres	2329/4643	. . . . characterised by the form or structure
2329/0431	. . . . . Nanotubes	2329/4647	. . . . . Shapes or dimensions of focusing electrode openings
2329/0434	. . . . . Particles	2329/4652	. . . . . Arrangement of focusing electrode openings
2329/0436	. . . . . Whiskers	2329/4656	. . . . characterised by the material
2329/0439	. . . . characterised by the emitter material	2329/466	. . . . Relative position to the gate electrodes, emitters, cathodes or substrates
2329/0442	. . . . . Metals or metal alloys	2329/4665	. . . . . In the same plane as the gate electrodes or cathodes
2329/0444	. . . . . Carbon types	2329/4669	. . Insulation layers
2329/0447	. . . . . Diamond	2329/4673	. . . for gate electrodes
2329/0449	. . . . . Graphite	2329/4678	. . . for focusing electrodes
2329/0452	. . . . . Fullerenes	2329/4682	. . . characterised by the shape
2329/0455	. . . . . Carbon nanotubes (CNTs)	2329/4686	. . . . Dimensions of openings
2329/0457	. . . . . Amorphous carbon	2329/4691	. . . characterised by the material
2329/046	. . . . . Diamond-like carbon [DLC]	2329/4695	. . Potentials applied to the electrodes
2329/0463	. . . . . Semiconductor materials	2329/86	. Vessels
2329/0465	. . . . . Carbides	2329/8605	. . Front or back plates
2329/0468	. . . . . Nitrides	2329/861	. . . characterised by the shape
2329/0471	. . . . . Borides	2329/8615	. . . characterised by the material
2329/0473	. . . . . Oxides	2329/862	. . Frames
2329/0476	. . . Ferroelectric cathodes	2329/8625	. . Spacing members
2329/0478	. . . Semiconductor cathodes, e.g. having PN junction layers	2329/863	. . . characterised by the form or structure
2329/0481	. . . Cold cathodes having an electric field perpendicular to the surface thereof ( <a href="#">H01J 2329/0407</a> - <a href="#">H01J 2329/0478</a> take precedence)	2329/8635	. . . . having a corrugated lateral surface
2329/0484	. . . . Metal-Insulator-Metal [MIM] emission type cathodes	2329/864	. . . characterised by the material
2329/0486	. . . Cold cathodes having an electric field parallel to the surface thereof, e.g. thin film cathodes	2329/8645	. . . with coatings on the lateral surfaces thereof
2329/0489	. . . . Surface conduction emission type cathodes	2329/865	. . . Connection of the spacing members to the substrates or electrodes
2329/0492	. . . Cold cathodes combined with other synergetic effects, e.g. secondary, photo- or thermal emission	2329/8655	. . . . Conductive or resistive layers
2329/0494	. . . Circuit elements associated with the emitters by direct integration	2329/866	. . . . Adhesives
2329/0497	. . . . Resistive members, e.g. resistive layers	2329/8665	. . . Spacer holding means
2329/08	. . Anode electrodes	2329/867	. . Seals between parts of vessels
2329/18	. Luminescent screens	2329/8675	. . . Seals between the frame and the front and/or back plate
2329/20	. . characterised by the luminescent material	2329/868	. . Passive shielding means of vessels
2329/22	. . characterised by the binder or adhesive for securing the luminescent material to its support, e.g. substrate	2329/8685	. . . Antistatic shielding
2329/28	. . with protective, conductive or reflective layers	2329/869	. . . Electromagnetic shielding
		2329/8695	. . . Mechanical shielding, e.g. against water or abrasion
		2329/88	. . Coatings on walls of the vessels ( <a href="#">H01J 2329/18</a> , <a href="#">H01J 2329/868</a> , <a href="#">H01J 2329/89</a> take precedence)

2329/89	. . Optical components structurally combined with the vessel	2893/0038	. . . Direct connection between two insulating elements, in particular via glass material
2329/892	. . . Anti-reflection, anti-glare, viewing angle and contrast improving means	2893/0039	. . . . Glass-to-glass connection, e.g. by soldering
2329/895	. . . Spectral filters	2893/004	. . . . Quartz-to-quartz connection
2329/897	. . . Lenses	2893/0041	. . . Direct connection between insulating and metal elements, in particular via glass material
2329/90	. Leading-in arrangements; seals therefor	2893/0043	. . . . Glass-to-metal or quartz-to-metal, e.g. by soldering
2329/92	. Means forming part of the display panel for the purpose of providing electrical connection to it	2893/0044	. . . Direct connection between two metal elements, in particular via material a connecting material
2329/94	. Means for exhausting the vessel or maintaining vacuum within the vessel	2893/0045	. . Non-solid connections, e.g. liquid or rubber
2329/941	. . Means for exhausting the vessel	2893/0046	. . Lamp base with closure
2329/943	. . Means for maintaining vacuum within the vessel	2893/0047	. . Closure other than lamp base
2329/945	. . . by gettering	2893/0048	. Tubes with a main cathode
2329/946	. . . . characterised by the position or form of the getter	2893/0049	. . Internal parts
2329/948	. . . . characterised by the material of the getter	2893/005	. . Cathodes
2329/96	. Circuit elements structurally associated with the display panels ( <a href="#">H01J 2329/0494 takes precedence</a> )	2893/0051	. . Anode assemblies; screens for influencing the discharge
<b>2893/00</b>	<b>Discharge tubes and lamps</b>	2893/0052	. . . Anode supporting means
2893/0001	. Electrodes and electrode systems suitable for discharge tubes or lamps	2893/0053	. . . Leading in for anodes; Protecting means for anode supports
2893/0002	. . Construction arrangements of electrode systems	2893/0054	. . . Cooling means
2893/0003	. . . Anodes forming part of vessel walls	2893/0055	. . Movable screens
2893/0004	. . . . Anodes formed in central part	2893/0056	. . Parts inside tubes brought to incandescence by the discharge
2893/0005	. . . Fixing of electrodes	2893/0058	. . Grids; Auxiliary internal or external electrodes
2893/0006	. . . . Mounting	2893/0059	. Arc discharge tubes
2893/0007	. . . . . Machines for assembly	2893/006	. Tubes with electron bombarded gas (e.g. with plasma filter)
2893/0008	. . . . Supply leads; Electrode supports via rigid connection to vessel	2893/0061	. Tubes with discharge used as electron source
2893/0009	. . . . Electrode system pressing against vessel wall	2893/0062	. Tubes with temperature ionized gas as electron source
2893/001	. . Non-constructive schematic arrangements	2893/0063	. Plasma light sources
2893/0011	. . Non-emitting electrodes	2893/0064	. Tubes with cold main electrodes (including cold cathodes)
2893/0012	. . Constructional arrangements	2893/0065	. . Electrode systems
2893/0013	. . . Sealed electrodes	2893/0066	. . . Construction, material, support, protection and temperature regulation of electrodes; Electrode cups
2893/0015	. . . Non-sealed electrodes	2893/0067	. . . Electrode assembly without control electrodes, e.g. including a screen
2893/0016	. . . . Planar grids	2893/0068	. . . electrode assembly with control electrodes, e.g. including a screen
2893/0017	. . . . Cylindrical, helical or annular grids	2893/0069	. Tubes for displaying characters
2893/0018	. . . . Bar or cage-like grids	2893/007	. Sequential discharge tubes
2893/0019	. . . Chemical composition and manufacture	2893/0072	. Disassembly or repair of discharge tubes
2893/002	. . . . chemical	2893/0073	. . Discharge tubes with liquid poolcathodes; constructional details
2893/0021	. . . . . carbon	2893/0074	. . . Cathodic cups; Screens; Reflectors; Filters; Windows; Protection against mercury deposition; Returning condensed electrode material to the cathodic cup; Liquid electrode level control
2893/0022	. . . . . Manufacture	2893/0075	. . . . Cathodic cups
2893/0023	. . . . . carbonising and other surface treatments	2893/0076	. . . . . Liquid electrode materials
2893/0024	. . . . . Planar grids	2893/0077	. . . . . Cathodic cup construction; Cathodic spot control
2893/0025	. . . . . by winding wire upon a support	2893/0078	. . . . . Mounting cathodic cups in the discharge tube
2893/0026	. . . Machines for manufacture of grids or anodes	2893/0079	. . . . . Means for limiting the cathodic spot movement
2893/0027	. . . Mitigation of temperature effects	2893/008	. . . . . Means for stabilising the cathodic spot
2893/0029	. Electron beam tubes	2893/0081	. . . . . Cooling means
2893/003	. Tubes with plural electrode systems		
2893/0031	. Tubes with material luminescing under electron bombardment		
2893/0032	. Tubes with variable amplification factor		
2893/0033	. Vacuum connection techniques applicable to discharge tubes and lamps		
2893/0034	. . Lamp bases		
2893/0035	. . . shaped as flat plates, in particular metallic		
2893/0036	. . . having wires, ribbons or tubes placed between two vessel walls and being perpendicular to at least one of said walls		
2893/0037	. . Solid sealing members other than lamp bases		

- 2893/0082 . . . . Returning condensed electrode material to the cathodic cup, e.g. including cleaning
- 2893/0083 . . . . Liquid electrode level control
- 2893/0084 . . . . Protection against mercury deposition
- 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
- 2893/0087 . . . . Igniting means; Cathode spot maintaining or extinguishing means
- 2893/0088 . . Tubes with at least a solid principal cathode and solid anodes
- 2893/0089 . . . Electrode systems
- 2893/009 . . . Anode systems; Screens
- 2893/0091 . . . . Anode supporting means
- 2893/0092 . . . . Anodic screens or grids
- 2893/0093 . . . . Anodic arms
- 2893/0094 . . . Electrode arrangements; Auxiliary electrodes
- 2893/0095 . . Tubes with exclusively liquid main electrodes
- 2893/0096 . Transport of discharge tube components during manufacture, e.g. wires, coils, lamps, contacts, etc.
- 2893/0097 . . Incandescent wires of coils
- 2893/0098 . . Vessels