

## **CLASS 313, ELECTRIC LAMP AND DISCHARGE DEVICES**

### **SECTION I - CLASS DEFINITION**

This is the generic class for electric lamp and electric space discharge device structure.

Examples of such devices are electric incandescent lamps, gas or vapor filled electric discharge tubes, including lamps, mercury arc devices, vacuum discharge tubes, radio tubes, cyclotrons, cathode-ray tubes, photosensitive discharge devices, secondary emission electron multipliers, spark plugs, and open air arc and spark devices.

### **SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS**

For specific class references where not provided in the sections below, see References to Other Classes that refer to the particular section title.

#### **A. LAMPS AND DISCHARGE DEVICE STRUCTURE CLASSIFIED ELSEWHERE**

1. X-ray Tubes And Targets - See References to Other Classes.

2. Insulators With Arcing Devices - See References to Other Classes.

3. Lightning Arresters - Class 313 includes lightning arresters where the only structure is an arc or spark gap. Excluded are lightning arresters which include an arc or spark gap in combination with an impedance element such as a resistance, or inductance. Also excluded are arc or spark gap arresters in combination with a circuit maker or breaker such as a thermostatic switch or fuse. Excluded from Class 313 are the lightning arresters of the arc or spark gap type which are designed to have the electrodes brought into physical contact upon a prolonged discharge or which are provided with a material, such as, a fusible substance which melts and flows between the electrodes to short-circuit the electrodes upon a prolonged discharge.

Among the excluded types of lightning arresters is the type including a mass of particulate particles, each particle being insulated from the other, usually by a coating upon the surface of the particle. When a discharge passes from particle to particle, the surface material becomes conductive making a short-circuit through the

mass. If the particles remain conductively insulated and the current is transmitted through the mass of particles by the arc or spark, then the device is included within the scope of Class 313.

For the excluded types of lightning arresters see References to Other Classes, below.

4. Electric Lamp Provided With Structure For Holding A Material To Be Heated - See References to Other Classes.

5. Molecular Or Atomic Beam Devices - See References to Other Classes.

6. Mass Spectrometers - See References to Other Classes.

7. Electron Microscopes - See References to Other Classes.

8. Cathode Ray Oscillographs - See References to Other Classes.

9. Consumable Electrode Discharge Devices (e.g., Arc Lamps, etc.) - See References to Other Classes.

10. Lamps And Discharge Devices Having A Circuit Element Included Therein

An electromagnet connected in circuit with an electrode does not prevent classification of a lamp or space discharge device in Class 313 if the electromagnet is an operator for moving an electrode or if the electromagnet generates a magnetic flux which influences the operation of the lamp or space discharge device (see Subclass References to the Current Class, below). The inherent resistance of an electrode, although significant to the operation of the device, is not considered a circuit element such as would prevent classification in Class 313. Also See References to Other Classes.

11. Discharge Devices Structurally Combined With And In Circuit Relation With Incandescent Lamps- See References to Other Classes.

12. Discharge Devices Having The Cathode Heater or Other Structurally Combined Heater In Circuit Relation Therewith- See References to Other Classes.

13. Gas Pumps And Fans- See References to Other Classes.

#### **B. LAMP AND DISCHARGE DEVICE SYSTEMS**

This class does not include electric systems for supplying electric current and/or potential to electric lamps or to discharge devices.

Patents which claim a lamp or discharge device having electrodes which are adapted to have current or potential impressed upon the electrodes or which claim a lamp or discharge device with means recited broadly (no specific means, such as a battery, source etc., being included) to impress current or potential on the electrodes are classified in this class as lamps or discharge devices unless some circuit elements are claimed which positively limit the claims to a system rather than to a lamp or discharge device, per se. However, where the relative potentials between the electrodes are claimed, the patent is classified as a system.

For example, a claim to a discharge device having an anode adapted to be maintained at a high positive potential, a control electrode adapted to be maintained at a low negative potential, and a cathode adapted to be maintained at ground potential will be excluded from this class and will be found in the appropriate system class.

For discharge devices and lamp systems, see References to Other Classes, below.

#### C. METHOD OF OPERATING LAMPS OR DISCHARGE DEVICE

Patents which claim a method of operating a lamp or discharge device are excluded from this class and will be found in the class which provides for the system which is required to operate the device. See above for the classification of electric lamp and discharge device systems. Also See References to Other Classes, below.

#### D. METHODS AND APPARATUS FOR SUBJECTING OBJECTS, ARTICLES AND MATERIALS TO RAY ENERGY OR ELECTRONS OR IONS GENERATED BY DISCHARGE DEVICES OR LAMPS

Class 313 does not include either processes or apparatus for subjecting materials, articles or objects to the ray energy (e.g., ultraviolet light, X-rays, etc.) or to electrons, ions, arcs or sparks generated by electric lamps or discharge devices.

For such methods and apparatus, see References to Other Classes, below.

#### E. COMBINED WITH A SUPPORT

Where the support is a casing, jacket, electrical connector (e.g., socket) or includes means for modifying the temperature of the lamp or discharge device, see below.

Lamps including discharge device lamps combined with a supporting means for the lamp are excluded from Class 313.

Class 313 is the generic class for discharge devices in combination with supporting means for the discharge device.

Also See References to Other Classes, below.

#### F. COMBINED WITH TEMPERATURE MODIFYING MEANS

##### 1. With Enclosing Casing Or Jacket:

Class 313 is a generic class for all discharge devices where significant discharge device structure is claimed in combination with a jacket, casing or enclosure having means to modify the temperature of the discharge device. (See Subclass References to the Current Class, below.)

Included in Class 313 are all lamps, per se, and discharge devices, per se, which are provided with a double walled envelope or two sealed enclosing envelopes, the second envelope being an integral part of the lamp or discharge device structure, the space between the two envelope portions being evacuated or filled with heat transfer or insulating means to modify the temperature of the lamp or discharge device. (See Subclass References to the Current Class, below.)

See References to Other Classes, below.

##### 2. Lamp, Discharge Devices, And Envelopes Therefor With Temperature Modifying Means

Class 313, provides for all lamp and discharge device structures, per se, where significant lamp or discharge device structure is claimed and which include means for modifying the temperature of the lamp or discharge device, excepting lamps and discharge devices of the consumable electrode type which are classified elsewhere. (See References to Other Classes, below.)

See above when the lamp or discharge device is provided with a separable casing, jacket, or enclosure and which include means to modify the temperature of the lamp or discharge device, and also see above with

respect to photocells provided with temperature modifying means where no significant photocell structure is claimed.

See Class 313 for lamp and discharge device structure which include means for modifying the temperature of the lamp or discharge device. Included are lamp and discharge devices, per se, having heating means for raising the temperature of the device, devices with electrodes provided with cooling ducts or heat radiators, devices with means to modify the temperature of the envelope, including double walled envelopes or two sealed enclosing envelopes with a heat conducting or heat insulating medium (including vacuum) in the space between the two envelope walls, devices with heat conducting or insulating members, etc.. Also included is the structure of electrodes for lamps and discharge devices which are provided with means to modify the temperature of the electrode (e.g., electrodes with cooling fins, fluid ducts, heat transmission means, etc.).

Excluded from Class 313 are mere envelopes, for electric lamps or discharge devices provided with temperature modifying means where no significant lamp or discharge device structure is claimed.

Parts of lamps and discharge devices, such as electrode clamps or electrical connectors provided with heat modifying means are classified with the appropriate device, e.g., with the clamp or connector, etc.

#### G. COMBINED WITH A SEPARABLE CASING, JACKET, SHIELD, OR ENVELOPE PROTECTIVE MEANS

Where the lamp or discharge device and casing or jacket includes means to modify the temperature of the lamp or discharge device, see above.

See below with respect to the classification of lamps and discharge devices provided with an envelope or a non-separable casing or jacket.

Class 313 is a generic class for the combination of significant discharge device structure and a separable casing jacket, shield or enclosure, or envelope protective means and provides for all discharge devices other than lamps which are not otherwise classified where significant discharge device structure is claimed in combination with a casing, jacket, shield, or envelope protective means. Included in Class 313 are all lamps which have a double wall envelope where the second envelope which encloses the first envelope is integrally united with the first envelope so that the two envelope walls

constitute an integral structure. Where the second envelope wall is not integral with the lamp envelope, that is, it is removable therefrom, the patent is excluded from Class 313 and will be found elsewhere. The combination of an envelope, box or housing (such as a lamp or discharge device envelope) and either a separable or integral casing or housing where electrical features are claimed is classified elsewhere. (See References to Other Classes, below.)

See Class 313 for lamps and discharge devices which have an integral double wall envelope; for discharge devices having an envelope and a casing or jacket therefor; for where the discharge device is provided with an electrical shield and for other discharge devices provided with a casing or jacket. (See Subclass References to the Current Class, below.)

Also See References to Other Classes.

#### H. COMBINED WITH OPTICAL DEVICE OR HAVING SPECIAL RAY TRANSPARENT ENVELOPE (E.G., FILTER, REFLECTOR, LENS, LIGHT DISTRIBUTOR OR MODIFIER LIGHT SHIELD, LIGHT SHADE, ULTRAVIOLET RAY TRANSPARENT PORTION, OR LIGHT OBSCURING MEANS)

Class 313 provides for all lamps and discharge devices which have an integral part of the lamp an optical means combined therewith or which are provided with an envelope at least a portion of which is made of a glass or material especially designed to transmit a particular portion of the spectrum, such as ultraviolet, infrared, or only a restricted portion of the visible spectrum. This includes lamps and discharge devices with light filters, reflectors, refractors, etc. within the envelope of the lamp or coated upon or forming a part of the envelope of the lamp. See Class 313 for this art. See this class (313) for lamps and discharge devices where the claims are limited to the envelope being made of a glass or other material (e.g., quartz) which transmits a particular portion of the spectrum or a restricted portion of the spectrum. (See Subclass References to the Current Class, below.)

See below for the classification of envelopes, jackets, and casings, per se, for lamps and discharge devices.

Class 313 does not provide for any discharge devices or lamps where the optical device is separable from the lamp or discharge device, that is, it is not an integral part of the lamp or discharge device.

See References to Other Classes, below.

## J. COMBINED WITH ELECTRICAL CONNECTOR STRUCTURE

Class 313 provides for the combination of all electric lamps and discharge devices where significant lamp or discharge device structure is recited in combination with an electric connector for connecting the lamp or discharge device in an electric circuit. See Class 313 where the lamp or discharge device is combined with a separable or detachable electric connector (e.g., a socket) and where the lamp or discharge device is provided with an electrical connector which is a part of the lamp or discharge device (e.g., a base on the lamp). (See Subclass References to the Current Class, below.)

### 1. Lamps And Discharge Devices Combined With A Separable Electric Connector

This class (Class 313), Electric Lamp and Discharge Devices) provides for the combination of an electrical lamp with a base or socket including a filament, or other reference to electrodes of the lamp.

See References to Other Classes.

### 2. Lamps And Discharge Devices Which Include Electrical Connector Structure

For reference to lamps and discharge devices with a base, where no electrical connector structure is involved, see below and References to Other Classes.

### 3. Electrodes Combined With Connector Structure

Class 313 includes all electrodes for electric lamps and discharge devices where significant lamp or discharge device electrode structure is claimed in combination with an electrical connector for the electrode, or where the electrode is provided with electrical connector structure. Merely reciting that the electrode is a metallic or nonmetallic rod or wire, or that the electrode has a particular cross-section where the connector is attached to the connector is not considered to be significant electrode structure.

See References to Other Classes, below.

## K. ENVELOPES, CASINGS AND JACKETS FOR LAMPS AND DISCHARGE DEVICES

Class 313 provides for the combination of electric lamps and discharge devices which are provided with an envelope, and for electric lamps and discharge devices which

are provided with a casing or jacket which is an integral part of the lamp or discharge device. Class 313 provides for lamps and discharge devices where the claims are limited to the envelope being made of a glass or other material (e.g., quartz) which transmits a particular portion of the spectrum or a restricted portion of the spectrum. See Class 313 for lamps and discharge devices with envelopes, and for discharge devices and lamps with casings or jackets. (See Subclass References to the Current Class, below.)

See discharge devices which are provided with separable casing, jacket, shield or envelope protective means, and References to Other Classes, below.

### 1. With Attached Base

Where the attached base includes electrical connector means see above and References to Other Classes, below.

### 2. With Lead-in Structure

Boxes, housings, and envelopes for electrical devices including electric lamps and discharge devices where the box, housing or envelope includes means to couple a conductor to the box, housing, or envelope, or has means for passing a lead-in conductor into the box or housing are classified elsewhere. Boxes, housings, and envelopes which are provided with other significant electrical structure or which are claimed as having an electrical device therein where no significant characteristics of the electrical device are recited are elsewhere. (See References to Other Classes, below.)

Note that if the lead-in conductors are of such rigidity to form contacts (usually plug-type contacts), the device is classified elsewhere unless significant structure of the device in addition to the connector structure is recited as pointed out above. Any specification of electric lamp or discharge device structure in addition to naming the type of lamp or discharge device will cause classification of the patent in Class 313. Where the claims are drawn to an electrical device broadly defined within the envelope, the patent is classified elsewhere. Claims which are drawn to a discharge device or electric lamp or a particular type, such as a gas filled discharge device, or an incandescent lamp where only envelope and lead-in structures are claimed are classified elsewhere.

For lead-in and seal structure such as glass to metal seals, see below.

3. With Identifying Indicating Mark- See References to Other Classes.

4. Defined Only By Composition

Envelopes, jackets and casings which are defined only by their composition will be found in the appropriate composition class.- See References to Other Classes, below.

5. Structure- See References to Other Classes, below.

#### L. BUSHINGS, GLASS-TO-METAL SEALS AND LEAD-IN CONDUCTORS

See above for lamps and discharge devices which are provided with electrical connector means such as a base having prongs thereon and which sometimes include bushings or lead-in conductors for conducting electricity through the wall of the housing, jacket or envelope of the lamp or discharge device to the electrodes within the casing, jacket or envelope. See above for housings, jackets, and envelopes for electric lamps and discharge devices which are provided with lead-in or bushing structure for passing electric current through the wall of the housing, jacket, or envelope to the interior of the device.

See References to Other Classes, below.

#### M. ELECTRODES AND SHIELDS

Class 313 provides for all electrodes and shields, per se, excepting the consumption feed type electrodes classified elsewhere. Class 313 includes electrodes and shields formed of two or more parts with a joint therebetween where significant electrode or shield structure is claimed. Electrodes which are limited by claimed structure to use in discharge devices (arc lamps) in which the feed or motion of one of the electrodes towards the other is accomplished by the destruction of the electrode or a portion thereof due to the discharge are classified elsewhere. (See References to Other Classes, below.)

Electrodes and shields which include no more structure than a base having one or more coatings thereon are excluded from Class 313. Merely naming the electrode or shield as a wire, filament, rod, ribbon or strand is not sufficient structure to cause classification in Class 313. Electrodes and shields which are defined only by their composition are excluded from this class. The excluded art relating to electrodes and shields will be found in the classes listed below:

1. Electrodes And Shields With Joints Therebetween

Where the only structure of the electrode or shield recited is that the electrode or shield is composed of two or more parts with means to join the parts together, the patents will be found in the appropriate class providing for the joint.

See References to Other Classes, below, for a reference to the classes which provide for joint structure.

Where an electrical feature is claimed in addition to the joint but no significant structure other than that required to make the joint is recited, the patent will be found elsewhere for the electrical connector structure. Where an electrode is composed of two rod-like portions and one portion is provided with a hollow screw threaded socket and the other is provided with the screw threaded end to fit into the socket, the patent is classified elsewhere. If the structure includes means such as a portion of higher electrical conductivity to insure good electrical contact between the portions, the patent would be classified elsewhere.

See References to Other Classes, below.

2. Coated Electrodes Or Shields And Compositions- See References to Other Classes, below.

3. Methods And Apparatus For Manufacturing Electrodes- See References to Other Classes, below.

#### N. FLUORESCENT AND PHOSPHORESCENT COATING AND COMPOSITIONS

Class 313 provides for electric lamps and discharge devices where significant lamp or discharge device structure is claimed which include as a part thereof a fluorescent or phosphorescent material. See this class (313) for cathode-ray tubes which have a fluorescent or phosphorescent target and for other discharge devices and lamps having an electrode or the envelope coated with or containing a fluorescent or phosphorescent material, or which otherwise include as a part thereof a fluorescent or phosphorescent material.

See References to Other Classes, below.

#### O. GETTERS AND GAS OR VAPOR GENERATING MATERIALS

Class 313, provides for all electric lamps and discharge devices which have combined therewith a getter or a gas

or vapor generating material, irrespective of whether the getter or gas or vapor generating means, is to be used during the manufacture of the device, or to be used during the operation of the device, or to be used as needed after the device has been operated. Class 313 also provides for electrode structure combined with containers or receptacles for the getter or the gas or vapor generating material. For electrodes which involve significant electrode structure with a coating or a getter material thereon, see this class (313). For the classification of electrodes which involve only a base with a coating of a getter material thereon, or which involves only an electrode defined by its compositions, see above.

See Subclass References to the Current Class, below, and References to Other Classes, below.

#### P. DEFLECTION AND FOCUSING MAGNETS

Magnets provided with a plurality of coils to deflect the cathode ray in a plurality of directions, (e.g., vertically, and horizontally) are classified elsewhere. Magnets for focusing, concentrating or accelerating cathode rays even if the magnet is provided with a plurality of separate coils are elsewhere. Magnets for cathode-ray tubes which have a plurality of coils to generate both a deflecting field and a focusing, concentrating and/or accelerating field are classified in Class 313.

See References to Other Classes, below.

#### Q. INFRARED RAY GENERATORS

Class 313 does not provide for devices for converting electrical energy into infrared ray energy, excepting in special cases. Many lamps and discharge devices inherently generate infrared ray energy in their operation. Class 313 will take therefore, electric lamps and discharge devices which are stated to be for the purpose of generating infrared ray energy when such lamps and discharge devices are substantially identical in structure with lamps and discharge devices intended to generate visible light or ultraviolet light or other analogous ray energy. Class 313 will take such devices even though the device includes means for preventing light energy other than the infrared ray energy from being emitted, such as having the envelope wall formed of an opaque material. Such infrared ray generators are classified in Class 313 in the subclasses providing for the structure of the analogous lamp or discharge device, see especially where the lamp or discharge device has an envelope made of the material which is especially transparent to infrared ray energy and where the lamp or discharge device is provided with a light obscuring means such as

an opaque coating on the envelope wall. (See Subclass References to the Current Class, below.)

Class 313 does not provide for the infrared generator in combination with a reflector, guard, support, separable casing, or jacket. For such excluded subject matter and other infrared ray generators see References to Other Classes, below.

#### R. METHODS AND APPARATUS FOR MANUFACTURING OR REPAIRING ELECTRIC LAMPS OR DISCHARGE DEVICES OR SALVAGING PARTS THEREOF

Class 313 does not provide for the processes or apparatus used either to manufacture or repair electric lamps or discharge devices. It should be noted, however, that Class 313 does provide for electric lamp and discharge devices which are provided with a getter, a gas or vapor generating means, or pressure regulating means, see above. (See Subclass References to the Current Class, below.)

#### S. SYSTEMS, APPARATUS AND METHODS FOR TESTING ELECTRIC LAMPS AND DISCHARGE DEVICES

See References to Other Classes.

#### T. RELATIONSHIP OF CLASSES 313 TO 445, ELECTRIC LAMP OR SPACE DISCHARGE COMPONENT OR DEVICE MANUFACTURING

In view of the statements in the above sections, the relationship between the classes and subclasses mentioned can be shown in schedule form thus:

313, Electric Lamp and Discharge Devices

314, Electric Lamp and Discharge Devices: Consumable Electrodes

315, Electric Lamp and Discharge Devices: Systems

445, Electric Lamp or Space Discharge Component or Device Manufacturing

#### U. DISTINCTION BETWEEN DISCHARGE DEVICES AND ELECTRIC SWITCHES

Some types of electric switches are closely analogous in structure to some types of discharge devices. This is especially true with respect to the type of discharge device where the electrodes of the discharge device are

placed in contact and then separated from each other to establish the discharge. Some types of switches include means, such as electromagnets, to extinguish the arc between the switch contacts when the switch is opened. Some types of discharge devices include means, such as electromagnets, to defect or otherwise alter the characteristics of the discharge between the electrodes.

The distinction between electric switches and discharge devices, therefore, depends in some cases principally upon the disclosed purpose of the structure claimed by the patent. Where the discharge is only an incident to the separating of the switch contacts and the purpose of the structure is to open or close a circuit, the device will be considered an electric switch for the purpose of classification. When the electrodes are placed in physical contact to close the circuit, and separated from each other to interrupt the circuit, the device will be classified as a switch. Where the purpose of the claimed structure is to establish a space discharge by contacting the electrodes with each other and then separating the electrodes, the device is considered to be a discharge device for Class 313.

Excluded from Class 313 are devices which are designed normally to have a discharge between the electrodes and which include means operative after either prolonged use or overload to establish a short-circuit path from one of the electrodes to the other electrode so as to extinguish the space discharge. See above relative to lightning arresters of this type.

Switches which are somewhat analogous in structure to space discharge devices where the switch is provided with means to separate the switch contacts from each other to open the circuit, the switch structure including means to extinguish the space discharge formed when the switch contacts are opened, are classified elsewhere.

See References to Other Classes, below.

#### W. DISTINCTION BETWEEN DISCHARGE DEVICES AND ELECTRIC CONDENSERS AND OTHER STATIC FIELD PRODUCING MEANS

Some types of space discharge devices are closely analogous in structure to some types of electric condensers and other static field producing devices. In these cases the device usually consists of two electrodes separated by air, gas, vapor or vacuum and are designed to have an electric potential impressed thereon. Where the device is intended to have a current flow between the electrodes either by ionization or by electron flow, the device is considered to be a space discharge device for

Class 313. However, if the device is designed for use without ionization between the electrodes or without transmitting current by electron flow then the device will be excluded from Class 313 and found in the other appropriate class.

Most devices other than the electric condensers of the type referred to above which are excluded from Class 313 are devices for treating materials such as ozonizers, electrical precipitators, disinfecting and sterilizing apparatus.

The Classification of such devices is referred to above. Also See References to Other Classes.

### SECTION III - SUBCLASS REFERENCES TO THE CURRENT CLASS

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 11+, for discharge devices where significant discharge device structure is claimed in combination with a jacket, casing or enclosure having means to modify the temperature of the discharge device.
- 11+, for lamp and discharge device structure which include means for modifying the temperature of the lamp or discharge device. Included are lamp and discharge devices, per se, having heating means for raising the temperature of the device, devices with electrodes provided with cooling ducts or heat radiators, devices with means to modify the temperature of the envelope, including double walled envelopes or two sealed enclosing envelopes with a heat conducting or heat insulating medium (including vacuum) in the space between the two envelope walls, devices with heat conducting or insulating members, etc.. Also included in subclasses 11+ is the structure of electrodes for lamps and discharge devices which are provided with means to modify the temperature of the electrode (e.g., electrodes with cooling fins, fluid ducts, heat transmission means, etc.).
- 25+, for all lamps, per se, and discharge devices, per se, which are provided with a double walled envelope or two sealed enclosing envelopes, the second envelope being an integral part of the lamp or discharge device structure, the space between the two envelope portions being evacuated or filled with heat transfer or insulating means to modify the temperature of the lamp or discharge device.

- 25+, 312, 315, 317+, and 634+ for lamps and discharge devices which have an integral double wall envelope.
- 49+, for a lamp or discharge device combined with a separable or detachable electric connector (e.g., a socket), and subclasses 318.01+ a lamp or discharge device provided with an electrical connector which is a part of the lamp or discharge device (e.g., a base on the lamp).
- 110+, for lamps and discharge devices with light filters, reflectors, refractors, etc. within the envelope of the lamp or coated upon or forming a part of the envelope of the lamp.
- 112, for lamps and discharge devices where the claims are limited to the envelope being made of a glass or other material (e.g., quartz) which transmits a particular portion of the spectrum or a restricted portion of the spectrum.
- 112, for where the lamp or discharge device has an envelope made of the material which is especially transparent to infrared ray energy.
- 117, for where the lamp or discharge device is provided with a light obscuring means such as an opaque coating on the envelope wall.
- 152, for an electromagnet connected in circuit with an electrode if the electromagnet is an operator for moving an electrode.
- 153+, for an electromagnet connected in circuit with an electrode if the electromagnet generates a magnetic flux which influences the operation of the lamp or space discharge device.
- 174+, for electric lamp and discharge devices which are provided with a getter, a gas or vapor generating means, or pressure regulating means.
- 312, for discharge devices having an envelope and a casing or jacket therefor.
- 313, for a discharge device provided with an electrical shield.
- 317+, for lamps and discharge devices with envelopes.
- 324, for discharge devices and lamps with casings or jackets.
- 355, and the subclasses referred to in the notes thereto, for electrodes which involve significant electrode structure with a coating or a getter material thereon.
- 416+, for cathode-ray tubes which have a fluorescent or phosphorescent target.
- 421+, for magnets for cathode-ray tubes which have a plurality of coils to generate both a deflecting field and a focusing, concentrating and/or accelerating field. ("Deflection And Focusing Magnets").
- 483+, for other discharge devices and lamps having an electrode or the envelope coated with or containing a fluorescent or phosphorescent material, or which otherwise include as a part thereof a fluorescent or phosphorescent material.
- 549+, for all electric lamps and discharge devices which have combined therewith a getter or a gas or vapor generating material, irrespective of whether the getter or gas or vapor generating means, is to be used during the manufacture of the device, or to be used during the operation of the device, or to be used as needed after the device has been operated. Subclasses 549+ also provides for electrode structure combined with containers or receptacles for the getter or the gas or vapor generating material.

#### SECTION IV - REFERENCES TO OTHER CLASSES

##### SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 825+ is the generic place for methods not elsewhere classified of mechanical manufacturing an electrical conductor or circuit and subclasses 745+ for corresponding apparatus. (Lines With Other Classes and Within This Class, "Methods and Apparatus For Manufacturing Electrodes").
- 75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 228+ for consolidated metal powder compositions. (Lines With Other Classes and Within This Class, "Bushings, Glass-to-Metal Seals and Lead-In Conductors").
- 75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 228+ for metal stock, filaments and wire made of consolidated metal particles. (Lines With Other Classes and Within This Class, "Coated Electrodes Or Shields And Compositions").
- 116, Signals and Indicators, subclasses 216+ provides for lamp or discharge device envelopes or casings which are provided with an identifying mark which changes its appearance if the lamp or discharge device is used for an appreciable time. (Lines With Other Classes and Within This Class, "With Identifying Indicating Mark").



- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 47 is the generic place for methods not elsewhere classified of making electrical conductors of indefinite length. (Lines With Other Classes and Within This Class, "Methods and Apparatus For Manufacturing Electrodes.")
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 99+ for methods of making laminated glass structures. (Lines With Other Classes and Within This Class, "Defined Only By Composition").
- 165, Heat Exchange, takes patents claiming heat exchange apparatus combined with a device to be cooled or heated thereby if no structure of said device is included other than the structure necessary for cooperation with the heat exchange apparatus, the mere naming of the device as a lamp or discharge device will not be sufficient to exclude the patent from Class 165. See especially subclasses 47+ for a structurally installed heat exchanger; subclass 74 for a device to be heated or cooled projecting into and removably secured to a container for a heat exchange fluid; and subclass 80 for a removable device removably retained in a heat exchanger. (Lines With Other Classes and Within This Class, "With Enclosing Casing Or Jacket:.")
- 165, Heat Exchange, for envelopes and casings provided with heat exchange means, including a mere metallic envelope defined as an anode or a similar electrode with heat exchange means; subclasses 177+ for a tubular structure with heat transfer means; and subclass 185 for a heat transmitter, per se. (Lines With Other Classes and Within This Class, "Lamp, Discharge Devices, And Envelopes Therefor With Temperature Modifying Means").
- 173, Tool Driving Or Impacting, for lead-in conductors of such rigidity as to form contacts (usually plug-type contacts), unless significant structure of the device in addition to the connector structure is recited. Any specification of electric lamp or discharge device structure in addition to naming the type of lamp or discharge device will cause classification of the patent in Class 313.
- 174, Electricity: Conductors and Insulators, appropriate subclasses for the combination of an envelope, box or housing (such as a lamp or discharge device envelope) and either a separable or integral casing or housing where electrical features are claimed. (Lines With Other Classes and Within This Class, G, "Combined With a Separable Casing, Jacket, Shield, or Envelope Protective Means")
- 174, Electricity: Conductors and Insulators, for an electrical device broadly defined within the envelope, the patent is classified in Class 174. See section 7 of the class definition of Class 174. Claims which are drawn to a discharge device or electric lamp or a particular type, such as a gas filled discharge device, or an incandescent lamp where only envelope and lead-in structures are claimed are classified in Class 174. (Lines With Other Classes and Within This Class, K, "Envelopes, Casings And Jackets For Lamps And Discharge Devices").
- 174, Electricity: Conductors and Insulators, is the generic class for boxes, housings, and envelopes for electrical devices including electric lamps and discharge devices where the box, housing or envelope includes means to couple a conductor to the box, housing, or envelope, or has means for passing a lead-in conductor into the box or housing. Class 174 also provides for boxes, housings, and envelopes which are provided with other significant electrical structure or which are claimed as having an electrical device therein where no significant characteristics of the electrical device are recited. (Lines With Other Classes and Within This Class, K, "Envelopes, Casings And Jackets For Lamps And Discharge Devices").
- 174, Electricity: Conductors and Insulators, generic class for boxes, casings, jackets, and envelope with lead-in conductors or means to couple conductors to the box, casing, or jacket; generic class for electrical device combined with casing, jacket, or shield; for lamp and discharge device envelopes with electrical connector structure; and for boxes and housings (e.g., envelopes and casings for lamp and discharge devices) with electric connector.
- 174, Electricity: Conductors and Insulators, provides for a mere housing, casing or envelope for an electrical device, such as a lamp or discharge device, where no significant structure of the device is claimed with means for modifying the temperature of the device and which has electrical features combined therewith, such as connector structure. See subclasses 15.1+ where the housing, casing or envelope is combined with means for feeding, circulating or distributing a temperature modifying fluid and see subclasses 50+ where the temperature mod-

- ifying means for the housing, casing, or envelope does not require circulation of a fluid, as for example, by having heat radiating fins or a heat conductive path. (Lines With Other Classes and Within This Class, "With Enclosing Casing Or Jacket:").
- 174, Electricity: Conductors and Insulators, is the generic class for the combination of an electrical device recited by name only (e.g., no significant characteristics of the device are recited, and the device may be a discharge device or lamp) and the separable casing, jacket, shield or enclosure where electrical features are involved such as the lead-in conductors for the device. See section 7 of the class definition of Class 174 for the subclasses in Class 174 which provide for boxes, housings and envelopes in Class 174. These subclasses also provide for the combination with a separable casing, jacket, shield or enclosure where electrical features are claimed. Note especially subclass 50.51 and 350 in Class 174. Class 174 provides for the combination of a lamp or discharge device and a box, housing, casing, jacket or other container. ("Combined With A Separable Casing, Jacket, Shield, or Envelope Protective Means").
- 174, Electricity: Conductors and Insulators, provides for envelopes designed for use with electrical devices, including those for electric lamps and space discharge devices, and which include electrical features (such as lead-in conductors for the lamp) but which do not include any significant characteristics of the electrical device, and means to modify the temperature of the device or envelope. See subclasses 15.1+ where the envelope is combined with means for feeding, circulating or distributing a temperature modifying fluid, and see subclasses 50.5+ where the temperature modifying means for the envelope does not require circulation of a fluid as, for example, by having heat radiating fins or a heat conductive path. (Lines With Other Classes and Within This Class, "Lamp, Discharge Devices, And Envelopes Therefor With Temperature Modifying Means").
- 174, Electricity: Conductors and Insulators, subclasses 17+ and 50+ for envelopes, boxes and housings for electric lamps and discharge devices which are of general utility and where electrical features are claimed which are provided with an electrical connector where significant structure of the box, housing or envelope is claimed in addition to the electrical connector structure; subclasses 17.08 and 50.52+ for hermetically sealed envelopes where significant structure of the envelope is recited in combination with electrical connector structure. These subclasses in Class 174 provide the envelopes having lead-in wires sealed therein which are designed to form contacts (usually plug type contacts) where structure of the envelope in addition to the lead-in wire structure is recited. Note especially subclass 50.53 where the envelope or seal for the envelope is formed of a conductive material and is used as the electrical connector for the device within the envelope. (Lines With Other Classes and Within This Class, "Lamps and Discharge Devices Which Include Electrical Connector Structure")
- 174, Electricity: Conductors and Insulators, subclass 15.1 for housings, casings, or envelopes for electrical devices (e.g., lamp or discharge devices) with means for modifying the temperature of the device; subclass 17 for boxes and housings with electric connector; subclass 17.08 for hermetically sealed envelope with electric connector; subclasses 50-64 for miscellaneous boxes and housings for electrical devices; subclass 50 for boxes and housings with electric connector; subclass 50.5 for hermetically sealed envelopes with lead-in conductors; subclass 50.51 for hermetically sealed envelope with separable casing or jacket; subclass 50.52 for hermetically sealed envelope with electrical connector; subclasses 140+ for line insulators with arcing device; subclass 144 for arcing device, per se, for line insulators; subclass 151 for insulators for passing conductors through walls or plates; subclass 152 for electrical bushings; and subclasses 350-397 for miscellaneous electrical shields.
- 174, Electricity: Conductors and Insulators, subclasses 15+ for housings, casings, or envelopes for electrical devices (e.g., lamp or discharge devices) with means for modifying the temperature of the device; subclass 17 for boxes and housings with electric connector; subclass 17.08 for hermetically sealed envelope with electric connector; subclass 35 for miscellaneous electrical shields; subclasses 50+ for miscellaneous boxes and housings for electrical devices; subclass 50 for boxes and housings with electric connector; subclass 50.5 for hermetically sealed envelopes with lead-in conductors; subclass 50.51 for hermetically sealed

- envelope with separable casing or jacket; subclasses 50.52+ for hermetically sealed envelope with electrical connector; subclasses 140+, for line insulators with arcing device; subclass 144, for arcing device, per se, for line insulators; subclass 151 for insulators for passing conductors through walls or plates; and subclass 152 for electrical bushings.
- 174, Electricity: Conductors and Insulators, provides for a box or housing including a hermetically sealed envelope such as an envelope for an electric lamp or discharge device where electrical features are claimed in combination with a separable electric connector or socket. Class 174 provides for such a combination where significant features of the box or housing is recited in addition to the electrical connector features on the envelope or in the socket or separable connector. Note that in Class 174, in these subclasses, the electrical device in the box or housing may be recited by name only. See especially subclasses 17.08 and 50.52+ where the box or housing is a hermetically sealed envelope such as is used for electric lamps or discharge devices. (Lines With Other Classes and Within This Class, "Lamps And Discharge Devices Combined With A Separable Electric Connector").
- 174, Electricity: Conductors and Insulators, subclass 151 provides for insulators for insulating a conductor from a wall through which the conductor extends. Subclass 152 provides for those devices known as bushings, in which a portion of the insulating element extends into the opening in the wall. (Lines With Other Classes and Within This Class, "Bushings, Glass-to-Metal Seals and Lead-In Conductors")
- 174, Electricity: Conductors and Insulators, is the generic class for boxes, housings, and envelopes for electrical devices including electric lamps and discharge devices where the box, housing or envelope includes means to couple a conductor to the box, housing, or envelope, or has means for passing a lead-in conductor into the box or housing. Class 174 also provides for boxes, housings, and envelopes which are provided with other significant electrical structure or which are claimed as having an electrical device therein where no significant characteristics of the electrical device are recited. See Class 174, Class Definition, Subclass References to the Current Class for the particular subclasses which provide for such boxes, housings and envelopes in Class 174, especially subclass 50.5 and the subclasses specified in the Notes thereto where the box, housing or envelope is hermetically sealed including such devices as are made of ceramic, vitreous or nonmetallic plastic material (e.g., glass), and is provided with lead-in conductors for passing electric current into the interior. (Lines With Other Classes and Within This Class, "With Lead-In Structure").
- 188, Brakes, provides, in subclasses 378+ for caps or jackets to be placed upon the envelope of a discharge device or a lamp to damp the vibrations thereof due to the inertia of the cap or jacket; and in subclass 381 for similar caps or jackets which damp the vibrations due to friction between the device and the cap or jacket; in both cases, wherein no significant features of the lamp or discharge device is claimed. (Lines With Other Classes and Within This Class, "Combined With A Separable Casing, Jacket, Shield, or Envelope Protective Means").
- 200, Electricity: Circuit Makers and Breakers, for switches distinguished from discharge devices.
- 200, Electricity: Circuit Makers and Breakers, subclass 144 for switches which are somewhat analogous in structure to space discharge devices, where the switch is provided with means to separate the switch contacts from each other to open the circuit, the switch structure including means to extinguish the space discharge formed when the switch contacts are opened. (Lines With Other Classes and Within This Class, U, "Distinction Between Discharge Devices and Electric Switches").
- 205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclass 50 for a product (other than one containing two or more contiguous metallic layers) produced by electrolysis involving electrolytic marking, battery electrode active material forming, electroforming, or electrolytic coating. (Lines With Other Classes and Within This Class, "Coated Electrodes or Shields And Compositions").
- 219, Electric Heating, for infrared ray generators; subclass 553 for the infrared generator in combination with a reflector, guard, support, separable casing, or jacket. (See Lines With Other Classes and Within This Class, Q, "Infrared Ray Generators").
- 219, Electric Heating, subclasses 45, 407, and 521 for electric lamps for heating materials. In

- some of these lamps, the envelope is made in the form of a receptacle so that the heat from the lamp filament will heat a material in the receptacle. Other of the lamps have means provided in the lamp base for holding the material to be heated. (See Lines With Other Classes and Within This Class, "Electric Lamp Provided With Structure For Holding Material To Be Heated").
- 220, Receptacles, generic class for boxes, casings, jackets, and containers; subclasses 2.1+ provides for the combination of envelope structure with an attached base where no electrical features are claimed. (Lines With Other Classes and Within This Class, "With Attached Base")
- 220, Receptacles, subclasses 2.1+ are the generic place for the structure of the envelope, casing, or jacket for lamps and discharge devices where no significant electrical features are included. ("Structure")
- 220, Receptacles, is the miscellaneous class for boxes, housings, casings, jackets and other containers and provides for envelopes for lamps and discharge devices and the separable jackets, boxes, casings, for discharge devices other than lamps. Class 220 does not provide for the combination of a lamp or discharge device and a box, housing, casing, jacket or other container even though the lamp or discharge device is recited by name only. Such combinations are found elsewhere. See subclasses 2.1+, of Class 220 for the separable jackets, casings and housings for discharge devices in Class 220. Also see subclasses 2.1+ for the gas tight envelope structure of Class 220. (Lines With Other Classes and Within This Class, "Combined With A Separable Casing, Jacket, Shield, Or Envelope Protective Means").
- 250, Radiant Energy, subclasses 200+ for photoelectric controlled systems; subclasses 216+ for photocells with separable optical means; subclasses 238 for photocells with temperature modifying means; subclass 239 for photocells with a casing or housing; subs. 281+ for mass spectrometers for the separation or analysis of materials; subclass 311 for electron microscopes; subclasses 336.1+ for systems for utilizing a space detecting or measuring invisible ray energy; subclasses 324+, 432+, 453.1+, and 492.1 for methods and for apparatus subjecting objects and materials to electrons, ions, arcs, and sparks, and for methods and apparatus for treating objects and materials with ray energy;
- subclasses 423+ and 453.1+ for invisible ray generators combined with a support; subclasses. 483.1+ for fluorescent and phosphorescent screens; subclasses 493.1+ for invisible ray generator combined with a separable casing and having temperature modifying means, for ultraviolet ray generators combined with a support, for ultraviolet ray generators with separable casing or jacket, for ultraviolet ray generator combined with a separable casing and having temperature modifying means, and for invisible ray generators with separable casing or jacket; subclasses 503.1+ for invisible ray generators with optical device, and for invisible ray generator with separable ray filter; and subclasses 522.1+ for casing and jackets limited to use with invisible ray generators.
- 250, Radiant Energy, subclass 251 for devices for producing and propagating a unidirectional stream of neutral molecules or atoms through a vacuum, usually with thermal velocity, and/or for exciting such molecules and atoms at a resonance frequency (Lines With Other Classes and Within This Class, "Molecular Or Atomic Beam Devices").
- 250, Radiant Energy, subclasses 281+, for discharge Devices of the type used in the separation or the analysis of materials utilizing the mass to electric charge ratio of particles. (Lines With Other Classes and Within This Class, "Mass Spectrometers").
- 250, Radiant Energy, subclass 309 and 311. For discharge devices used to produce electrons or ions and having means for subjecting objects or materials to the electrons or ions, including electron microscopes, (Lines With Other Classes and Within This Class, "Electron Microscopes").
- 250, Radiant Energy, provides for invisible ray generators which are enclosed within a separable casing or housing and which are provided with means for modifying the temperature of the ray generator where not provided for elsewhere. See subclasses 423+ for invisible radiant energy generation and sources. Subclass 238 provides for photocells including those of the discharge device type which include a separable casing or housing and means to modify the temperature of the photocell. (Lines With Other Classes and Within This Class, "With Enclosing Casing Or Jacket:")
- 250, Radiant Energy, provides for generators of invisible ray energy (e.g., ultraviolet ray) which have combined therewith a separable

- casing or jacket not provided for elsewhere. See subclasses 423+ for ion generation and subclasses 493.1+ for invisible radiant energy generation and sources. Subclass 239 provides for the combination of a photocell including those of the discharge type in combination with a separable casing or housing. (Lines With Other Classes and Within This Class, "Combined With A Separable Casing, Jacket, Shield, Or Envelope Protective Means").
- 250, Radiant Energy, subclasses 503.1+ provides for invisible ray generators combined with a separable optical or ray modifying means where not classified elsewhere. Subclasses 216 to 236 provide for the combination of a photoelectric cell including those of the discharge device type in combination with separable optical means used to project light upon the photocell. (Lines With Other Classes and Within This Class, "Combined With Optical Device Or Having Special Ray Transparent Envelope, etc.")
- 250, Radiant Energy, subclass 336.1 for miscellaneous electric systems for detecting or measuring invisible ray energy (e.g., Geiger-Mueller counter systems, etc.); and subclasses 200+ for miscellaneous electric systems which are controlled by a photo-electric discharge device. (Lines With Other Classes and Within This Class, "Gas Pumps And Fans, Lamp And Discharge Device Systems," for discharge devices and lamp systems.)
- 250, Radiant Energy, for the irradiation of material by nuclear or electromagnetic wave or particle radiation, especially subclasses 324+ for methods and apparatus to subject material to corona irradiation, subclasses 432+ for methods and apparatus to contained, supported or transferred material with an irradiating source for the material, subclasses 453.11+ for object supports with or without an irradiating source for the supported object, subclasses 458.1+ for methods and apparatus to irradiate fluorescent and phosphorescent materials and subclass 492.1 for methods and apparatus to irradiate objects or materials. Also note that subclasses 281+ provides for methods and apparatus for the ionic separation or analysis of materials utilizing the mass to electric charge ratio of particles (e.g., mass spectrometers). (Lines With Other Classes and Within This Class, Methods and Apparatus for Subjecting Objects, Articles and Materials to Ray Energy or Electrons or Ions Generated by Discharge Devices or Lamps, for such methods and apparatus.)
- 250, Radiant Energy, provides for generators of invisible ray energy in combinations with the means for supporting the ray generating means where not elsewhere provided. See subclasses 423+ for methods and apparatus for ion generation and subclasses 493.1+ for methods and apparatus for radiant energy generation and sources. (From Combined With a Support.)
- 250, Radiant Energy, subclasses 483.1+ provides for fluorescent and phosphorescent screens. (Lines With Other Classes and Within This Class, "Fluorescent And Phosphorescent Coating And Compositions").
- 250, Radiant Energy, subclasses 522.1+ provides for casings and jackets for use with generators of invisible ray energy (e.g., ultraviolet) where structure is claimed which limits the jacket to use with such invisible ray energy and subclass 239 provides for photocells where no significant characteristics of the photocell is recited which include an envelope or housing for the photocell. (Lines With Other Classes and Within This Class, "Structure").
- 252, Compositions, subclass 181.1 and the classes specified in the notes to the Definition of those subclasses, provides for compositions which are designed for use as getters or electric lamp or discharge devices or which are designed for use in generating a gas or vapor within the envelope or jacket of an electric lamp or space discharge device. (Lines With Other Classes and Within This Class, "Getters And Gas Or Vapor Generating Materials").
- 252, Compositions, subclasses 301.16 through 301.6 is the generic place for fluorescent or phosphorescent materials. (Lines With Other Classes and Within This Class, "Fluorescent And Phosphorescent Coating And Compositions").
- 252, Compositions, subclasses 500+ for compositions which conduct or emit electrons and for electrically conductive or emissive devices defined solely by the composition of which they are composed. Thus the compositions may be specialized for use as electron emissive compositions or for preparing electrodes, filaments and shields for electric lamps or electric space discharge devices. (Lines With Other Classes and Within This Class, "Coated Electrodes Or Shields And Compositions").
- 279, Chucks or Sockets, provides for chucks and sockets for holding rod-like bodies and tools.

- Some of the chucks and sockets are designed to hold electrodes such as the carbon rods used in arc lamps. (Lines With Other Classes and Within This Class, “Electrodes Combined With Connector Structure”).
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 26+ for lamps and discharge devices of the consumable electrode type. (Lines With Other Classes and Within This Class, F, Combined With Temperature Modifying Means.)
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, (e.g., arc lamps with means for feeding the electrodes) Systems; subclasses 26+ for consumable electrode discharge device, with temperature modifying means.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclass 60 for consumption feed type electrodes; subclass 60 provides for electrodes which are limited by claimed structure to use in discharge devices (arc lamps) in which the feed or motion of one of the electrodes towards the other is accomplished by the destruction of the electrode or a portion thereof due to the discharge. (See Lines With Other Classes and Within This Class, M, Electrodes and Shields.)
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, for electric systems for supplying electric current to discharge devices of the consumable electrode (e.g., arc lamp) type. See above with respect to consumable electrode discharge devices. (Lines With Other Classes and Within This Class, “Gas Pumps And Fans, Lamp And Discharge Device Systems,” for discharge devices and lamp systems.)
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, provides for arc and other electric space discharge lamps or devices which are provided with at least one electrode which is consumed during the operation of the discharge device and such devices in combination with electric current supply systems therefor. Substantially all of the lamps in Class 314 are characterized by being provided with feeding means to move the electrodes together as the electrode is consumed.
- (a) Patents claiming an “arc discharge device” or an “arc lamp” are not classified in Class 314 unless the claims are limited by claimed subject matter to discharge devices of the consumable electrode type. Class 313 provides for arc lamp and discharge device structure which is of general utility and not necessarily limited to use with devices of the consumable electrode type. The electrodes for the consumable electrode type discharge devices are classified with other electrodes in Class 313 except for the consumption feed type electrodes in Class 314 subclass 60. See above for the classification of electrodes in Class 313. (See Lines With Other Classes and Within This Class, “Consumable Electrode Discharge Devices” above).
- 315, Electric Lamp and Discharge Devices: Systems, subclasses. 1-11, 12.1, 13.1-17, and 364-410, for systems of supply for cathode-ray tubes; subclasses 3+ for cathode-ray tubes structure combined with a circuit element; subclasses 32+ for electric lamps and discharge devices structurally combined with a circuit element; subclasses 32+ for lightning arrestor structurally combined with a discharge device; subclasses 46+ for discharge devices having a lamp filament or heating resistance in shunt with the electrodes; subclass 49 for discharge devices having a lamp filament or heating resistance in series with the discharge electrodes; subclasses 76-363 for systems of supply for electric lamps and gas or vapor type discharge devices; and subclasses 364+ for resting electric lamps or discharge devices.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 3+ and 32+ provide for discharge devices and lamps which have a circuit element (e.g., switch, impedance, etc..) structurally combined with the lamp or discharge device, see subclasses 3+ where the discharge device is a cathode-ray tube. The circuit element may be within the base of the lamp or discharge device or within the enclosing envelope of the lamp or discharge device. (See Lines With Other Classes and Within This Class, “Lamps And Discharge Devices Having A Circuit Element” above).
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 46+ and 49 provide for the combination of a discharge device and a filamentary lamp which are structurally combined in a single unitary structure and where the lamp filament is in circuit relation with the electrodes of the discharge device. See subclasses 46+ where the lamp filament is connected in shunt with the discharge electrodes and sub-

- classes 409 and 410 where the lamp filament is connected in series with the discharge electrodes. (Lines With Other Classes and Within This Class, "Discharge Devices Structurally Combined With/In Circuit Relation With Incandescent Lamps").
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 46+ and 49 provide for discharge devices which include an electric heater (e.g., the cathode heater filament for an indirectly heated cathode, or other heater) which is connected in circuit relationship with the discharge electrodes. See subclasses 46+ where the heater is connected in shunt to the discharge electrodes and subclass 49 where the heater is in series with the discharge electrodes. Not included in Class 313 in accordance with the line stated in this section are discharge devices having a directly heated or filamentary cathode which is necessarily in series with the discharge electrodes. (Lines With Other Classes and Within This Class, "Discharge Devices With Cathode Heater Or Other Structurally Combined Heater In Circuit Relation")
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 32+ for lightning arrestors having a space discharge device and circuit impedance element structurally combined to make an integral unit. (Lines With Other Classes and Within This Class, "Insulators With Arcing Devices," the excluded types of lightning arresters.)
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 1 through 11, 12.1, 13.1-17, and 364-410 for miscellaneous systems for supplying electric current and/or potential to a cathode-ray tube, subclasses 3+ and 32+ for electric lamp and discharge devices which have a circuit element structurally combined with the lamp or discharge device, subclasses 76 to 363 for miscellaneous systems for supplying electric current and/or potential to electric lamps, and to discharge devices of the gas or vapor type, and subclass 411 for power supplies utilizing the magnetic energy of an output transformer of a cathode ray deflection circuit. (Lines With Other Classes and Within This Class, "Gas Pumps And Fans, Lamp And Discharge Device Systems," for discharge devices and lamp systems.)
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 364+ is the generic place for testing electric lamps or discharge devices.
- 327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems," appropriate subclasses for miscellaneous systems employing space discharge active element devices. (Lines With Other Classes and Within This Class, "Gas Pumps And Fans, Lamp And Discharge Device Systems," for discharge devices and lamp systems.)
- 331, Oscillators, subclass 5 for magnetron oscillator with automatic frequency stabilization; subclasses 6+ for Klystron oscillator with automatic frequency stabilization; subclass 78 for electric noise generators using gas tubes; subclasses 79+ for beam tube oscillators; subclass 98 for oscillators using disk seal tube; subclasses 126+ for oscillator using gaseous space discharge device; and subclass 184 for oscillator using unique space discharge device.
- 331, Oscillators, appropriate subclasses for electrical oscillators utilizing space discharge devices of particular construction, especially subclasses 6+ and 79+ for beam tube oscillators, subclasses 5 and 86+ for magnetron type oscillators, subclasses 78 and 126+ for gaseous space discharge type oscillators, subclass 98 for oscillators utilizing disk seal tubes enclosed by distributed parameter resonators, and subclass 184 for oscillators utilizing a space discharge device of particular construction. (Lines With Other Classes and Within This Class, "Gas Pumps And Fans, Lamp And Discharge Device Systems," for discharge devices and lamp systems.)
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 210+ provides for electromagnets designed for use with electric lamps and discharge devices. Such magnets include those used with the cathode-ray tubes classified in subclasses 75+ of Class 313 to deflect the cathode ray beam, those used with the cathode ray tubes classified in subclasses 441+ to focus, concentrate or accelerate the cathode ray, and those used with the other discharge devices and lamps in subclasses 153+. (Lines With Other Classes and Within This Class, "Deflection And Focusing Magnet")
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 210+ for electromagnets for focusing and deflecting.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 28+ for combined thermal switches and lightning arrestors. (Lines With Other Classes and Within

- This Class, "Insulators With Arcing Devices," the excluded types of lightning arresters.)
- 338, Electrical Resistors, appropriate subclasses, for electrical resistors, per se. Some of the resistance elements in Class 338 are somewhat analogous to the filaments used in electric lamps and space discharge devices. Note that subclasses 500+ in Class 252 provides for electrically conductive or emissive compositions which include resistance defined solely by their composition.
- 347, Incremental Printing of Symbolic Information, subclasses 121+ and 226+ for cathode ray discharge devices provided with means for making a record of the trace of the cathode beam (usually means for impressing the beam upon a photographic film or means for impressing the trace made upon a fluorescent screen upon a photographic film) irrespective of whether the recording means is within or without the envelope of the cathode-ray device. (Lines With Other Classes and Within This Class, "Cathode Ray Oscillographs").
- 348, Television, subclasses 818+ for cathode-ray tubes of the signal receiving type and provided with a shield or envelope protective means. (Lines With Other Classes and Within This Class, "Combined With A Separable Casing, Jacket, Shield, Or Envelope Protective Means").
- 348, Television, subclasses 373+ and 825+ for cathode-ray tubes utilized in television systems and provided with a supporting means. (Lines With Other Classes and Within This Class, "Combined With A Support").
- 348, Television, subclasses 335+ and 832+ for cathode-ray tubes utilized in television systems and combined with an optical device. (Lines With Other Classes and Within This Class, "Combined With Optical Device or Having Special Ray Transparent Envelope etc.")
- 361, Electricity: Electrical Systems and Devices, subclasses 117+ for lightning arrester; and subclasses 271+ for condensers distinguished from discharge devices.
- 361, Electricity: Electrical Systems and Devices, subclasses 271+ for electric condensers, per se. (Lines With Other Classes and Within This Class, "Distinction Between Discharge Devices And Electric Condensers, etc.")
- 361, Electricity: Electrical Systems and Devices, subclasses 117+ for the lightning arresters generally. (Lines With Other Classes and Within
- This Class, "Insulators With Arcing Devices," the excluded types of lightning arresters.)
- 362, Illumination, where the second envelope wall is not integral with the lamp envelope, that is, it is removable therefrom; subclass 363 for means for surrounding a light source wherein said means is made of light pervious material. See Class 362 or one of the classes specified in the notes to that class. (Lines With Other Classes and Within This Class, G, "Combined With a Separable Casing, Jacket, Shield, or Envelope Protective Means").
- 362, Illumination, or one of the classes specified in the notes thereto, provides for all lamps including those of the discharge device type, which have a separable casing, jacket or enclosure about the lamp and which include means to modify the temperature of the lamp; see especially subclasses 294 and 373. (Lines With Other Classes and Within This Class, Temperature Modifying Means--With Enclosing Casing Or Jacket).
- 362, Illumination, or one of the classes specified in the notes to that class for lamps including discharge device lamps combined with a supporting means for the lamp (Lines With Other Classes and Within This Class, "Combined With A Support").
- 362, Illumination, or one of the classes specified in the notes thereto provides for all combinations of lamps including those of the discharge device type in combination with separable casing, jacket, shield or enclosure. (Lines With Other Classes and Within This Class, "Combined With A Separable Casing, Jacket, Shield, Or Envelope Protective Means").
- 362, Illumination, for lamps combined with a support; for lamps combined with a separable casing or jacket and having temperature modifying means; for lamps combined with a separable casing, jacket, shield or enclosure; for lamps with separable optical devices, light shade, light obscuring means, lamp protector or other illuminating devices; and subclass 84 for illuminating devices with a fluorescent or phosphorescent material. (Lines With Other Classes and Within This Class, "Fluorescent And Phosphorescent Coating And Compositions").
- 362, Illumination, or one of the classes specified in the notes thereto, provides for all lamps including those of the discharge device which have a separable optical device, light shade, light obscuring means, lamp protector or other illu-



- minating device combined therewith. In the art in Class 362, and the related classes specified in the notes thereto will be found devices such as lanterns, projectors, signal lights, etc., where the lamp may be readily replaced or changed without modifying or altering the structure of the electric lamp. The devices in Class 362 and the classes referred to in the notes thereto ordinarily include an electrical socket or other connector into which the lamp base is placed. (Lines With Other Classes and Within This Class, "Combined With Optical Device Or Having Special Ray Transparent Envelope, etc.")
- 376, Induced Nuclear Reactions: Processes, Systems, and Elements, appropriate subclasses, particular subclasses 156+ for processes of treating materials with ray energy within a nuclear reactor, or for processes and apparatus for carrying out nuclear changes by the use of ray or similar energy. See subclasses 100+ for fusion reactions and reactors and subclasses 347+ for fission reactions and reactors. (Lines With Other Classes and Within This Class, "Methods and Apparatus for Subjecting Objects, Articles and Materials to Ray Energy or Electrons or Ions Generated by Discharge Devices or Lamps," for such methods and apparatus.)
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 193+ for source supports, per se. ("Combined With A Separable Casing, Jacket, Shield, Or Envelope Protective Means").
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 91+ for electronic circuits; subclasses 119+ for sources; and subclasses 193+ for source supports. ("X-ray Tubes And Targets").
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 91+ provides for systems for supplying electric current and/or potential to X-ray tubes. (Lines With Other Classes and Within This Class, "Gas Pumps And Fans, Lamp And Discharge Device Systems," for discharge devices and lamp systems.)
- 378, X-Ray or Gamma Ray Systems or Devices, appropriate subclasses for subjecting objects to X-rays or gamma rays. (Lines With Other Classes and Within This Class, "Methods and Apparatus for Subjecting Objects, Articles And Materials to Ray Energy or Electrons or Ions Generated by Discharge Devices or Lamps," for such methods and apparatus.)
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 119+ for sources, combined with supports. (Lines With Other Classes and Within This Class, "Combined With a Support").
- 392, Electric Resistance Heating Devices, subclasses 407+ provides for electrical heaters which include an electric lamp and a reflector, casing or other housing. See above for electric lamps provided with structure for holding a material to be heated. (Lines With Other Classes and Within This Class, "Combined With A Separable Casing, Jacket, Shield, Or Envelope Protective Means").
- 403, Joints and Connections, appropriate subclasses for a joint between a metal member and a glass or ceramic member. (Lines With Other Classes and Within This Class, "Bushings, Glass-to-Metal Seals and Lead-In Conductors").
- 403, Joints and Connections, appropriate subclasses for the joint between an envelope and its attached base where no structure of the envelope other than that providing for the joint is included. See References to Other Classes for other classes which provide for joints. (Lines With Other Classes and Within This Class, "With Attached Base").
- 403, Joints and Connections, is a class of joints of general application. See the search notes thereto for other classes which provide for joints or connections. (Lines With Other Classes and Within This Class, "Electrodes Combined With Connector Structure")
- 417, Pumps, subclasses 48+ provides for pumps utilizing a space discharge. See subclass 49 of Class 417 for a statement of the line. (Lines With Other Classes and Within This Class, "Gas Pumps And Fans")
- 417, Pumps, subclasses 48+ for electrical or getter-type means. (Lines With Other Classes and Within This Class, "Getters And Gas or Vapor Generating Materials").
- 420, Alloys or Metallic Compositions, appropriate subclasses for metal strands, filaments or wire made of alloys or single metals. (Lines With Other Classes and Within This Class, "Coated Electrodes Or Shields And Compositions")
- 423, Chemistry of Inorganic Compounds, subclasses 445+ provides for carbon, per se, and carbon articles defined solely in terms of the material from which they are made. (Lines With Other Classes and Within This Class,

- “Coated Electrodes or Shields And Compositions”).
- 427, Coating Processes, subclasses 58+ for processes of coating, per se, wherein the product is an electrical product. (Lines With Other Classes and Within This Class, “Methods And Apparatus For Manufacturing Electrodes”)
- 427, Coating Processes, subclasses 64+ for coating processes, per se, wherein the product is an electrical product with a fluorescent or phosphorescent base or coating. (Lines With Other Classes and Within This Class, “Fluorescent And Phosphorescent Coating And Compositions”).
- 427, Coating Processes, subclasses 58+ for processes of coating, per se, wherein the product is an electrical product. (Lines With Other Classes and Within This Class, “Coated Electrodes or Shields And Compositions”).
- 428, Stock Material or Miscellaneous Articles, subclasses 34.1+ for hollow articles (e.g., lamp bulbs) with a coating thereon; subclasses 426+ for laminated glass structure; subclasses 913 and 917 for phosphorescent, fluorescent, and electroluminescent; and subclasses 375+ for coated conductors or conductors or emitters or electrodes with emissive coatings thereon.
- 428, Stock Material or Miscellaneous Articles, subclasses 544+ is the generic place for all metal or adjacent metals containing materials not elsewhere classified. (Lines With Other Classes and Within This Class, “Bushings, Glass-to-Metal Seals and Lead-In Conductors”).
- 428, Stock Material or Miscellaneous Articles, subclasses 375+ and 544+ provide for a rod, strand, fiber or filament with a coating thereon, which coated products may be electron emissive or miscellaneous conductors such as metal rods, wires or filaments with various coating thereon, including insulating coatings and also for electrodes which are merely composite laminates defined in terms of the composition of the components. (Lines With Other Classes and Within This Class, “Coated Electrodes or Shields And Compositions”).
- 428, Stock Material or Miscellaneous Articles, subclasses 34.1+ for a hollow or container type article (e.g., lamp bulb) defined only as a base with a coating thereon, subclasses 426+ for a nonstructural composite web or sheet including a layer of glass, and subclasses 913 and 917 (cross-reference art collections) for a product which is responsive to light (e.g., fluorescent or phosphorescent) and a product which is electro-luminescent. (Lines With Other Classes and Within This Class, “Defined Only By Composition”).
- 431, Combustion, subclasses 358+ for flash lamps in which a solid fuel is burned and which have electric igniting means for initiating combustion of the fuel, e.g., “photoflash bulbs”. The distinction between a photoflash bulb found in Class 431, Combustion, subclasses 358+ and an electric lamp is that in the photoflash bulb there is a solid fuel usually aluminum or magnesium foil and an electric filament for igniting the foil so that the foil burns and the light is due to the combustion of the foil. In other types of photoflash bulbs the filament is made of a material which burns and the light is due to the combustion of the filament. In an incandescent electric lamp the light is due only to the heat generated by the current passing through the filament and the filament is not intended to be burned. The lamp ordinarily is provided with a noncombustible gas or a vacuum to prevent combustion of the filament while the devices in Class 431 are provided with an atmosphere of combustible gas.
- 439, Electrical Connectors, appropriate subclass providing for the electrical connector structure. For example, where an electrode is composed of two rod-like portions and one portion is provided with a hollow screw threaded socket and the other is provided with the screw threaded end to fit into the socket, the patent is classified elsewhere. However, if the structure includes means such as a portion of higher electrical conductivity to insure good electrical contact between the portions, the patent would be classified in Class 439. (Lines With Other Classes and Within This Class, M, Electrodes And Shields).
- 439, Electrical Connectors, for device with separable electrical connector, for device with electrical connector and for electrode with connector structure; and for electrode and shield with joint between parts; subclasses 607+ for connector with anti-inductive shield; and subclasses 611+ for connector having vitreous envelope secured thereto.
- 439, Electrical Connectors, provides for an electrical connector, per se. Also included in that class is a combination not provided for elsewhere, or of such nature as to be best grouped with the electrical connector. For example, a “named” lamp combined with a specific con-

- nector is included in Class 439. The reference to a “filament” or to the support structure is considered to make a claimed lamp “significant” whereas a reference to the “envelope” is not considered to be more than naming of the lamp. Further examples, included in Class 439 is the combination of an electrical lamp base with an “incandescent” lamp, a “fluorescent” lamp, or a “gas filled” lamp, provided that there is no claimed reference to other illuminating portions of the lamp. Reference to the particular shape of the envelope will not exclude placement of a patent from Class 439 if no structure is recited which limits the envelope to use with a lamp or discharge device. (Lines With Other Classes and Within This Class, “Lamps And Discharge Devices Combined With A Separable Electric Connector”).
- 439, Electrical Connectors, provides for a device having significant electrical connector structure combined with named other structure or with such other structure as is not provided for elsewhere. See the discussion above. See especially subclasses 611+ for the combination of an electrical connector with a vitreous envelope secured thereto. (Lines With Other Classes and Within This Class, “Lamps And Discharge Devices Which Include Electrical Connector Structure”).
- 439, Electrical Connectors, provides for a device having electrical connector structure where no significant structure for the device is recited other than that necessary to provide for or to cooperate with electrical connector structure. Class 439 includes an electrode for an electric lamp or space discharge device where the only structure of the electrode recited is that necessary to provide for or to cooperate with electrical connector structure; see subclasses 607+ for the combination of an electrical connector and means to shield the connector portions from radiating electromagnetic waves for which see. (Lines With Other Classes and Within This Class, “Electrodes Combined With Connector Structure”).
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, is the generic place for a process or an apparatus for manufacturing an electric lamp, a discharge device, an electrode or another part thereof. The search notes for Class 445 should be consulted as to the other classes and subclasses which provide for processes or apparatus used in manufacture an electric lamp, discharge device or a part thereof; see subclass 2 for a process which is limited to use in repairing or reconditioning a lamp or discharge device, or to use in salvaging one or more parts of a lamp or discharge device; subclass 61 provides for the corresponding apparatus. (Lines With Other Classes and Within This Class, “Methods, Apparatus For Manufacturing/Repairing Electric Lamps or Discharge Devices or Salvaging Parts”).
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 35+ for methods of manufacturing electrodes; and subclasses 46+ for methods of manufacturing electrodes.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, is the generic place for methods and apparatus for manufacturing electrodes for electric lamps and discharge devices. See subclasses 35+ and 46+ for the processes of making electrodes. See the search notes to these subclasses for the classes which provide for either process or apparatus for manufacturing electrodes. (Lines With Other Classes and Within This Class, “Methods and Apparatus For Manufacturing Electrodes.”)
- 501, Compositions: Ceramic, subclasses 11+ for lamp and space discharge device envelopes defined only as being made of glass compositions and for glass compositions, per se. (Lines With Other Classes and Within This Class, “Defined Only By Composition”).

## SECTION V - GLOSSARY

### ANODES

An electrode which acts as the positive terminal of the discharge or which acts as the positive terminal of an electric field to cause a discharge or accelerate the electrons in a discharge. See the definition of cathode above, and the definition of control electrode below.

### ANTI-CATHODE

Same as “target” or anode. Used in reference to X-ray tube anodes.

### AUXILIARY STARTING ELECTRODE

An electrode designed for use in a discharge device having at least two principal discharge electrodes and the auxiliary starting electrode. The starting electrode is

designed to be connected in the circuit so that the discharge is initiated between it and one of the principal electrodes, the auxiliary discharge conditioning the discharge space so that a discharge between the principal electrodes can be established. An auxiliary starting electrode does not necessarily differ in structure or material from any other electrode. Auxiliary starting electrodes are usually simple electrodes, a wire or rod, and are usually not formed from as heavy or strong material as the principal electrodes. Usually an auxiliary starting electrode is placed close to a principal electrode so that the discharge may be initiated between the auxiliary starting electrode and the main electrode at a smaller voltage than is necessary to initiate the discharge between the principal electrodes. The auxiliary starting electrode may be supplied with current only during the starting period or it may be supplied with current during the operation of the device so that a continuous discharge takes place between it and one of the principal electrodes to assure ionization in the discharge space so that the discharge between the principal electrodes may take place at the proper time. The latter type of auxiliary starting electrodes are also known as "holding electrodes". Where a plurality of auxiliary starting electrodes are used, they may be spaced at intervals between the principal electrodes so that the discharge may first be established between one principal electrode and the nearer auxiliary starting electrode, then to a more remote auxiliary starting electrode and so on until the discharge is established between the principal electrodes. If a plurality of auxiliary starting electrodes are used, one may be placed close to each of a plurality of principal electrodes. In as much as the determination of whether or not an electrode is an auxiliary starting electrode depends upon the circuit connections to the discharge device, and this class includes only the structure of the discharge device, per se, only in subclasses 170+ (liquid electrode discharge devices) and subclasses 596+ and 601+ (gas or vapor-type discharge devices) is the classification based upon one of the electrodes being an auxiliary starting electrode.

#### BASE

A member attached to the lamp or discharge device so that it may be attached to a supporting socket or supported on a surface. The base usually includes electrical connector means for connecting the lamp or discharge device in a circuit. Where the lamp or discharge device is provided with an envelope, the base is usually attached to the envelope, as by cementing, or the envelope is formed so as to have an integral base portion.

#### CASING

A container or enclosure for a lamp or discharge device, or a part thereof. See Envelope above.

#### CATHODE

An electrode which acts as the negative device. In some discharge devices, such as spark gaps, there is no difference in structure between the cathode and anode. Consequently, the use of the words "cathode" and "anode" have been avoided except where there is some significance in structure between the two electrodes.

#### CATHODE RAY DEVICE

A discharge device having means for forming the electric discharge into a restricted beam or ray, usually pencil-like.

#### CATHANODE

An electrode designed to serve as an anode with respect to a cathode and to be heated by the discharge so that another surface of the electrode emits electrons to a second anode. See subclass 305 for discharge devices having a cathanode.

#### CONTROL ELECTRODE

An electrode designed to influence or control the discharge current flowing between other electrodes. It may depend for its effect on either its electro-static effect or on the current flow thereto. The most common type of control electrode is the control grid. Since, however, the grid may be used as an anode, and the anode as a grid in many types of discharge devices, the use of the expression "control electrode" has been avoided where possible and similar structures placed together irrespective of whether the disclosure indicated that the grid electrode is to be used as an anode or control electrode. Patents relating to discharge devices having one or more grid electrodes interposed between a cathode and an anode are classified in subclasses 293+ or in the subclasses referred to in the notes to these subclasses. See subclass 308 and the subclasses referred to in the notes thereto for other discharge devices having a control electrode.

#### DIRECTLY HEATED CATHODE:

A filament designed to have its terminals connected to a source of current, the filament being heated by the current passing through it.

#### ELECTRIC LAMP

A device for converting electrical energy into visible light or ultraviolet light. Most lamps also generate infrared rays, but infrared ray generators are included only when they have structure analogous to electric lamps or electric space discharge devices. See the notes below. Electric lamps may be in the form of electric space discharge devices, for which see the next paragraph.

#### ELECTRIC SPACE DISCHARGE DEVICES

(the shorter expression "DISCHARGE DEVICES" is used in these definitions) Any device which is intended to have an electrical current flow between two spaced electrodes, at least part of the path followed by the discharge being constituted by a gas, vapor, or vacuum.

#### ELECTRODE

A filament or glower of an electric lamp or a member arranged to emit, and/or collect, and/or control the movement of electrons or ions in a discharge device.

#### EMISSIVE CATHODE

A low work function electrode.

#### ENVELOPE

A gas tight enclosure for an electric lamp or discharge device. It may be evacuated or filled with a gas or vapor. In general the distinction between an envelope and a mere jacket, casing or housing is that the envelope is sealed, so as to be gas tight.

#### FILAMENT

A wire, ribbon or rod conducting member. It may be made of metal or nonmetal. In this class filaments, per se, are classified in subclasses 341+ irrespective of whether the filament is to be used in a lamp or discharge device, and irrespective of whether the filament is to be heated by passing a current through the filament (directly heated cathode) or is to be heated by the discharge in a discharge device (see thermionic cathode).

#### FLUORESCENT OR PHOSPHORESCENT MATERIAL

A material which absorbs radiant energy of one wave length (e.g., light) and is excited thereby to cause it to emit radiant energy of another wave length (e.g., light of another wave length), or a material which is excitable by

the impact of electrons, ions, or analogous energy (e.g., gamma rays) thereon to emit light energy without becoming incandescent.

#### GAS OR VAPOR GENERATING MATERIAL

Solid or liquid material which is placed within the envelope and generates a gas or vapor by virtue of a chemical change, by volatilization, or by giving off an absorbed gas or vapor. It may do this during normal operation or it may be caused to do so by treatment preliminary to placing the device in operation.

#### GETTERS

Materials which, when used in closed containers, reduce the gas or vapor content of the container. A getter may react with the gas or vapor in the container to form a solid nonvaporizable material, or to adsorb or absorb the gas or vapor, or may reduce the amount of the gas or vapor in the container in any other way. The material may be a getter for one gas or vapor and may not have any effect upon another gas or vapor.

#### GLOWER

Any body made of a material which when heated by the passage of an electric current therethrough emits light rays. The term glower includes filaments and also includes other bodies which are not of filamentary dimensions such as, rods and bars made of second class conductors.

#### GRID ELECTRODE

An electrode having one or more apertures therein, usually formed of open-work material, such as wire mesh, perforated sheet material, or of wires or bars as of coiled wire, or other foraminous structure, and sometimes used as the control electrode in a discharge device. As pointed out in the definition of "control electrode" above, the terms "grid electrode" and "control electrode" are not synonymous in this class.

#### HEATED CATHODE

Either a directly heated cathode or an indirectly heated cathode.

#### HOLDING ELECTRODES

See the definition of auxiliary starting electrode above.

#### INCANDESCENT LAMP

Lamps which are provided with a filament or glower adapted to be heated to incandescence by the passage of an electric current therethrough.

#### INDIRECTLY-HEATED CATHODE (EQUIPOTENTIAL CATHODE)

A cathode designed to be heated to its emitting temperature by a separate heating element.

#### IONIC CATHODE

A virtual cathode formed by a discharge in a gas or vapor between two electrodes, the discharge serving to supply electrons to a third electrode. See subclass 588 for discharge devices having an ionic cathode.

#### JACKET

Same as casing above.

#### LEAD-IN

The conductor used to transmit electric current or potential from the exterior of the envelope or casing into the interior of the envelope or casing. Where the envelope is made of glass it usually consists of a conductor which passes through the wall of the envelope and which is sealed to the glass by a glass-to-metal seal.

#### LOW WORK FUNCTION ELECTRODE (COLD CATHODE, CATHODES CONTAINING OR COATED WITH ELECTRON EMISSIVE MATERIAL)

A cathode containing or coated with a material which readily emits electrons, i.e., a material which has a low work function. Examples of such materials are the alkali metals and their oxides, alkaline earth metals and their oxides, thorium, magnesium. The expression "low work function electrode" includes thermionic electrodes which contain or are coated with electron emissive material, photosensitive cathodes, secondary emissive cathodes as well as cathodes which emit electrons without being heated.

#### PHOTO-CELLS

A device to be used in an electrical circuit which is provided with means responsive to light or analogous rays for altering the operation of the device. The only photo-cells included in this class are photosensitive discharge devices and photosensitive electric lamps.

#### PHOTO-SENSITIVE

A device provided with means sensitive to light or analogous rays for altering the operation of the device.

#### PHOTO-SENSITIVE CATHODE

An electrode which emits electrons when subjected to the action of light or analogous rays. Discharge devices having a photosensitive cathode or other photosensitive electrode are classified in subclasses 523+ in this class. See photosensitive electrode above. See the class definition for the classification of photosensitive cathodes, per se.

#### PHOTO-SENSITIVE ELECTRODE

An electrode which has its electrical properties changed by the action of light or analogous ray energy. The ray energy may be X-rays, ultraviolet rays, infrared rays, or any analogous radiation. See the class definition for the classification of photosensitive electrodes, per se.

#### PYRO-ELECTRIC LAMP

An electric lamp which has as the light emitting body a material which is a second class conductor. The lamps are designed to have the pyro-electric body heated by a separate source until the pyro-electric material becomes conductive and then the current flow through the pyro-electric body maintains the second class conductor material at a temperature at which it emits light.

#### SECOND CLASS CONDUCTORS

A material having a very high electrical resistance at ordinary temperatures and a low resistance when heated. Glowers formed of oxides, such as  $\text{Th}^2$  or the rare earth oxides, used in the pyro-electric (e.g., Nernst) type of incandescent lamp are examples of second class conductors.

#### SECONDARY EMISSIVE CATHODE

A cathode designed to emit electrons by virtue of the impact by electrons upon the electron emissive surface. See the class definition for the classification of secondary emissive cathodes, per se. See cathode below.

#### SHIELDS

Structures used in lamps and discharge devices to mod-

ify the electrical characteristics thereof, or structures which are used to protect the lamp or discharge device from external influences, or structures which are used to protect parts of the device from influences, such as electron bombardment, originating in another part of the device, and other structures used for protective purposes. Shields do not include mere electrodes even though the electrode is defined as being a shielding electrode. Where an electrode of a discharge device is provided with shielding structure in addition to the structure provided for influencing the electric space discharge, such additional structure is considered to be shielding structure. Examples of such additional shielding are where an indirectly heated cathode is provided with a flange for shielding the discharge space from the influence of the cathode heater current, or where an anode, grid, or lead wire is provided with shielding means to shield the lead-in wires from the effects of electrostatic fields. Metal or conductive envelopes for discharge devices are not considered to be shields where the envelope is designed to function as an electrode of the discharge device, such as an anode. Where the metal or conductive envelope is disclosed as being provided for shielding purposes and not an electrode, the envelope is considered to be a shield.

#### SPARK PLUG

A unitary spark gap having a plurality of insulated electrodes arranged out of contact with each other so that the space discharge is a "jump spark" and usually having a shell or sleeve designed to be attached to an opening in an internal combustion engine or other device, the shell or sleeve carrying one or more electrodes within it which are insulated from the shell or sleeve by an insulating bushing or other insulation. The shell or sleeve often carries an electrode which cooperates with the other insulated electrode to form the jump-spark gap. Included are the devices known as spark plugs usually used on the ordinary automotive internal combustion engine. Also included are spark plugs for other uses which are similar in structure. It does not include ignitors where the spark is made by moving the electrodes into contact and then separating them to draw the spark. It does not include ignitors which are not similar in structure to the automobile spark plug even if they are of the jump spark type. Spark plugs having only a single electrode which are designed to be used with some other device, as the cylinder head, so as to form a jump spark therewith are also excluded.

#### TARGET

In an X-ray tube, cathode-ray tube, or other beam type

discharge device, the anode or the member against which the principal electron or ion stream impinges. See the definition of anode above.

#### THERMIONIC CATHODE

A cathode designed to operate at an elevated temperature. The expression, "thermionic cathode" includes directly heated cathodes, indirectly heated cathodes, and also cathodes which are designed to be heated by ionic bombardment to the electron emitting temperature.

#### THREE OR MORE ELECTRODE DISCHARGE DEVICES

Any discharge device having three or more electrodes whether all of the electrodes have lead-wires for connection to the supply circuit or not. In some of the three or more electrode discharge devices, the electrodes are arranged with one or more electrodes disposed in the interelectrode space or in the discharge path between two other electrodes, and have only the outer electrodes provided with lead-wires for connecting to the supply circuit, the discharge passing from the outer electrodes to the interposed electrode so that the discharge device has a plurality of series connected discharge spaces.

#### X-RAY TUBE

A discharge device designed to generate X-rays.

#### SUBCLASSES

**1** This subclass is indented under the class definition. Subject matter wherein the plurality of electric lamps or discharge devices or an electric lamp and a discharge device are structurally combined in a single device to form a single unitary device.

- (1) Note. This or the indented subclasses do not include the following subject matter even though such subject matter is within the subclass definition: (a) An incandescent lamp having a plurality of filaments or glowers all within the same envelope is not included in this or the indented subclasses but will be found in subclass 316 below, or in one of the subclasses specified in the search notes of that subclass; (b) Structural combinations of an incandescent lamp and a discharge device where the filament of the lamp is connected in shunt with the dis-

charge electrodes of the discharge device. See Class 315, Electric Lamp and Discharge Devices: Systems, subclasses 46+ for this subject matter; (c) Structural combinations of an incandescent lamp and a discharge device where the lamp filament is connected in series with the discharge electrodes of the discharge device. See Class 315, Electric Lamp and Discharge Devices: Systems, subclass 49 for this subject matter; (d) Structural combinations consisting of a firing gap of a spark plug, and an intensifier gap connected in series therewith, see subclasses 123+ for this subject matter.

- (2) Note. In many of the devices in this and the indented subclasses the plurality of devices are enclosed within the same envelope.
- (3) Note. Where the subject matter includes a plurality of discharge devices which are structurally combined, to be classified in this or the indented subclasses there must not be a common electrode for the plurality of discharge devices. For example, discharge devices having a single cathode and a plurality of anodes which cooperate with the single cathode are excluded from this and the indented subclasses even though the disclosure states that the device may be used in place of a plurality of discharge device. Included in this and the indented subclasses are structural combinations of plural discharge devices and lamps or a discharge device and a lamp where there is an interelectrode connection between the electrodes of the different devices.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

306, and the subclasses specified in the notes thereto for discharge devices which are provided with a plurality of anodes and/or cathodes. Included in subclasses 306+ are space discharge devices having a plurality of similar gaps connected in series, such as for example, a row of spaced sphere electrodes in which a discharge takes place along the length of the row.

**SEE OR SEARCH CLASS:**

- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 7+, for the combination of a consumable electrode discharge device (e.g., an arc lamp or similar device having means for feeding the electrodes together as they are consumed) and another type of discharge device or electric lamp.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 3+, 32, 35+, and 64+ for the structural combination of a plurality of discharge devices, or lamps, or a discharge device and a lamp where the structural combination includes a circuit element (e.g., switch, impedance, etc.), see subclasses 3+ where one of the devices is a cathode-ray tube, subclass 32 where the combination includes a lamp and a discharge device, subclasses 35+ where the combination includes a plurality of discharge devices, and subclasses 64+ where the combination includes a plurality of lamp filaments (multifilament lamps). In the devices in Class 315, the circuit element may be connected between electrodes of different ones of the combined devices, or to an electrode of one of the devices, or not connected to any of the combined devices but be merely mounted in the envelope, base or other part of the unitary device. For the structural combinations of incandescent lamps and discharge devices connected in circuit relation, which are classified in Class 315, see (1) Note, parts b and c, above.
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 9, 92 and 193+ for plural source systems or devices.

**2.1 Cathode-ray tube:**

This subclass is indented under subclass 1. Subject matter in which one of the devices is a cathode-ray generating device.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

364+, for cathode ray devices, per se.



## SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclasses 3+ for devices which include the structural combination of a plurality of cathode-ray tubes and which have a circuit element (e.g., switch, inductance, condensers, resistances, etc.) structurally combined therewith. See especially subclasses 5.14+ for cathode-ray tube circuits wherein a plurality of rays pass through or in a hollow distributed parameter device, such as a wave guide, cavity resonator, or coaxial line; and subclasses 5.16+, 5.27, 5.28, and 5.39+ for cathode-ray tube system including a plurality of hollow distributed parameter devices having a cathode ray passing through or in. See subclass 9 for systems for supplying electric current and/or potential to a plurality of cathode-ray tubes.
- 378, X-Ray or Gamma Ray Systems or Devices, subclass 92 for the structural combination of a plurality of X-ray tubes and a circuit element which is combined therewith.

- 3** This subclass is indented under subclass 1. Subject matter in which one electrode of one of the devices is electrically connected to an electrode of another of the devices.

- (1) Note. Excluded from this subclass and class are structural combinations of a discharge device and an incandescent lamp where the lamp filament is connected either in series or in shunt relation with the discharge electrodes. The excluded devices will be found in Class 315, Electric Lamp and Discharge Devices: Systems, subclasses 46+ where the filament is connected in shunt relation to the discharge electrodes and in subclass 49 where the filament is connected in series relation with the discharge electrodes.
- (2) Note. If the connection between the electrodes includes a circuit element such as a resistor, capacitor, inductance, switch, or the like the combination is not classified in this class but in Class 315.

The devices in this subclass have a conductive connection but no more.

## SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, (see (1) Note) above, and subclasses 3+, 32+, 35+, 64+ for the structural combination of a plurality of discharge devices, or lamps, or a discharge device and a lamp where the structural combination includes a circuit element (e.g., switch, impedance, etc.), connected between electrodes of different ones of such devices. See the notes to subclass 1 for the subclasses which provide for the different types of devices.

- 5** This subclass is indented under subclass 1. Subject matter in which one of the structurally combined devices is a discharge device with a control electrode.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 308, and the subclasses specified in the notes thereto for other discharge devices which are provided with a control electrode.

- 6** This subclass is indented under subclass 5. Subject matter which includes a plurality of discharge devices each having a control electrode.

## SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclasses 3+ and 35+ where the structural combination also includes a circuit element (e.g., switch, impedance, etc.), see subclasses 3+ where the devices are cathode-ray tubes and subclasses 35+ for other plural discharge devices.

- 7** This subclass is indented under the class definition. Subject matter where the lamp or discharge device is provided with an envelope and has an evacuating pump connected to the envelope for evacuating the envelope.

- (1) Note. In the devices in this subclass the evacuating pump is designed for connection to the lamp or discharge device dur-

ing the use of the lamp or discharge device. Where the arrangement is only for use during the manufacturing of the lamp or discharge device see the reference to Class 226 below.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

549+, for devices under the class definition provided with envelopes and having a getter, a gas or vapor generating means or a pressure regulating means associated therewith.

**SEE OR SEARCH CLASS:**

53, Package Making, subclasses 79+ and 403+ for methods of and apparatus for gas filling and/or evacuating receptacles combined with closing including lamps and discharge devices, and see the Notes to subclass 403 for the disposition of related art.

141, Fluent Material Handling, With Receiver or Receiver Coating Means, subclasses 4, 8 and 65+ for methods of and apparatus for inducing a gas or vapor into or evacuating the envelope of an electric lamp or space discharge device.

315, Electric Lamp and Discharge Devices: Systems, subclasses 108+ for electric lamp or a gas or vapor type discharge device systems where the lamp or discharge device is provided with means for regulating the pressure within the envelope of the device and the system includes means to supply electrical energy to the lamp or discharge device or to control the pressure regulating means.

378, X-Ray or Gamma Ray Systems or Devices, subclass 123 for X-ray tube systems where the X-ray tube is provided with means for controlling the pressure within the envelope of the tube.

417, Pumps, appropriate subclasses for miscellaneous evacuating pumps.

**8** This subclass is indented under the class definition. Discharge devices which have a body other than an electrode, placed adjacent to the discharge space and which is designed to be

heated to incandescence by the space discharge.

(1) Note. The body which is designed to be heated to incandescence is not designed to be connected into the circuit in any way but is only a light emitting body.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

305, and the subclasses specified in the notes to the definitions of that subclass for discharge devices which have an electrode designed to be heated by the discharge, including devices having cathanodes.

**9** This subclass is indented under the class definition. Devices having a filament and an additional body other than an electrode designed to be heated to incandescence by the filament.

(1) Note. The body designed to be heated to incandescence is not designed to be connected in the circuit in anyway but is designed only to be a light emitting body.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

14, for pyroelectric type electric lamps which include a body designed to be heated from a separate source such as an electric filament. The body being a second class conductor and being connected in the circuit so that when heated it will conduct electric current and be heated by the current flowing through it.

305+, and the subclasses specified in the notes thereto for discharge devices which have an electrode which is designed to be heated to incandescence by the electric space discharge between the cathode and the electrode.

**10** This subclass is indented under the class definition. Subject matter where the lamp or discharge device is provided with means to indicate the temperature of some part of the device.

## SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, subclasses 100+ for temperature measurement, per se.

**11** This subclass is indented under the class definition. Subject matter where a lamp, discharge device or an electrode therefor is provided with means or is combined with means for modifying the temperature of the device, the electrode, or some other part thereof.

(1) Note. Neither this nor any of the indented subclasses provide for electric lamps including those of the discharge device type, photosensitive discharge devices nor generators of invisible radiation such as X-ray tubes, ultraviolet ray generators in combination with a separable casing for the lamp or device which is provided with means for modifying the temperature of the lamp or device. See the class definition for the classes which provide for the excluded subject matter.

(2) Note. Indented subclass 26 provides for discharge devices and lamps which are provided with an envelope formed of two spaced apart integral walls, the space between the walls being evacuated, gas filled, or otherwise containing means to modify the temperature of the lamp or discharge device. See the class definition for the classification of double wall envelopes, per se.

(3) Note. Discharge devices and lamps provided only with directly heated filaments, indirectly heated cathodes or other types of thermionic cathodes, are not included in this or the indented subclasses. This and the indented subclasses provide only for lamps and discharge devices which have means in addition to the filament or cathode for modifying the temperature of the lamp or discharge device. Note that discharge devices having liquid electrodes (e.g., mercury vapor device) and electric heaters therefor are in subclass 16 and discharge devices having liquid electrodes and

other types of temperature modifiers for the liquid electrode are in subclass 29.

(4) Note. See the class definition for other classes which provide for the miscellaneous heat transfer apparatus such as envelopes and casings for lamps or discharge devices with temperature modifying means.

(5) Note. Discharge devices and lamps having a movable electrode actuated by a thermally responsive means such as a thermostat, with or without a heating means for the thermally actuated moving means, are not classified in this and indented subclasses, but are found in subclass 151.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

151, see (5) Note above.

## SEE OR SEARCH CLASS:

314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 26+ for consumable electrode discharge devices provided with temperature modifying means and the electrical systems therefor.

315, Electric Lamp and Discharge Devices: Systems, subclass 50 for electric lamps and discharge devices which are provided with means for modifying the temperature of at least part of the lamp or discharge device, the temperature modifying means being either combined with or forming an electrical impedance element. In subclass 50, of Class 315 will be found, for example, discharge devices which are provided with means to conduct a cooling fluid to the discharge device where the conduits for conducting the cooling fluid are arranged to form a high resistance path between a discharge device and the source of cooling fluid. See subclasses 112+ and the subclasses specified in the notes to those subclasses for electric lamp and discharge device systems wherein the lamp or discharge device is provided with means for modifying its temperature and the

system includes means to supply current to the lamp or discharge device or to control the temperature modifying means.

**11.5** This subclass is indented under subclass 11. Unitary devices known as spark plugs.

- (1) Note. See the glossary of this class definition, for a definition of spark plugs. In general, the spark plugs classified herein are the jump-spark type found in the gasoline engine of an automobile.
- (2) Note. This subclass contains patents relating to spark plugs where the temperature modification of some part of the plug is material. If the plug is provided with gaskets or joints are of high or low heat conductivity, the patent would be included. A plug having gaskets or joints formed of particular materials would be classified in subclasses 144+ if it was not stated the materials were selected for their temperature modification properties.
- (3) Note. Preheating of the gas charge (before the spark jumps) by heat left in the spark plug from a previous explosion stroke cycle is not basis for classification in this subclass unless such preheating is accomplished by means which are especially provided to alter the temperature of the spark plug.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 120, for spark plugs having means to feed a fluid, such as priming fluid or air, where there is no disclosure that the temperature of the spark plug is affected by the fluid feed.
- 126, for spark plugs having means to move an electrode in response to a thermal change and having no means to influence the thermal characteristics of the spark plug.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 15.3 and 152 for spark plug type electrical bushings (a spark plug with no sparking elec-

trodes claimed) having temperature modifying means. See subclass 15.3 where the bushing is combined with means for feeding, circulating or distributing a temperature modifying fluid.

- 439, Electrical Connectors, subclasses 190+ and 485+ for an electrical connector, including the spark plug type, with temperature modifying means.

**12** This subclass is indented under subclass 11. Subject matter in which the temperature modifying means includes a closed path for circulating the temperature modifying means from the lamp or discharge device to a heat exchange means and then back to the lamp or discharge device to again modify the temperature of the lamp or discharge device.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclasses 104.11+ recirculating heat exchange system of general application.

**13** This subclass is indented under subclass 11. Subject matter in which a control means is provided for controlling the operation of the temperature modifying means.

- (1) Note. Included in this subclass are discharge devices in casings provided with apertures which are controlled by thermostatic means so as to regulate the amount of cooling air which flows over the discharge device. If the thermostatic means controls an electric circuit which in turn controls an electric circuit which in turn controls electrical means for controlling the apertures, the patent is excluded from this class and will be found in Class 315. See the reference to class 315 below.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclasses 279+ for miscellaneous heat exchange apparatus provided with automatic control means.
- 236, Automatic Temperature and Humidity Regulation, appropriate subclasses for automatic temperature regulation, per se.

- 315, Electric Lamp and Discharge Devices: Systems, subclass 117 and the subclasses specified in the notes thereto for discharge devices and lamps which are provided with temperature modifying means and which include electrical circuit means for controlling the operation of the temperature modifying means.
- 14** This subclass is indented under subclass 11. Subject matter having a glower formed of a second class conductor designed for connection into an electrical circuit, and having means for heating the glower to render it conductive.
- (1) Note. The devices in this subclass are mostly pyroelectric lamps.
- (2) Note. See "Glossary" in the class definition for a definition of second class conductor, glower, pyroelectric lamps.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 9, for devices under class definition which include a filament and a body not designed to be connected into an electrical circuit which is heated to incandescence by the filament.
- 326+, for the structure of pyroelectric glowers, per se.
- SEE OR SEARCH CLASS:
- 252, Compositions, subclasses 500+ for pyroelectric glower compositions.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 115+ for pyroelectric lamp systems having an electric heater for the glower and circuit means for controlling or supplying electric current to the glower or the heater element, and subclass 359 for miscellaneous systems for supplying electric current to pyroelectric lamps.
- 338, Electrical Resistors, subclasses 25+ for electrical resistors whose resistance value is responsive to a change in ambient temperature.
- 15** This subclass is indented under subclass 11. Subject matter in which the temperature modifier is an electric heater.
- (1) Note. This subclass does not include lamps or discharge devices where the only heating means for the lamp or discharge device is a light emitting filament, a directly heated or indirectly heated cathode or other thermionic cathode or where the heating means is a means for heating a gas or vapor generating material (e.g., a getter). See subclasses 549+ for the discharge devices and lamps with electric heating means for a gas or vapor generating material.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 14, where the lamp is a pyroelectric lamp and is provided with an electric heater to heat the glower.
- SEE OR SEARCH CLASS:
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 115+ for electric lamp and discharge device systems where the lamp or discharge device is provided with an electrical heater to modify the temperature of the lamp or discharge device and the system includes means to control or supply current to the heater or the lamp or discharge device.
- 16** This subclass is indented under subclass 15. Subject matter in which the lamp or discharge device is provided with a liquid electrode and the electric heater is provided to heat the liquid electrode.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 29, for other devices under subclass 11 having liquid electrode and having temperature modifying means for the liquid electrode.
- 163+, for other liquid electrode discharge devices.
- SEE OR SEARCH CLASS:
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 115+ for lamp and discharge device systems where the lamp or discharge device is provided with a liquid electrode and an electric heater therefor,

the system including means to control or to supply current to the heater or to the lamp or discharge device.

**17** This subclass is indented under subclass 11. Subject matter in which a lamp or discharge device is provided with a an integral spaced double walled envelope, and discharge devices which are provided with envelopes and in which the means for modifying the temperature of the discharge device includes a jacket or casing which encloses the envelope of the device or a portion thereof.

- (1) Note. Neither this nor any of the indented subclasses provide for electric lamps including those of the discharge device type, photosensitive discharge devices nor generators of invisible radiation such as X-ray tubes, ultraviolet ray generators in combination with a separable casing for the lamp or device which is provided with means for modifying the temperature of the lamp or device. See the class definition for the classes which provide for the excluded subject matter.
- (2) Note. The double-walled envelopes specified above includes only walls which are spaced apart. The double walled envelope may be provided with means for circulating a fluid between the spaced walls or the space between the walls may be evacuated, gas filled or filled with a heat insulating or transmitting material. See the class definition for the classification of double-wall envelopes, per se.
- (3) Note. The jacket or casing which encloses the discharge device or lamp must have its walls spaced from the envelope of the lamp or discharge device. Where the device is provided with a sleeve with heat exchange means such as radiating fins which fit over and into contact with the envelope of the device, the device is excluded from this and the indented subclass and will be found in subclass 44 below.
- (4) Note. Included as separable casings and jackets are structures formed of coiled

conduits which are designed to receive the discharge device and to transfer heat to or from the envelope of the discharge device.

- (5) Note. See the class definition for other classes which provide for the miscellaneous heat transfer apparatus such as envelopes and casings for lamps or discharge devices which are provided with temperature modifying means.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 44, see (3) Note, above.  
 312, and the subclasses specified in the notes thereto for devices under the class definition which are provided with an envelope and which have a casing or jacket for the envelope.  
 324, and the subclasses specified in the notes thereto for devices under the class definition which do not have an envelope but which have a casing or jacket for the device.

**SEE OR SEARCH CLASS:**

- 165, Heat Exchange, subclass 74 for a removable device to be heated or cooled projecting into a casing, and subclasses 154+ for coaxial enclosures.  
 215, Bottles and Jars, subclasses 12.1+ for receptacles of glass or other ceramic or similar materials, of the bottle, jar, or jug type, which are encased in a protective casing or jacket or having spaced walls.  
 220, Receptacles, subclasses 2.1+ for miscellaneous envelopes, casings and jackets designed for use with electric lamps, discharge devices and similar devices and subclasses 415+ for miscellaneous receptacles having double walls where the inner and outer walls are spaced apart, with or without intervening packing or insulation.  
 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 26+ for discharge devices of the consumable electrode type (e.g., arc lamps) which are provided with means for modifying the temperature of a portion of the device, the

temperature modifying means including a separable casing or jacket for a portion of the device.

- 18** This subclass is indented under subclass 17. Subject matter in which the envelope of the lamp or discharge device is provided with an integral double wall envelope made in whole or in part of electrically conductive material, and discharge devices which are provided with envelopes formed in whole or in part of electrically conductive material and in which the casing or jacket encloses the electrically conductive portion of the envelope or a portion thereof.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 44, for other lamps and discharge devices under subclass 11 which have a conductive envelope and which are provided with means for modifying the temperature of the envelope wall. Included in subclass 44 are discharge devices which are provided with a separable sleeve which fits about a portion of the envelope wall, the sleeve being provided with heat exchange means (e.g., radiating fins).
- 246+, for discharge devices which are provided with a conductive envelope portion (e.g., anode) and means to support one or more electrodes (e.g., cathode, grid) within the conductive envelope portion usually by means of the closure for the conductive envelope portion.
- 317+, for devices under the class definition having envelopes or a part thereof made of conductive material.

SEE OR SEARCH CLASS:

- 220, Receptacles, subclass 2.3 for envelopes for discharge devices and lamps which are made in whole or in part of conductive material.

- 19** This subclass is indented under subclass 18. Subject matter wherein the lamp or discharge device has a plurality of electrodes and means are provided for modifying the temperature of a plurality of the electrodes.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 23, for other lamps and discharge devices which are provided with a plurality of electrodes, a double wall jacket or casing for the envelope and means for circulating a fluid within the double wall envelope, casing, or jacket to modify the temperature of a plurality of the electrodes.
- 28, for other lamps and discharge devices which are provided with a plurality of electrodes, a double wall envelope or a casing or jacket for the envelope and means for modifying the temperature of a plurality of the electrodes.

- 20** This subclass is indented under subclass 18. Subject matter where the lamp or discharge device includes a temperature modifying baffle structure which extends across or into the envelope.

- (1) Note. In some of the devices in this subclass the baffle comprises a re-entrant portion of the envelope wall and the temperature modifying fluid may enter the re-entrant portion. In other of the devices, a heat transfer device, such as a radiator member for containing a heat transfer fluid, is enclosed within the envelope of the device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 33, for other lamps and discharge devices which do not have an enclosing casing or jacket and which have an internal temperature modifying baffle.
- 34, for lamps and discharge devices which do not have an enclosing casing or jacket where the envelope is provided with a condensing chamber or surface.

- 21** This subclass is indented under subclass 18. Subject matter in which the conductive envelope portion of the lamp or discharge device is cylindrical in form and is designed for use as one of the electrodes of the device.

- (1) Note. Many of the devices in this subclass are discharge devices such as are

used as the transmitting tube in radio transmitting systems.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

246+, for discharge devices which are provided with a cylindrical conductive envelope portion (e.g., anode) and means to support one or more electrodes (e.g., cathode, grid) within the conductive envelope portion usually by means of the closure for the cylindrical envelope portion.

317+, and the subclasses specified in the notes thereto for other lamps and discharge devices under the class definition in which an electrode forms a portion of the envelope.

**22** This subclass is indented under subclass 17. Subject matter in which the structure is designed so that a temperature modifying fluid may be circulated in the space between the envelope and the jacket or casing or between the walls of the double walled envelope.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

18+, where the envelope of the lamp or discharge device is made in whole or part of conductive material.

36, for discharge devices and lamps which are not provided with an envelope but which includes a jacket or casing for the discharge device or lamp or a part thereof, and means to apply a temperature modifying fluid to the lamp or discharge device. Some of the devices in subclass 36 are open-air arc lamps with casing means around portions of the lamp to direct a cooling fluid into contact with a portion of the lamp.

**23** This subclass is indented under subclass 22. Subject matter where the lamp or discharge device has a plurality of electrodes and means are provided for modifying the temperature of a plurality of the electrodes.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

19, where the lamp or discharge device is provided with an envelope which is

made in whole or part of a conductive material.

28, for other lamps and discharge devices which are provided with a plurality of electrodes, a double wall envelope or a casing or jacket for the envelope and means for modifying the temperature of a plurality of the electrodes.

**24** This subclass is indented under subclass 22. Subject matter having means (e.g., baffles) within the casing or jacket which encloses the envelope or between the walls of the double-walled envelope for directing the flow of the temperature modifying fluid as it flows through the casing, jacket or doubled envelope.

**25** This subclass is indented under subclass 17. Devices in which the space between the double wall envelopes or between the envelope and the casing or jacket is sealed off from the atmosphere and from the space within the envelope of the lamp or discharge device.

(1) Note. This subclass includes electric lamps whether of the discharge device type or not, photosensitive discharge devices, generators of invisible ray energy (e.g., X-ray tubes, ultraviolet lamps, etc.) only when the casing or jacket is integrally united with the envelope of the device. See (1) Note to the definition of subclass 11 with respect to the classification of such subject matter where the casing or jacket is not integrally united.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

27, for other discharge devices and lamps which are provided with a double wall envelope or which have a jacket or casing for the envelope of the device, the space between the envelope walls or between the casing or jacket and the envelope containing a heat conserving or heat insulating material.

312, and the subclasses specified in the notes thereto, for miscellaneous and discharge devices which are provided with an envelope and a casing or jacket for the envelope.

317+, for miscellaneous lamps and discharge devices which are provided



with a double-wall envelope where the heat transmitting properties of the double wall envelope are not involved.

**26** This subclass is indented under subclass 25. Subject matter in which the lamp or discharge device is provided with a double wall envelope, the envelope walls being formed as a unitary, integral body.

- (1) Note. Included in this subclass are lamps and discharge devices which are provided with a double-walled envelope or an envelope and a casing where the space between the double walls or between the envelope and casing is evacuated or filled with a gas or vapor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

317+, for miscellaneous lamps and discharge devices which are provided with a double walled envelope where the heat transmitting properties of the double-wall envelope are not involved.

SEE OR SEARCH CLASS:

215, Bottles and Jars, subclass 13.1 for receptacles of the bottle or jar type made of glass or other ceramic or similar materials and having spaced walls, with the interwall space evacuated or filled with a gas or vapor for heat insulation purposes.

220, Receptacles, subclasses 2.1+ for double walled envelopes designed for use with lamps and discharge devices.

**27** This subclass is indented under subclass 17. Subject matter in which the space between the casing or jacket which encloses the envelope or the space between the double-walled envelope, includes means for preventing the flow of heat to or from the device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

25+, where the space between the double walls or between the envelope and the casing or jacket is sealed off from the atmosphere and from the space within the envelope of the device. The

sealed off space may be evacuated or filled with a gas or vapor. Note indented subclass 26 for discharge devices and lamps provided with an integral double-wall envelope.

SEE OR SEARCH CLASS:

215, Bottles and Jars, subclass 13.1 for receptacles of the bottle or jar type made of glass or other ceramic or similar material and having spaced walls with the interwall space containing a heat insulating means.

220, Receptacles, subclasses 2.1+ for double-walled envelopes designed for use for lamps and discharge devices, subclasses 415+ for miscellaneous receptacles having double-walls where the inner and outer walls are spaced apart and the intervening space contains a heat insulating material.

**28** This subclass is indented under subclass 17. Subject matter where the lamp or discharge device is provided with a plurality of electrodes and means are provided for modifying the temperature of a plurality of the electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19, where the envelope of the lamp or discharge device is made in whole or part of electrical conductive material.

23, where the structure includes means to circulate a fluid between the walls of a double walled envelope of a lamp or discharge device or between the envelope and the enclosing casing or jacket of a discharge device.

**29** This subclass is indented under subclass 11. Devices having a liquid electrode and having means for modifying the temperature of the liquid electrode.

SEE OR SEARCH THIS CLASS, SUBCLASS:

16, where the means for modifying the temperature of the liquid electrode is an electric heater.

163+, for liquid electrode discharge devices, per se.

- 30** This subclass is indented under subclass 11. Devices where the lamp or discharge device is provided with a hollow electrode or a hollow electrode lead conductor, means being provided to modify the temperature of the hollow portion of the electrode or the electrode lead.
- (1) Note. In many of the devices in this subclass a fluid is circulated into the hollow electrode or electrode lead. See indented subclasses 31 and 32 where the hollow electrode or lead constitutes a closed path so that fluid may be circulated through the electrode or lead.
- 31** This subclass is indented under subclass 30. Devices in which the electrode is in the form of a fluid conduit which is in the form of a coil.
- SEE OR SEARCH CLASS:
- 138, Pipes and Tubular Conduits, subclasses 100 through 178 for pipe structure, per se.
- 165, Heat Exchange, appropriate subclasses for a heat exchanger, per se.
- 32** This subclass is indented under subclass 30. Devices in which the hollow electrode or lead is provided with a closed conduit designed for the passage of a temperature modifying fluid therethrough.
- (1) Note. In many of the devices in this subclass the electrode or lead is provided with two coaxial tubes one within the other and the fluid flows in one direction through the inner tube and in the opposite direction between the walls of the inner and outer tubes, but this subclass is not limited to such devices.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 31, where the electrode is in the form of a conduit which is in the form of a coil.
- 35+, and the subclasses specified in the notes thereto for devices under subclass 11 in which the temperature modifying means includes means for applying a temperature modifying fluid (e.g., a cooling fluid) to some part of the device, which part may be an electrode or lead.
- 33** This subclass is indented under subclass 11. Devices having an envelope and having a temperature modifying baffle extending across or into the interior of the envelope.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 20, where the envelope is made in whole or part of conductive material and has a double-wall or is enclosed within a casing or jacket.
- 34** This subclass is indented under subclass 11. Devices where the device is provided with an envelope, the envelope including a chamber having a surface which has a large heat dissipating surface for condensing vapors generated during the operation of the device.
- (1) Note. Most of the devices in this subclass are mercury vapor discharge devices and the condensing surface is designed to condense the mercury vapor into its liquid state.
- (2) Note. Included in this subclass are all discharge devices where the envelope is provided with any portion such as an enlarged portion or a portion located in a place which remains relatively cool during the operation of the device, where the purpose of such portion is to condense vapors and to change the vapors to either their liquid or solid state.
- (3) Note. See the classification of envelopes designed for use with lamps and discharge devices which are provided with temperature modifying means. See the class definition for the classification of envelopes, per se, designed for use with electric lamps and discharge devices.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 17+, where the device is provided with either a double-wall or a jacket or casing for the envelope. Note especially indented subclass 20 where the device is provided with an internal temperature modifying baffle and subclasses 22+, where means are provided for

- circulating a fluid in contact with the envelope wall.
- 33, for devices within the definition of subclass 11 where the envelope of a device is provided with an internal temperature modifying baffle.
- 35, for discharge devices and lamps which are provided with envelopes with tubular passageways or conduits formed in the envelope and passing through the lamp near the filament or other heated portion of the device so that the conduit becomes hot and the heated air rises to draw cold air in at the bottom of the conduit.
- 35** This subclass is indented under subclass 11. Subject matter wherein the temperature of the discharge device or lamp is modified by applying a heat exchange liquid to the discharge device or lamp or where the structure includes means to direct the flow of the temperature modifying fluid.
- (1) Note. Subclasses 35+, includes discharge devices and lamps which do not have envelopes and which are provided with means for contacting a portion of the device with a heat exchange fluid or liquid. The fluid or liquid containing means may be arranged so that the fluid or liquid may be circulated. Also included are lamps and discharge devices with envelopes with tubular passage ways or conduits formed in the envelope and passing through the lamp near the filament, or other heated portion of the device so that the conduit becomes hot and the heated air rises to draw cold air in at the bottom of the conduit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 12, where the apparatus includes a recirculating system with a heat exchanger in it so that the temperature modifying fluid is circulated from the lamp or discharge device to the heat exchanger then back again to the lamp or discharge device.
- 17+, where the lamp or discharge device is provided either with a spaced double-walled envelope or with an envelope and a casing or jacket around the envelope, the structure including means to modify the temperature of the lamp or discharge device. See especially subclasses 22+, where means are provided to circulate a temperature modifying fluid in the space between the double-walls of the envelope or between the envelope and the casing or jacket.
- 29, where the lamp or discharge device is provided with a liquid electrode.
- 30+, where the lamp or discharge device is provided with a hollow electrode or a hollow electrode lead conductor and means are provided to modify the temperature of the hollow portion of the electrode or electrode lead.
- 33, where lamp or discharge device is provided with an envelope and an internal temperature modifying baffle which extends across or into the envelope.
- 34, where the envelope is provided with either a condensing chamber or condensing surface.
- SEE OR SEARCH CLASS:
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 26+ for discharge devices of the consumable electrode type (e.g., arc lamps) which are provided with means for directing the flow of a temperature modifying medium over a portion of the device. The flow directing means may include a casing or jacket for a portion of the device. See indented subclass 29 where the temperature of the device is modified by means of a heat exchange liquid.
- 36** This subclass is indented under subclass 35. Devices in which the means for applying the temperature modifying fluid includes a jacket or casing which surrounds at least a part of the lamp or discharge device or which is associated with the means for applying the temperature modifying fluid so as to direct the temperature modifying fluid upon some part of the lamp or discharge device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 17+, where the lamp or discharge device is provided either with a spaced double walled envelope or with an envelope that has a casing or jacket which surrounds at least a portion of the envelope.
- 324, for miscellaneous electric lamps and discharge devices which do not have envelopes but which are provided with casings and jackets.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 74 for a removable device projecting into a chamber containing a heat exchanger fluid.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 26+ for discharge devices of the consumable electrode type (e.g., arc lamps) which are provided with a jacket or casing for directing the flow of a temperature modifying medium over a portion of the device.

- 37** This subclass is indented under subclass 11. Devices which are provided with a filament, a directly heated cathode or an indirectly heated cathode and which include means to modify the temperature of the filament or cathode.

- (1) Note. The structure must include more than a filament, a directly heated cathode or an indirectly heated cathode. For example, included in this and the indented subclass are devices in which a heat conserving shield is placed about the cathode to conserve the heat of the cathode and devices which have means to conduct heat from a portion of the cathode so as to reduce the temperature of the cathode portion.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 39+, for other devices under subclass 11 which are provided with a cathode which may be a thermionic cathode other than a directly or indirectly heated cathode and which includes

means to modify the temperature of the cathode.

- 337+, for the structures of indirectly heated cathodes, per se.
- 341+, for the structure of filaments and directly heated cathodes.
- 346, for the structure of thermionic cathodes.

- 38** This subclass is indented under subclass 37. Devices in which the temperature modifying means is a hollow shield which surrounds at least a portion of the filament or heated cathode.

- 39** This subclass is indented under subclass 11. Devices which are provided with an envelope and an electrode within the envelope, heat transfer means being provided to modify the temperature of the electrode.

- (1) Note. The heat transfer means may be mounted upon or form a part of the electrode. For example, an electrode may be formed with a heat indicating surface.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 16, and 29, where the electrode is a liquid electrode. See subclass 16 where an electric heater is provided for the liquid electrode.
- 23, and 28, where the device is either provided with a double spaced wall envelope or is provided with an envelope and a jacket or casing which surrounds at least a portion of the envelope and means are provided to modify the temperature of a plurality of electrodes within the envelope. See subclass 23, where the structure includes means to circulate a heat transfer fluid between the envelope walls or between the envelope and the casing or jacket.
- 28, see the reference to subclass 23 above.
- 29, see the reference to subclass 16 above.
- 30+, where the electrode or the electrode lead is hollow and means are provided to modify the temperature of the hollow portion of the electrode or lead.

- 37+, where the electrode which has its temperature modified is either a filament or a thermionic cathode.
- 42, for devices under subclass 11 which are provided with an envelope and an electrode lead-in conductor or an electrode support, the electrode lead-in or the electrode lead-in support having heat transfer means mounted thereon or including means to modify the flow of heat along the electrode lead-in or support. Subclass 42 also provides for devices under subclass 11, which are provided with an envelope and which have the heat transfer means mounted upon a lead-in wire exterior to the envelope of the device.
- 43, for devices under subclass 11 which are provided with an envelope and which have temperature modifying means to protect the lead-in-seal or the stem of the envelope from excessive temperatures.
- 44, for discharge devices under subclass 11 which have the envelope formed of conductive material, the conductive material being designed for use as an electrode, heat transfer means being arranged to modify the temperature of the conductive envelope wall.

## SEE OR SEARCH CLASS:

- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 127+ for X-ray tubes provided with movable targets, usually rotatable, so that the temperature of the target may be maintained cool by moving the target and changing the area exposed to the electron beam during the operation of the device.

- 40** This subclass is indented under subclass 39. Devices in which the temperature modifier comprises a radiating surface adapted to transmit or receive radiant heat.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 45, for other devices under subclass 11 in which the temperature modifying means is a radiating surface adapted to transmit or receive radiant heat.

## SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 133 for a heat exchanger with a coated, roughened or polished surface, and subclasses 177+ for a tubular structure with heat transfer means.

- 41** This subclass is indented under subclass 40. Devices in which the radiating surface is either composed of a material or is coated with a material which is designed to readily radiate heat or in which the radiating surface is roughened to facilitate the radiation.

- 42** This subclass is indented under subclass 11. Devices which are provided with an envelope and electrode within the envelope and a lead-in conductor or electrode support for the electrode, the device having either a heat transfer means mounted upon the lead-in or electrode support or the lead-in or the electrode support including means to modify the flow of heat along the lead-in or support.

- (1) Note. The heat exchange means may be mounted upon the lead-in conductor exteriorly of the envelope.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 30+, where the electrode lead-in conductor is hollow (e.g., is provided with a conduit) and means are provided to modify the temperature of the hollow portion of the lead-in.
- 39+, for devices under subclass 11 which have a heat transfer means mounted upon or forming a part of an electrode within the envelope of the device.
- 43, for devices under subclass 11 which are provided with means to protect the lead-in-seal or stem of the envelope from excessive temperatures.

- 43** This subclass is indented under subclass 11. Devices in which the device is provided with an envelope and an electrode lead-in-seal or a stem and temperature modifying means are provided for protecting the lead-in-seal or the stem of the envelope from excessive temperatures.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
42, where the device includes a heat transfer means mounted upon the lead-in conductor or electrode support or where the lead-in conductor or support is formed so as to modify the flow of heat along the lead-in conductor or support.
- 44** This subclass is indented under subclass 11. Devices which are provided with an envelope and where the temperature modifier is designed to modify the temperature of the envelope wall or some portion thereof.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
16, and 29, for devices which have a liquid electrode in contact with the envelope wall and which are provided with means to modify the temperature of the liquid electrode. See subclass 16 where the temperature modifier is an electric heater.  
17+, where the device is provided with a spaced double wall envelope or is provided with a casing or jacket for the envelope, the structure including means to modify the temperature of the envelope wall.  
29, see the reference to subclass 16 above. 34, where the envelope is provided with a chamber or surface for condensing vapors generated within the envelope.  
35, where the envelope wall has its temperature modified by using liquids or where the temperature modifying means includes means for directing the flow of the temperature modifying fluid.  
42, where the device is provided with a temperature modifying means mounted on or forming a part of the lead-in conductor or electrode support so as to prevent the transmission of heat to the envelope from the electrodes.  
43, where the envelope is provided with means for protecting the lead-in seal or stem of the envelope from excessive temperatures.
- 45** This subclass is indented under subclass 11. Devices in which the temperature modifier comprises a radiating surface adapted to transmit or receive radiant heat.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
40+, where an electrode within an envelope is provided with a radiating surface.
- 46** This subclass is indented under subclass 11. Devices in which the temperature modifier is a means for conducting heat.
- (1) Note. Included in this subclass are devices which have a portion made of a large size or of a special material so that the heat will be conducted from a place which it is desired to keep cool to a place where the heat will be dissipated.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclasses 177+ for a tubular structure with attached heat transmitter.
- 47** This subclass is indented under subclass 11. Devices which include means for preventing the flow of heat to or from the device.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
25+, and 27, for devices under subclass 11 where the device is provided with a spaced double wall envelope, or where the device is provided with an envelope and a casing or jacket for the envelope, see subclasses 25+ where the space between the double walls or between the envelope and the casing or jacket is sealed and either evacuated or filled with a gas or vapor (e.g., for heat insulation), and see subclass 27 where the space between the double walls or between the envelope and casing contains other heat insulating means.
- SEE OR SEARCH CLASS:  
220, Receptacles, appropriate subclasses for miscellaneous receptacles pro-

- vided with heat insulating means, see especially subclasses 2.1+ for envelopes and casings designed for use with lamps and discharge devices, and subclasses 400+ and 415+ for miscellaneous receptacles provided with linings.
- 252, Compositions, subclass 62 for miscellaneous heat insulating compositions.
- 48** This subclass is indented under the class definition. Devices which are provided with a handle.
- (1) Note. This subclass excludes electric lamps including those of the discharge device type where the handle is separable from the electric lamp. For the excluded electric lamps, see Class 362, Illumination, appropriate subclasses, see especially subclasses 190+ for portable self contained illuminating devices which include a casing or handle for the lamp and means to supply the lamp with electricity (e.g., flashlights), subclasses 399+, and subclasses 382+ for miscellaneous light supports including separable handles for electric lamps.
- (2) Note. Among the devices included in this subclass are spark gaps mounted on handles such as are used to ignite gas burners.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 49, for devices under the class definition combined with a support or a detachable electrical connector for the device.
- SEE OR SEARCH CLASS:
- 219, Electric Heating, appropriate subclasses, for arc welding electrode holders in which a handle supports a single electrode. Where the handle supports two or more electrodes and the device is not structurally limited to use in electric welding or heating, classification is in Class 313.
- 315, Electric Lamp and Discharge Devices: Systems, subclass 33 for portable self contained devices which include a source of energy, a discharge device of the arc, spark, gas or vapor type (other than a lamp), and the system for connecting the source of energy to the discharge device.
- 362, Illumination, see (1) Note, above.
- 607, Surgery: Light, Thermal, and Electrical Application, subclass 88 for electric lamps which are limited by claimed structure to use for therapeutic purposes which are provided with a handle and subclass 150 for discharge devices which are designed to transmit high frequency electric current into the human body which are provided with a handle. The devices in this subclass sometimes include an envelope with a confined gas or vapor, an electrode within the envelope and a handle for the device, the human body being used as the other electrode in the use of the device.
- 49** This subclass is indented under the class definition. Subject matter where the lamp or discharge device is provided with a support or has combined therewith a detachable electrical connector.
- (1) Note. This subclass excludes electric lamps including those of the discharge device type, generators of invisible rays (e.g., X-ray tubes, ultraviolet ray generators) in combination with a separable support for the device. See the class definition for the excluded subject matter.
- (2) Note. See the class definition of this class (Class 313) for the location of a distinct electrical connector and for line notes distinguishing this class and Class 439, Electrical Connectors.
- SEE OR SEARCH CLASS:
- 174, Electricity: Conductors and Insulators, subclass 138 for insulating supports for elongated tubular lamps. Also, see the reference to Class 248, subclass 50, below.
- 248, Supports, appropriate subclasses for miscellaneous supports. Note especially subclass 50 for supports designed to support elongated tubing such as gas or vapor lamps (see the reference to Class 174, above), and

subclasses 500+ for the combination of a lamp or discharge device envelope and a support therefor (e.g., a socket) with where no electrical features are claimed.

- 439, Electrical Connectors, subclasses 296+ for an electrical coupling part with coupling movement actuating means or retaining means in addition to the contact thereof; and subclasses 527+ for a connector having mounting or supporting means. Class 439 includes the combination of a specific electrical connector with a broadly recited electric lamp. See (2) above.

**50** This subclass is indented under subclass 49. Subject matter in which a support is designed to reduce the transmission of vibrations from and/or to the supported lamp or discharge device and subject matter under subclass 49 in which the support is resilient.

- (1) Note. The support may be a detachable electric connector (e.g., socket structure).

SEE OR SEARCH CLASS:

- 188, Brakes, subclasses 378+ for devices having significant mass, which are attached to articles for damping the vibrations by inertia; and subclass 381 for devices damping vibrations by friction.
- 248, Supports, subclasses 560+ for resilient supports.
- 362, Illumination, subclasses 306 and 390, for illuminating devices which include a resilient light support.

**51** This subclass is indented under subclass 49. Subject matter in which the support is detachable and includes an electrical connector for the lamp or discharge device, and lamps and discharge device which have combined therewith a detachable electrical connector.

- (1) Note. See the class definition for the classification of lamps including discharge devices, lamps, generators of invisible ray energy (e.g., X-ray tubes, ultraviolet ray generators), in combination with a detachable support which may include an electrical connector for

the device. See the class definition for the classification of detachable electrical connectors, per se, and the line between this class and Class 439, Electrical Connectors.

SEE OR SEARCH CLASS:

- 248, Supports, subclasses 500+ for hold-down devices of general application.
- 439, Electrical Connectors, subclasses 296+ especially subclasses 357+ for the combination of an electrical connector with the envelope of a lamp, including a resilient finger for holding that device to a mating electrical connector.

**52** This subclass is indented under the class definition. Devices which are convertible from one type of device to another type of device.

- (1) Note. Many discharge devices may be considered to be convertible from one type of discharge device to another type of discharge device simply by not using some of the electrodes of the discharge device. For example the usual triode may be used as a half-way rectifier by not connecting the grid in any circuit. In the device in this subclass some means must be provided which is limited to use in converting the device from one type of device to another type of device. An example of the subject matter in this subclass is an incandescent lamp which has the lead wires coated with electron emissive material so that when the filament fails a glow discharge may take place between the coated lead wires thus converting the incandescent lamp to a discharge device type lamp. Note that where the converting means is an electric switch or other circuit element such as an impedance, the device is excluded from this class and will be found in Class 315, subclasses 32+. Also excluded from this subclass are incandescent lamps having plural filaments, such as a high resistance filament and a low resistance filament, which may be converted from one type of incandescent lamp to another merely by connecting one filament or the other in the circuit.



- (2) Note. See the class definition for the classification of lightning arresters of the arc or spark type which are designed to have the electrodes brought into contact with each other upon prolonged use of the device thereby establishing a conductive path through the device.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 1+, for plural unit devices under the class definition, that is, devices which include in structural combination a plurality of discharge devices, a plurality of lamps other than mere multiple filament lamps, or a lamp and discharge device.
- 236, for devices under the class definition which are provided with a spare or extra electrode which is not used until one of the electrodes fails to operate properly when the spare or extra electrode is used to replace the defective electrode.

**SEE OR SEARCH CLASS:**

- 315, Electric Lamp and Discharge Devices: Systems, see (1) Note above.

- 53** This subclass is indented under the class definition. Discharge devices in which a flame provides an ionized path for the discharge.

**SEE OR SEARCH CLASS:**

- 96, Gas Separation: Apparatus, subclasses 15+ for apparatus for smoke precipitation of the electrostatic type having electrodes between which the combustion products (e.g., smoke) are passed and which attract particles in the combustion products by means of electrostatic fields.
- 123, Internal-Combustion Engines, subclass 594 for high tension ignition systems for internal combustion engines, which include a jump type spark gap igniter operating within a cylinder.
- 361, Electricity: Electrical Systems and Devices, subclasses 247+ for electrical devices for igniting combustible material which include spark or arc electrodes and means to bring the

electrodes into contact with the combustible material.

- 431, Combustion, subclass 25 for a burner control circuit utilizing the current rectifying effect of a flame and subclasses 78+ for a burner controlled by an electric control circuit that senses flame.

- 54** This subclass is indented under the class definition. Devices which are provided with a radioactive material, the radioactive properties of the material being utilized in the operation of the device.

- (1) Note. In the patents in this subclass the radioactive property of the material must have some significance in the operation of the device. The mere use of a radioactive substance such as thorium on or in a cathode to render it electron emissive, the use of uranium stained glass, or other such uses of radioactive materials where the radioactive properties of the material are not involved in the operation of the device is not considered sufficient to cause classification of the device in this subclass.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclasses 381 and 382 for an invisible radiant energy responsive gas discharge device having a radioactive gas, a gas borne radioactive material or a radioactive source within the device to ionize the gas of the device.
- 252, Compositions, subclasses 625+ for radioactive compositions, per se.

- 62** This subclass is indented under the class definition. Discharge devices provided with magnetic means for confining the path of the particles of the space discharge into a circular path and having means for accelerating the particles tangentially of the circular path.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 153+, for other devices under the class definition which have a magnetic device associated therewith.
- 359.1+, for discharge devices including means to accelerate positive or negative ions.

- 421+, for cathode-ray tubes with means to deflect a beam of electrons.
- 441+, for cathode-ray tubes including means to accelerate a focus or beam of electrons.

## SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclass 502 for a cyclotron.
- 376, Induced Nuclear Reactions: Processes, Systems, and Elements, appropriate subclasses for nuclear reactions and nuclear reactors.

**93**

This subclass is indented under the class definition. Devices which are provided with means responsive to invisible radiant energy other than ultraviolet rays or heat rays or radio waves, for altering the operation of the device.

- (1) Note. Such rays may be protons, alpha particles, X-rays, gamma rays, cosmic rays or similar ray energy.
- (2) Note. Many discharge devices having an envelope and a confined gas or vapor atmosphere may be used as Geiger-Mueller counter tubes. This subclass is limited to devices which include some structure which is especially provided because the device is responsive to the invisible ray energy and to discharge devices which are claimed as being Geiger-Mueller counter tubes. For other types of gas or vapor discharge devices see subclasses 182+, and the subclasses specified in the notes thereto.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 54, for devices within the class definition which include a radioactive material.
- 103+, for devices within the class definition having an electrode which is secondarily emissive, i.e., which emits secondary electrons when bombarded by primary electrons from another source.
- 523+, for photosensitive devices within the class definition. Especially see indented subclass 539 for those which are designed to be responsive to radiant energy, (ultraviolet or heat rays or

visible light) of particular wave lengths.

- 539, see reference to subclasses 523+, above.
- 567, see (2) note, above.

**103**

This subclass is indented under the class definition. Discharge devices having a secondary emissive electrode.

- (1) Note. The devices in this subclass are also known as "electron multipliers".

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 106, for devices under the class definition provided with means to prevent secondary emission from some part of the device.
- 346, and the subclasses specified in the notes thereto, for secondary emissive electrodes, per se.
- 377, 387 and 399, for cathode-ray tubes with a secondary emissive electrode.
- 532+, where the discharge device includes a photosensitive electrode in addition to the secondary emissive electrode.

## SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclass 39.63 for discharge devices having an electrode formed so as to provide a structure having distributed inductance and capacitance and operable in a magnetic field (e.g., magnetrons), the discharge device being provided with a secondary emissive electrode.
- 327, Miscellaneous Active Electrical Non-linear Devices, Circuits, and Systems, subclasses 572+ for miscellaneous secondary emissive circuits.
- 329, Demodulators, appropriate subclasses for demodulators or detectors generally with secondary emission.
- 330, Amplifiers, subclass 42 for amplifiers having a secondary emitter discharge device.
- 331, Oscillators, subclass 89 for oscillator systems utilizing a magnetron type tube having a secondary electron emissive electrode, and subclass 133 for negative resistance oscillators uti-

lizing a tube of the secondary electron emissive type.

- 104** This subclass is indented under subclass 103. Discharge devices having a plurality of secondarily emissive electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

306+, and the subclasses specified in the notes thereto for other discharge devices which have a plurality of cathodes.

- 105** This subclass is indented under subclass 104. Discharge devices having three or more secondarily emissive electrodes.

- 106** This subclass is indented under the class definition. Devices provided with means to prevent the emission of secondary electrons from some part of the device.

(1) Note. Discharge devices which have one or more control electrodes and in which the only means provided to suppress the secondary emissive is that one or more of the control electrodes may be used as a secondary emissive suppressing electrode are not included in this or the indented subclass but will be found in subclasses 293+, or one of the subclasses specified in the notes thereto.

- 107** This subclass is indented under subclass 106. Devices in which the secondary emission suppression is secured by the use of a nonelectron emissive material.

(1) Note. In the devices in this subclass the part which is to be nonemissive may be made of a nonemissive material or coated with a nonemissive material.

(2) Note. See the class definition for the classification of electrodes where no structure of the electrode is involved other than composition of the materials used to form the electrodes, coated electrodes which involve no more structure than a base with one or more coatings thereon, and for the processes of making or coating electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

353, for electrodes, per se, which are made of two or more portions or which have a coating upon a portion of the electrode, one portion of the electrode being a nondischarge sustaining portion.

355, and the subclasses specified in the notes thereto for coated electrodes.

SEE OR SEARCH CLASS:

252, Compositions, subclasses 500+, and the subclasses specified in the notes thereto for materials and compositions for discharge device electrodes.

- 107.5** This subclass is indented under the class definition. Discharge devices provided with means between the cathode and anode to change the width of the electron stream between the anode and the cathode.

(1) Note. Included in this subclass are discharge devices of the so-called "magic eye" type which have an annular anode coated with fluorescent material surrounding an emissive central cathode and a control electrode for varying the width of the discharge between the cathode and anode so that as the potential of the control electrode varies the width of the nonluminous portion of the anode varies.

SEE OR SEARCH THIS CLASS, SUBCLASS:

293+, and the subclasses specified in the notes thereto, for other discharge devices which have a control grid or other apertured electrode interposed between the cathode and anode, see especially indented subclass 299 where the discharge device is provided with a plurality of control electrodes with the apertures in the different electrodes in alignment (e.g., beam power type tubes).

364+, for cathode-ray tubes provided with means to focus the electrons into a restricted beam and with means for deflecting the beam over the surface of a target. See especially indented

subclasses 461+ where the target is a fluorescent or phosphorescent screen.  
483+, for other discharge devices provided with fluorescent material.

**110** This subclass is indented under the class definition. Devices which have an optical device structurally combined with the device so that the optical device and the lamp or discharge device constitutes a single integral device and devices under the class definition which are provided with an envelope which is designed to be especially transparent to particular wave lengths of radiant energy.

(1) Note. Optical devices as defined in the subclass definition include lenses, polarizers, reflectors, light diffusers, light valves, light obscuring means or any other means designed to alter the transmission of light rays in any manner.

(2) Note. See the class definition for the classification of lamps and discharge devices which are combined with a separable casing, jacket, shield, or envelope protective means. See the class definition for the classification of lamps and discharge devices which are combined with a separable optical device. See the class definition for the classification of envelopes, per se, for lamps and discharge devices.

SEE OR SEARCH THIS CLASS, SUBCLASS:

359.1, for discharge devices of the positive ion accelerator type which are provided with windows through which the positive lens may pass.  
420, for cathode ray devices provided with electron permeable windows.  
461+, for cathode-ray tubes provided with fluorescent or phosphorescent screens or targets.  
465, for cathode ray devices provided with light valves.  
483+, for devices having a fluorescent material as a part thereof.  
539, for photosensitive devices provided with means for transmitting particular portions of the light spectrum to the photosensitive element of the device.

SEE OR SEARCH CLASS:

359, Optics: Systems (Including Communication) and Elements, subclasses 642+ for lenses.  
362, Illumination, subclasses 351+ for antiglare lens and subclasses 326+ for light refractors (e.g., lenses) for use with illuminating devices where the refractor is separable from the source of light.  
378, X-Ray or Gamma Ray Systems or Devices, subclasses 121+ for X-ray tubes which are provided with screening means to eliminate unwanted secondary X-rays.

**111** This subclass is indented under subclass 110. Devices which have structurally combined therewith a plurality of optical devices of diverse types (e.g., a reflector and a lens or a filter and a polarizer).

**112** This subclass is indented under subclass 110. Devices in which the optical device is a polarizer, a light filter, or which are provided with an envelope which is designed to be especially transparent to particular wave lengths of radiant energy.

(1) Note. See the class definition for the classification of envelopes including those made of special compositions for electric lamps and discharge devices.

SEE OR SEARCH CLASS:

252, Compositions, subclasses 299.01+ for liquid crystal containing compositions useful in making optical filters and subclasses 582+ for other compositions useful in making optical filters.  
359, Optics: Systems (Including Communication) and Elements, subclasses 483+ for light polarizers and subclasses 350+ and 885+ for optical filters.  
427, Coating Processes, for processes of coating, per se, wherein the product is an optical element.  
428, Stock Material or Miscellaneous Articles, subclasses 415, 417 and 426+ for a nonstructural composite web or sheet embodying a layer of glass.

- 501, Compositions: Ceramic, subclasses 11+ for glass compositions capable of filtering light.
- 113** This subclass is indented under subclass 110. Devices in which the optical device is a light reflector.
- SEE OR SEARCH CLASS:
- 359, Optics: Systems (Including Communication) and Elements, subclasses 838+ for reflectors, per se.
- 362, Illumination, subclasses 341+, and the subclasses specified in the notes thereto for reflectors for use with light projectors where the reflector is separable from the source of light.
- 427, Coating Processes, for processes of coating, per se, wherein the product is an optical element.
- 114** This subclass is indented under subclass 113. Devices having a plurality of reflectors.
- 115** This subclass is indented under subclass 113. Devices in which the lamp is an incandescent lamp having a plurality of filaments or glowers.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 316, and the subclasses specified in the notes thereto for other lamps which are provided with a plurality of filaments or glowers.
- 116** This subclass is indented under subclass 110. Devices in which the optical device is a light diffusing means.
- (1) Note. Incandescent lamps with frosted globes are included in this subclass.
- SEE OR SEARCH CLASS:
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 663+ for methods of etching glass to produce a light diffusing surface thereon.
- 427, Coating Processes, for processes of coating, per se, wherein the product is an optical element.
- 117** This subclass is indented under subclass 110. Devices in which the optical device is a light valve, or a light shield or other light obscuring means for preventing transmission of light.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 364+, for cathode ray devices provided with light valves.
- SEE OR SEARCH CLASS:
- 359, Optics: Systems (Including Communication) and Elements, subclasses 227+ and 238+ for light valves, per se.
- 118** This subclass is indented under the class definition. Unitary devices known as spark plugs.
- (1) Note. See the glossary for the class definition of spark plugs. In general, the spark plugs classified herein are the jump spark type found in the gasoline engine of an automobile.
- (2) Note. The shell is the part having means usually threaded for attachment to the cylinder. The shell may be made of more than one piece. Some plugs do not have a shell, the insulating core being attached directly to the cylinder, as by having screw threads thereon. The core is the insulating means fastened to the shell and holding the center electrode with respect to the shell. It may consist of several parts which may or may not be cemented to each other. The center electrode is the electrode or wire extending from the exterior to the interior of the spark plug and which is insulated from the shell by the core. There may be several center electrodes insulated from each other. The spark electrodes are the electrodes between which the jump spark is formed. The ignition spark gap is the gap on the interior of the spark plug designed to ignite the combustible fuel. A spark gap is constituted by two or more spark electrodes. The interior of the spark plug is the portion which will be exposed to the combustible gas. The exterior is the part usually exposed to atmosphere and which has the connector

for the ignition wire mounted thereon. Electrode chamber is the space defined by the interior part of the core and the shell and exposed to the combustible gas in the engine. It may be substantially flat in some cases.

- (3) Note. Spark plugs are collected here on the basis of use, art and structure. Spark plugs having the usual structure of a shell, an insulating core with one or more electrodes therein are found here. Due to the rules of classification, certain types of spark plugs and combinations of spark plugs with accessories are classified in the lower numbered subclasses of this class. Also, since the presence or absence of claimed sparking electrodes determines the classification in this class, a number of other classes provide for bushings, connectors, shields, joints and other subcombination features. Such other subclasses and classes are referred to in the notes below, and in cases where only a few patents are classified in other subclasses or classes and which are not noted in the notes, cross-reference patents have been placed in this and the indented subclasses.
- (4) Note. Spark Intensifiers for Spark Plugs: Intensifier spark gaps designed for use with spark plugs are not classified in this or the indented subclasses unless the intensifier gap is a unitary part of the complete spark plug when see subclasses 123+. Where only the spark plug bushing (i.e., shell, core, center wire) is claimed, no ignition spark electrodes being claimed, the intensifier gap being located in or on the bushing, the patent is likewise excluded and classified as an intensifier gap. Some of the subclasses to be searched for these intensifier gaps are: 1+, where there are a plurality of intensifier gaps in a unitary device; 51, where the intensifier is claimed in combination with a detachable electric connector; 110+, where the intensifier includes an optical element as a lens, mirror, etc.; 146+, where the intensifier is provided with a movable or adjustable electrode or shield (e.g., a screw threaded electrode so that the size of the

gap may be adjusted); 238+, especially 243, 267, 268 where the supporting or spacing structure for mounting the intensifier electrodes are claimed; see subclass 267 where the electrodes are rods or rod-like members, subclass 268 where the electrodes are held apart by an insulating member between the electrodes, and subclass 243 for the other type; 324, for the intensifiers with a casing including those having a transparent window; and 567, especially 620+, 622, 634+ where the intensifier is mounted in a sealed envelope containing gas or vapor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 1+, for unitary devices providing two or more separate spark plug gaps or providing a spark plug gap and another discharge device, but excluding spark plugs with intensifier gaps for which see subclasses 123+ and spark plugs with a plurality of series spark gaps for which see subclass 123.
- 10, for spark plugs combined with a temperature indicator.
- 11.5, for spark plugs with temperature modifying means.
- 51, for spark plugs claimed in combination with a detachable electric connector (e.g., the connector on the lead-in wire).
- 54, for spark plugs which include a radioactive material.
- 110+, for spark plug devices which include means, see subclass 110 where the plug includes a lens, subclass 113 where the plug is combined with a mirror, subclass 116 where the plug includes a prism or light diffusing means.
- 513+, where the plug includes indicia or a scale (e.g., to show width between the ignition electrodes).

SEE OR SEARCH CLASS:

- 15, Brushing, Scrubbing, and General Cleaning, subclass 104.011 for spark plug cleaners.
- 73, Measuring and Testing, subclasses 118.1+ for spark plug testing devices. Also see Class 324, subclasses 378+ for spark plug testers.

- 123, Internal-Combustion Engines, subclasses 143+, especially subclasses 169 and 594+ for this subject matter in combination with an internal combustion engine or engine accessory. Subclass 169 relates, for example, to the combination of a spark plug and a cylinder head; the combination of a plug and cylinder space in which the interior of the skirt has a special claimed relationship to the cylinder volume the combination of a spark plug with an adaptor of the screw coupling type (which, for example, permits a small plug to be inserted in a large hole or which acts to extend the shell skirt to provide a chamber for the spark), etc. Also search Class 123 for plural separate spark plugs such as, for example, a plurality of adjustable spark plugs having means to adjust them.
- 138, Pipes and Tubular Conduits, subclasses 37+ for fittings or adapters to be interposed between the spark plug and the cylinder which include a flow regulator or baffle.
- 174, Electricity: Conductors and Insulators, appropriate subclasses for spark plug-type electrical bushings (i.e., a spark plug with no sparking electrodes claimed), and electrical shields for spark plugs; subclasses 15.1 through 16.3 for such bushings combined with means for feeding, circulating, or distributing a fluid, such as a cooling liquid or air; subclass 31 for such bushings with a fluid (air) vent, valve, or other fluid feeding means combined therewith (e.g., a priming means); subclasses 152+ for such bushings, per se, including such bushings as are provided with thermal modifying means (e.g., heat radiating fins or heat conductive members) and electrical connectors; and subclass 350 for such bushings with an electrical shield about it and for the spark plug shields, per se. Note that Class 174 provides for subcombinations of spark plug type bushings which are less than a complete bushing and more than is provided for in other subcombination classes (e.g., the combination of the insulator and center electrode which involves more structure than a mere joint would be in Class 174 rather than one of the classes providing for joints.
- 285, Pipe Joints or Couplings, appropriate subclasses for fittings or adapters having joint means to attach one end of the fitting to the engine and joint means at the other end to receive a spark plug.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 32+ for space discharge devices, such as spark plugs, having integral therewith a circuit element such as a resistor, condenser or switch. Note particularly indented subclass 46 for spark plugs having a resistor in shunt to the sparking electrodes which is adapted to flash-over when traversed by a high current impulse, said flash-over serving to ignite the combustion charge; indented subclasses 51+ for spark plugs having a plurality of circuit elements, such as a resistor and a condenser; subclass 56 for spark plugs having an integral switch; subclass 57 for spark plugs having an integral transformer, and subclass 58 for spark plugs having a suppressor resistor. Note that spark plugs having only an integral intensifier (i.e., series connected gap) are classified in subclasses 123+ of Class 313. The presence of a separable connector or merely conductive lead (e.g., ignition cable) will not prevent classification in Class 315, subclasses 32+ if the device is otherwise classifiable there. Class 315 also provides for systems for supplying electrical energy to spark gaps. Note especially subclasses 209+ for such systems having a periodic switch (e.g., a timer switch) in the circuit and subclasses 211+ where there are a plurality of spark plugs and the system includes a distributor type switch.
- 361, Electricity: Electrical Systems and Devices, subclasses 247+ for miscellaneous ignitors and ignitor systems.

- 403, Joints and Connections, appropriate subclasses for a joint between metal and glass or ceramic members.
- 439, Electrical Connectors, appropriate subclasses for an electrical connector or certain connector related accessories. Note that Class 439 includes the combination of an electrical connector with a named spark plug. Search especially subclasses 125+ for an electrical connector having a spark or glow plug cover. Also, search subclasses 191+ for the combination of an electrical connector with a fluent material transmission line. Search subclasses 271+ for an electrical connector with a packing or gasket to seal the joint with a mating connector; subclasses 312+ for a coupling part with coupling part movement-actuating means or retaining means in addition to a contact thereof with relatively pivotable concentric movement-actuating or retaining ring. Search Class 439, subclasses 607+ for a connector with a radiation shielding means; and subclasses 625+ for a connector with insulation other than a conductor sheath.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclass 7 for methods of manufacturing spark plugs.
- 501, Compositions: Ceramic, appropriate subclasses for ceramic compositions used for spark plug insulators. Note especially subclasses 127+ and 134+ for clay containing compositions; and subclasses 141+ for titanate and similar material containing compositions.
- 119** This subclass is indented under subclass 118. Subject matter having means, integral with the spark plug, permitting the removal of a part of the spark plug from normal operating position with respect to the portion of the shell which is attachable to the cylinder, without forming an open passageway from the cylinder to the atmosphere.
- (1) Note. Included in this subclass are only unitary spark plugs. See Class 123, Internal-Combustion Engines, subclasses 143+, especially 169 for similar subject matter where the plug is combined with another separable device (as a fitting with a valve) which permits removing of the plug without stopping the engine.
- (2) Note. These spark plugs are designed usually to permit inspection or repair of the ignition spark gap electrodes or of the interior end of the insulator without stopping the operation of the engine.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 236, for other discharge devices which have a stand-by or spare electrode.
- 237, for other discharge devices which have electrode replacement means or are demountable.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, appropriate subclasses for automatically operated valves.
- 251, Valves and Valve Actuation, appropriate subclasses for manually operated valves.
- 120** This subclass is indented under subclass 118. Subject matter provided with a passageway for a fluid extending through the spark plug structure from the interior of the spark plug to the exterior or to a fluid feed line so that a liquid or gas may flow between the electrode chamber and the exterior of the spark plug or the fluid feed line.
- (1) Note. The passageway may be provided with a valve so that the fluid may pass in one direction only or have a valve so that the fluid feed line may be closed or opened as desired.
- (2) Note. The fluid feed or air vent, for example, may supply priming fluid to the ignition spark gap space, or may blow oil off the electrodes or allow some of the burned gas to escape. Included in this subclass are spark plugs in combination with integral fuel injection nozzles.
- (3) Note. The fluid feed or air vent may, for example, act as an observation port for visual inspection of the ignition spark



gap or as a port for the insertion of a cleaner.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 11.5, for this subject matter when the fluid passageway is for the purpose of supplying a cooling fluid (e.g., air) to the spark plug.
- 119, for spark plugs having valve means arranged so that the interior of the plug or part of the shell may be sealed off to permit removal or inspection of at least part of the plug without stopping the engine.
- 143, for spark plugs having gas directing means, such as baffles or valves in the electrode chamber where there is no fluent passageway between the interior and the exterior of the plug.
- 231.01+, for other discharge devices which have a fluent material supply means or flow directing means.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclasses 179.9+ for priming devices for internal combustion engines.
- 137, Fluid Handling, subclasses 455+ for automatically operated valves responsive to the fluid passing through the valve, see especially subclasses 511+ for automatically operated check valves.
- 239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclasses, for fuel injection nozzles for internal combustion engines, especially subclasses 86 through 96, and 584+. See also (2) Note, above.
- 251, Valves and Valve Actuation, appropriate subclasses for manually operated valves.

**121** This subclass is indented under subclass 118. Subject matter in which the whole or a portion thereof is reversible.

- (1) Note. This subclass relates, for example, to spark plugs in which the core can be reversed, so that the center electrode tip becomes the binding post and vice versa.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 144+, for spark plugs having specific joint structure such as between the insulator and the shell.
- 236, for other discharge devices which are provided with a stand-by or spare electrode.

**122** This subclass is indented under subclass 118. Subject matter in which one of the ignition spark electrodes is supported by the shell, and is mounted so as to be removable therefrom.

- (1) Note. The removable electrode supported by the shell may be attached to a sleeve or other supporting means fastened between the shell and core so that the core must be removed to remove the electrode.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 128, for spark plugs wherein the core supports a plurality of separate ignition electrodes with individual lead-in wires which are insulated from each other.

**123** This subclass is indented under subclass 118. Subject matter having a plurality of spark gaps connected in series.

- (1) Note. The plural gaps may be located on the interior portion of the plug (e.g., used to ignite the combustible gas) or one or more of the gaps may be located in or on some other portion of the spark plug.
- (2) Note. Spark gaps in series with the igniter spark gap, when not exposed to the cylinder charge, are often referred to as intensifier gaps, since they prevent voltage break-down until a voltage level, higher than would otherwise be required, is reached.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 306+, and the subclasses specified in the notes thereto for miscellaneous discharge devices having a plurality of gaps in series.

## SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 180+ for systems for supplying electrical energy to a plurality of different type spark gaps, subclasses 185+ for systems for supplying electrical energy to a plurality of series connected spark gaps, subclass 334 and the subclasses specified in the notes thereto, for supplying electrical energy to a discharge device having three or more series arranged electrodes.

**124** This subclass is indented under subclass 123. Subject matter in which one of the series gaps is located in the lead-in path which includes the center electrode connector for the ignition wire and the ignition spark electrode conductively attached to or formed by the center electrode, the gap being located outside of the interior portion of the spark plug (e.g., not in the electrode chamber).

(1) Note. Where all of the series gaps are exposed to the cylinder charge so as to form ignition spark gaps, or where the intensifier is located, not in the center electrode but rather in a noncenter electrode return circuit or lead-in, the art will be found in subclass 123 above.

(2) Note. The center electrode may be formed of plural parts with the spaced electrode parts forming the intensifier gap, or the center electrode may be spaced from the connector for the ignition wire so as to form an intensifier gap with a portion of the connector structure, or it may be otherwise arranged so as to be in the center electrode lead-in path.

(3) Note. Spark Intensifiers for Spark Plugs: Intensifier spark gaps designed for use with spark plugs are not classified in this or the indented subclasses unless the intensifier gap is a unitary part of the complete spark plug, when see subclasses 123+. Where only the spark plug bushing (i.e., shell, core, center wire) is claimed, no ignition spark electrodes being claimed, the intensifier gap being located in or on the bushing, the patent is

likewise excluded and classified as an intensifier gap. See Search This Class, Subclass, below, for some of the subclasses to be searched for these intensifier gaps are:

## SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, where there are a plurality of intensifier gaps in a unitary device.

51, where the intensifier is claimed in combination with a detachable electric connector.

110+, where the intensifier includes an optical element as a lens, mirror, etc..

146+, where the intensifier is provided with a movable or adjustable electrode or shield (e.g., a screw threaded electrode so that the size of the gap may be adjusted).

267, where the electrodes are rods or rod-like members.

268, where the electrodes are held apart by an insulating member between the electrodes, and subclass 243 for the other type.

282+, especially 243, 267, 268 where the supporting or spacing structure for mounting the intensifier electrodes are claimed. See subclass

324, for the intensifiers with a casing including those having a transparent window.

567, especially 620+, 622, 634+ where the intensifier is mounted in a sealed envelope containing gas or vapor.

## SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 58+ for similar subject matter having a circuit impedance such as, for example, a nonlinear resistor in the center electrode lead-in.

**125** This subclass is indented under subclass 118. Subject matter having an ignition spark electrode which is movable into two different positions.

(1) Note. For the purpose of this definition, an electrode which is variably positioned by plastic distortion thereof (as, for example, when points are "set" to a

desired position by bending to provide a particular gap length) is not considered to be movable. Where the distortion is an elastic deformation as, for example, due to vibration, the art is in this and the indented subclass.

- (2) Note. In general, this subclass includes spark plugs provided with means whereby an electrode may be moved other than by plastic distortion without disassembly of the spark plug. The electrode may be moved for cleaning or for obtaining a variable width ignition gap.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 119, for this subject matter where the spark plug can be removed from normal operating position without stopping the engine.
- 120, for spark plugs having a reversible electrode which can assume one position or a reversed position.
- 122, for spark plugs having a removable electrode on the shell.
- 127, for spark plugs having stationary electrodes and a movable cleaner.
- 143, for spark plugs having a movable baffle or gas directing means for the electrode chamber.
- 146+, for other space discharge devices having a movable electrode.

**126** This subclass is indented under subclass 125. Subject matter in which the electrode is automatically moved.

- (1) Note. The electrode may be moved, for example, by engine vibration or by a thermostat. The motion may be effected so as, for example, to adjust the spacing of the spark gap electrodes or to clean the electrodes.
- (2) Note. This subclass also includes spark plugs having means for automatically moving electrodes and means for disabling said first mentioned means so that the electrodes can optionally be held immovable.

- (3) Note. This subclass includes spark plugs having both manual and automatic means to move an electrode.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 127, for spark plugs having automatically moved cleaners.
- 143, for spark plugs having automatically moved baffles or gas directing means for the electrode chamber.

**127** This subclass is indented under subclass 118. Subject matter having a cleaner.

- (1) Note. The cleaner may, for example, be a movable scraper which scrapes the electrode tips or movable balls which knock carbon off the insulator.
- (2) Note. Many spark plugs are "self cleaning" by virtue of their operating at a sufficiently high temperature to burn off carbon deposits. Such spark plugs are not classified in this subclass unless they have means for cleaning in addition to the means which produce the high temperature operation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 120, for spark plugs having fluid feed or vent means, through which means a cleaner may be inserted to clean the electrodes or other parts.
- 125+, for this subject matter in which an electrode is movable as, for example, where an electrode can be rubbed against another electrode or where an electrode vibrates during use to shake off deposits or where a movable scraper is an electrode tip.

SEE OR SEARCH CLASS:

- 15, Brushing, Scrubbing, and General Cleaning, subclass 104.011 for spark plug cleaners, per se.

**128** This subclass is indented under subclass 118. Subject matter having plural ignition spark electrodes which are insulated from the shell, and from each other, each of the so insulated electrodes having its own lead-in structure.

- (1) Note. The spark plug may have three or more ignition spark electrodes, one of which is mounted on the shell, at least two of the others being insulated from the shell and having individual lead-in conductors.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 123+, for spark plugs having plural series connected ignition gaps.  
 140, for spark plugs having a plurality of parallel connected gaps, e.g., having a plurality of ignition spark electrodes connected together which cooperate with the electrode mounted on the shell to form a plurality of parallel connected ignition gaps.  
 306+, and the subclasses specified in the notes thereto for other discharge devices having three or more electrodes.

SEE OR SEARCH CLASS:

- 439, Electrical Connectors, subclasses 626+ and 709+ for electrical connector structure having a plurality of terminals which are insulated from each other mounted upon an insulating member.

- 129** This subclass is indented under subclass 118. Subject matter having a transparent part.

- (1) Note. The transparent part may, for example, make the spark or explosion inside the engine cylinder visible to an observer.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 110+, for spark plugs where the transparent part is an optical device such as, for example, a lens. See subclass 116 where the transparent part has light diffusing properties.  
 120, for spark plugs having fluid feed or air vent means, through which the spark gap may be observed.  
 124, for spark plugs having an intensifier gap and the portion of the plug having the intensifier gap is provided with an

observation window or is made transparent.

- 324, for miscellaneous spark gaps which are provided with a casing having a transparent part.

- 130** This subclass is indented under subclass 118. Subject matter having nonconducting material interposed between or closely adjacent the ignition spark gap.

- (1) Note. The nonconducting material, for example, may be provided with a minute aperture through which the spark must pass, or it may be an impervious barrier between the electrodes.  
 (2) Note. For the purpose of this definition, the material is closely adjacent the spark gap if it is so close that it affects the sparking.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 143, for spark plugs having an insulator end at the ignition spark gap end of the plug of particular shape.  
 325, for miscellaneous spark gaps having an insulator material within or closely adjacent to the spark electrodes.

SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclass 46 for similar subject matter where the material with or closely adjacent the gap is a resistance material.

- 131** This subclass is indented under subclass 130. Subject matter in which the material is so situated that the spark is caused to follow the surface of the insulator or to follow a path which is not the shortest path between electrodes.

- (1) Note. For example, the insulating material may form a barrier between the sparking electrodes so that the spark must jump the barrier.

- 132** This subclass is indented under subclass 118. Subject matter having a groove or analogous surface structure or having a narrow space which is disclosed as drawing or holding fluid by capillary action.

- (1) Note. The fluid, for example, may be condensed oil mist which is drawn away from the electrode points by capillary action.
- (2) Note. The narrow space may be formed, for example, between two facing flat electrodes of extended area positioned closely together.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

141+, and the subclasses specified in the notes thereto, for spark plug ignition electrode structure, not having capillary grooves, in which condensed fluid is drawn away from electrode points by gravity action due to the inclination of a surface of the electrode.

**133** This subclass is indented under subclass 118. Subject matter having an ignition electrode whose shape is that of a ball or a substantial portion of a ball.

- (1) Note. This subclass relates, for example, to spark plugs in which one electrode is a substantially hemispherical or hemispheroidal surface formed of a thin sheet material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

325, and the subclasses specified in the notes thereto for other discharge devices having ball electrodes, and subclass 326 for the electrodes, per se.

**134** This subclass is indented under subclass 118. Subject matter having electrical shielding means to shield the spark plug.

- (1) Note. The shielding means ordinarily are used to prevent the ignition current used with the spark plug from radiating or otherwise establishing unwanted electrical effects.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

313, for other space discharge devices having electric shielding means.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclasses 146.5+ for shielded ignition systems for internal combustion engines.
- 174, Electricity: Conductors and Insulators, subclasses 32 through 397 for electrical conductors having shielding means and subclass 350 for miscellaneous electrical shielding structure including that designed for use with spark plugs or spark plug-type bushings.
- 315, Electric Lamp and Discharge Devices: Systems, subclass 85 for miscellaneous space discharge device systems including some spark ignition systems having shielding means and consult the search notes of subclass 85 for a list of related art.
- 439, Electrical Connectors, subclasses 125+ for an electrical connector with a spark or glow plug cover; and subclasses 607+ for an electrical connector having or providing an inductive or capacitive shield.

**135** This subclass is indented under subclass 118. Subject matter having significant connector structure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 51, for spark plugs having a detachable connector such as, for example, a spark plug with a connector part attached thereto in combination with the connector part attached to the ignition wire and designed to be attached to the spark plug connector.
- 134, for this subject matter wherein the spark plug includes electrical shielding means.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclass 152 for spark plug type bushings (i.e., having no ignition sparking points claimed) in combination with an electrical connector when more bushing structure is recited than is necessary for mounting or supporting the connector.

- 439, Electrical Connectors, appropriate subclasses for an electrical connector and for certain accessories. Class 439 provides for an electrical connector combined with a "named" spark plug, (i.e., no more of the spark plug is claimed than is necessary to support or attach the connector to the spark plug). Search subclasses 125+ for a spark plug connector with a cover, or for a spark plug cover, per se; subclasses 191+ for an electrical connector combined with a fluid line conduit (e.g., air vent or priming means); subclasses 271+ for an electrical connector with a packing or gasket to seal the joint between the connector and a mating connector; subclasses 312+ for an electrical connector with a coupling movement-actuating relatively pivotable concentric ring in addition to the contacts thereof; subclasses 607+ for an electrical connector with a radiation shielding means; and appropriate other subclasses for an electrical connector generally which may be used on a spark plug.
- 136** This subclass is indented under subclass 118. Subject matter in which the portion of the center electrode which is encased by the insulating core structure consists of more than one part.
- (1) Note. For the purpose of classification in this subclass, necessary terminal structure immediately adjacent the end of the insulator shall not be considered to be one of the aforementioned parts, nor shall a coated or covered wire (as, for example, in the cored rod) be considered to be plural parts for classification in this subclass.
- (2) Note. The parts may be physically united as by welding a rod of one metal to a rod of another metal.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
124, for this subject matter where the plural parts are separated so as to form an intensifier gap.
- 137** This subclass is indented under subclass 118. Subject matter having the insulating core formed of a plurality of parts.
- (1) Note. For the purpose of classification in this subclass, stacked parallel laminations of mica will not be considered to be plural members, but mica members whose planes are not parallel (as, for example, a rolled mica tube surrounded by flat mica washers) are considered to be plural members. A thin cement layer which is utilized to adhere together parts of the spark plug or to make joints gas tight is not considered to be an insulating member even though it may, in fact, be an insulator.
- (2) Note. The different parts of the core may be cemented together or may be held together by mechanical means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
130+, for spark plugs having an insulating member in or closely adjacent to the spark gap.
- SEE OR SEARCH CLASS:  
174, Electricity: Conductors and Insulators, subclasses 152+ for insulated bushings, including spark plug type bushings (i.e., not having claimed ignition spark electrodes).
- 138** This subclass is indented under subclass 118. Subject matter having plural ignition electrodes each of which is a pure figure of revolution about the longitudinal axis of the plug.
- (1) Note. Where an electrode is only in part a figure of revolution, such as being a disk and in part not a figure of revolution, such as having a supporting spur, a perforated supporting means or a perforation, classification is not in this subclass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
133, for this subject matter where one of the electrodes is ball shaped.

- 139, and 140, for similar subject matter in which one of the electrodes is not a pure figure of revolution. See subclass 139 where one of the electrodes is a disk or ring and the other electrode is not a pure figure of revolution, or where one electrode is only a section of a disk or ring and subclass 140 where one of the electrodes has a multi-pointed or serrated edge.
- 139** This subclass is indented under subclass 118. Subject matter having an ignition electrode whose shape is that of a ring or disk or a sector of a ring or disk.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 133, for this subject matter having a ball shaped electrode.
- 138, for this subject matter having plural ignition electrodes each of which are pure figures of revolution about the longitudinal axis of the plug, one of the electrodes being a ring or disk.
- 140** This subclass is indented under subclass 118. Subject matter having means to define plural distinct ignition spark gap spaces which are electrically connected in parallel.
- (1) Note. This subclass includes, for example, spark plugs having a plurality of separate center electrodes which are connected in parallel and which all cooperate with one or more other electrodes to define parallel gaps, spark gaps having a multipointed electrode cooperating with another electrode so that each point of the electrode defines a sparking electrode with the other electrode, and spark plugs having a plurality of shell electrodes which cooperate with the same center electrode.
- (2) Note. Some of the spark plugs in this subclass are intended to make the plug efficient over a longer period of time by having the spark shift to another electrode or place on the electrode as the spark gap space widens due to the "pitting" or wearing action of the spark.
- (3) Note. This subclass does not include spark plugs having two electrodes formed of smooth wires or rods which are mounted in parallel or convergent relation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 123+, for spark plugs having plural ignition spark gaps which are electrically connected in series.
- 236, for space discharge devices having a stand-by or spare electrode.
- 306+, for other space discharge devices having three or more distinct electrodes.
- 309, for other space discharge devices having a multipointed or serrated edge electrode, and subclass 351 for the electrodes, per se.
- 141** This subclass is indented under subclass 118. Subject matter having significant ignition electrode structure, interelectrode spacing, or interelectrode spatial relationship, or having an ignition electrode formed of particular material.
- (1) Note. An electrode for a spark plug defined only by the composition of which it is made is not classified herein. Such electrodes are classified elsewhere. See the Search Class notes below.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 122, for this subject matter where the shell electrode is readily removable or demountable.
- 123+, for this subject matter having plural series gaps.
- 132, for this subject matter where an electrode has a capillary groove.
- 133, for this subject matter where an electrode is ball shaped.
- 138, for this subject matter where both electrodes are pure figures of revolution about the plug axis.
- 139, for this subject matter where the electrode is shaped like a ring or disk or sector of a ring or disk.
- 140, for this subject matter having plural distinct parallel gaps, such as, for

- example, those formed between a serrated and a smooth electrode.
- 311, for space discharge devices having electrodes made of particular materials.
- 326+, for miscellaneous discharge device electrode structure.
- SEE OR SEARCH CLASS:**
- 75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, if made of a pure metal, or an alloy subclasses 228+ provides for sintered or consolidated metal powder stock material.
- 148, Metal Treatment, provides for such electrodes defined solely by their metal or alloy composition and which are distinguished by their internal structure or characteristics of the metal or metal alloy (e.g., produced by a Class 148 treatment).
- 428, Stock Material or Miscellaneous Articles, subclasses 544+ provides for electrode materials which as defined are only metal wire or other metallic stock material.
- 142** This subclass is indented under subclass 141. Subject matter in which the spatial relation and construction of the ignition electrodes is such that the spark gap between them coincides with the longitudinal axis of the plug.
- (1) Note. Electrodes of extended area will be considered, for the purpose of classification in this subclass, to have the spark gap on the axis of the plug if the sparking faces of the electrodes are symmetric about the axis and the spacing gap between the electrodes coincides substantially with the axis of the plug. This note is applicable where the electrodes are plane sheets of material spaced along the longitudinal axis of the plug.
- 143** This subclass is indented under subclass 118. Subject matter having means to provide an electrode chamber of significant shape, or having an insulator whose exposed cylinder end has a significant shape, or having a shell skirt
- of particular shape, or having a baffle or gas directing means.
- (1) Note. The insulator end, for example, may be ridged so as to provide a longer leakage current path. The baffle, for example, may prevent oil vapor from reaching the insulator, or it may cause gas currents to concentrate in the vicinity of the electrode points.
- (2) Note. The baffle may or may not be movable.
- (3) Note. Spark plugs in combination with separable adapters are not included herein. See Class 123, Internal-Combustion Engines, subclass 169 for this combination. Adapters which are no more than a pipe fitting with means to attach the plug at one end and the fitting to the plug at the other end and which include joint structure will be found in the appropriate subclasses of Class 285, Pipe Joints or Couplings. Fittings or adapters which include flow regulator or baffle structure are classified in Class 138, Pipes and Tubular Conduits, subclasses 37+.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**
- 127, for spark plugs having a movable cleaner, such as, for example, a movable scraper within the electrode chamber.
- 144** This subclass is indented under subclass 118. Subject matter having significant joint structure.
- (1) Note. Where there is a significant joint between the center electrode and core in addition to a joint between other parts, such as the shell and core, subclass 145 must also be searched.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**
- 119, for spark plugs which are provided with a joint involving structure so that a part of the plug may be removed from operating position without stopping the engine (e.g., the insulator



- may be removed from the shell and means are provided to seal off the opening in the shell).
- 121, where the spark plug is provided with joint structure so that some part (e.g., the insulator) may be removed and replaced in the reverse position.
- 137, for the subject matter when the insulating core is formed of a plurality of parts.
- 238+, especially subclasses 243, 267 and 268 for other space discharge devices with supporting and spacing structures which involve joints between the parts.

## SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclass 169 for spark plugs in combination with an internal combustion engine or engine accessory. Included in Class 123 are joints between the spark plug and the cylinder where significant cylinder structure is recited. Also, included in Class 123 is the combination of a spark plug with an adapter designed to hold the plug at one end and designed to be attached to the cylinder at the other end (e.g., to use a small sized plug in a larger sized cylinder opening).
- 174, Electricity: Conductors and Insulators, subclass 138 for miscellaneous insulated rod joints and subclass 152 for spark plug type electrical bushings (i.e., a spark plug with no ignition sparking electrodes claimed) having joint structure between the parts of the bushing.
- 285, Pipe Joints or Couplings, appropriate subclasses for mere pipe joints including insulated pipe joints.
- 403, Joints and Connections, appropriate subclasses for rod joints of general application. Note that insulated rod joints are in Class 174, subclass 138, or one of the classes specified in the notes thereto.
- 439, Electrical Connectors, subclasses 625+ for an electrical connector mounted on or attached to an electrical insulator.
- 501, Compositions: Ceramic, appropriate subclasses for ceramic compositions

or the electric insulating type, such as cements for joints, and for electric insulators defined merely by their composition, especially subclasses 127+ and 134+ for clay containing compositions; and subclasses 141+ for titanate and similar material containing compositions.

- 145** This subclass is indented under subclass 144. Subject matter in which the said joint is between the center electrode and the insulating core.

(1) Note. This subclass includes spark plugs having a significant joint between the center electrode and the insulating core or significant joint structure between the shell and core in addition to the significant joint between the center electrode and core. Where the only significant joint is between the insulator and the shell, see the Search This Class, Subclass notes below.

(2) Note. to subclass

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 120, where the joint structure includes a fluid valve.
- 124, where there is an intensifier in the center electrode.
- 128, where there is a plurality of insulated center electrodes.
- 136, where the center electrode is made of a plurality of parts.
- 144, where the only significant joint is between the insulator and the shell, and see the search notes for other classes providing for closely related subject matter.

- 146** This subclass is indented under the class definition. Devices having at least one electrode or shield which is movable relative to another electrode or shield or to some other part of the device.

(1) Note. This subclass includes devices where the electrode or shield is designed to be moved during the operation of the device and also includes devices where the electrode or shield is mounted so as

to be moved for adjustment and need not be moved during the operation of the device. For example, included in this and the indented subclasses are spark gaps having one of the electrodes mounted by means of screw threads so that the electrodes can be moved closer or further apart.

SEE OR SEARCH THIS CLASS, SUBCLASS:

125+, where the device is a spark plug.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclasses 29, 39+, and 94 for electrical precipitators which have movable electrodes.

191, Electricity: Transmission to Vehicles, appropriate subclasses for means for transmitting electricity from a fixed point or contact to an object which is movable.

314, Electric Lamp and Discharge Devices: Consumable Electrodes, appropriate subclasses for arc lamps and similar discharge devices of the consumable electrode type having an electrode which is movable in order to feed it towards another electrode to maintain the proper length discharge space as the electrode is consumed by the discharge.

315, Electric Lamp and Discharge Devices: Systems, subclasses 327+ for systems for supplying electrical energy to discharge devices which are designed to be started by placing the electrodes into contact with each other and then separating the electrodes from each other (e.g., which have a movable electrode), and subclass 357 for electric systems for supplying electrical energy to other discharge devices of the gas or vapor type which have a movable electrode.

378, X-Ray or Gamma Ray Systems or Devices, subclass 135, where the device is an X-ray tube.

**147** This subclass is indented under subclass 146. Devices having a plurality of movable electrodes or shields.

SEE OR SEARCH CLASS:

314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 51+, for discharge devices of the consumable electrode type (e.g., arc lamps) which have a plurality of movable electrodes.

**148** This subclass is indented under subclass 146. Devices which are provided with an envelope and which have a portion of the envelope wall movable, the means for moving the electrode or shield being connected to the movable envelope wall.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 17.8 for miscellaneous structures for transmitting mechanical motion through a wall by means including an imperforate movable envelope wall portion.

403, Joints and Connections, subclasses 230+ for joints between a rod-like body transverse to a plate-like body.

**149** This subclass is indented under subclass 146. Devices in which the movable electrode or shield is mounted so as to rotate.

SEE OR SEARCH CLASS:

314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 42+ for discharge devices of the consumable electrode type (e.g., arc lamps), which are provided with rotary electrodes.

378, X-Ray or Gamma Ray Systems or Devices, subclass 135, for this subject matter where the device is an X-ray generator.

**150** This subclass is indented under subclass 146. Devices having a movable liquid electrode.

(1) Note. Since all devices having liquid electrodes may have the electrode moved by tilting the device so as to cause the electrode to flow, this subclass includes only those devices which are provided with a liquid electrode which may be moved by means other than the mere tilting of the device. Some of the

devices in this subclass have means for changing the level of a liquid electrode and some are provided with means for producing a jet or fountain of liquid from the region of the liquid electrode for starting a discharge, but the subclass is not limited to such types.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

163+, for other discharge devices under the class definition which are provided with liquid electrodes.

**SEE OR SEARCH CLASS:**

315, Electric Lamp and Discharge Devices: Systems, subclasses 327+ for systems for supplying electrical energy to discharge devices which have a liquid electrode and which are provided with means for moving the liquid electrode into contact with another electrode to start the device into operation, see subclasses 328+ where the device is designed to be started by tilting the discharge device so as to bring the liquid electrode into contact with another electrode.

362, Illumination, subclasses 263+ for liquid electrode type lamps (e.g., mercury vapor lamps) in combination with a separable support for the lamp.

**151** This subclass is indented under subclass 146. Devices having thermally operable means for moving the electrode or shield.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

146+, for movable electrode discharge devices in which an electrode is moved by the blast of gas or fluid which results from vaporization or thermal expansion of the gas or fluid due to the presence of a space discharge. Such thermal vaporization or expansion is not deemed to be "thermally actuated" for subclass 151.

**SEE OR SEARCH CLASS:**

314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 89+ for discharge devices of the consumable electrode type

(e.g., arc lamps) which are provided with a thermostatic means for moving the electrodes.

315, Electric Lamp and Discharge Devices: Systems, subclass 39.59 for discharge devices having an electrode formed so as to provide a structure having distributed inductance and capacitance and operable in a magnetic field (e.g., magnetrons), the device having thermally actuated means for varying the tuning of the reactive structure, subclasses 331+, for systems for supplying electrical energy to discharge devices of the gas or vapor type including those which are provided with a liquid electrode where the discharge device is provided with an auxiliary starting electrode which is moved into contact with and then separated from one of the principal electrodes by thermostatic means to start the discharge device.

**152** This subclass is indented under subclass 146. Devices having a magnetic means for moving the electrode or shield.

(1) Note. The magnetic means may be an electromagnet connected in circuit with an electrode. A mere conductive connection is not sufficient circuit to exclude the organization from Class 313.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

153+, and the subclasses specified in the notes thereto for other devices under the class definition which are provided with a magnetic device.

**SEE OR SEARCH CLASS:**

314, Electric Lamp and Discharge Devices: Consumable Electrodes, for consumable electrode type arc lamps and other consumable electrode type discharge devices having magnetic means for feeding one of the electrodes towards the other electrode as it or they are consumed in the discharge or for separating the electrodes from

- each other to start the space discharge. See especially subclasses 66+, 69+, 78, 105+, and 113+; not that subclasses 69+, provides for rotary electric motors while the other subclasses mentioned provide for electromagnets.
- 315, Electric Lamp and Discharge Devices: Systems, subclass 39.59 for discharge devices having an electrode formed so as to provide a structure having distributed inductance and capacitance and operable in a magnetic field (e.g., magnetrons), the device being provided with magnetically actuated means for varying the impedance of the distributed impedance structure, subclasses 331+ for systems for supplying electrical energy to discharge devices of the gas or vapor type including those which are provided with a liquid electrode where the discharge device is provided with an auxiliary starting electrode which is moved into contact with and then separated from one of the principal electrodes by magnetic means to start the discharge device.
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 220+ for electromagnets with armatures.
- 153** This subclass is indented under the class definition. Subject matter where the lamp or discharge device has a magnetic device associated therewith.
- (1) Note. Many of the devices in this and the indented subclasses are discharge devices in which the magnetic field is designed to influence the space discharge but these subclasses are not limited to such devices.
- (2) Note. This and the indented subclass includes devices in which an electrode generates the magnetic field, such as having an electrode made in coil form to generate the magnetic field.
- (3) Note. Where the lamp or discharge device is provided with an envelope, the magnetic field generating means may be within or without the envelope.
- (4) Note. See the class definition for the classification of deflection and focusing magnets.
- (5) Note. The magnetic means may be an electromagnet connected in circuit with an electrode. A mere conductive connection is not sufficient circuit to exclude the organization from Class 313.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 62, for cyclotrons which include magnetic means.
- 152, for devices under the class definition which are provided with a movable electrode and with magnetic means for moving the electrode.
- 421, 426, 427, 433, and 440, for cathode-ray tubes provided with magnetic means for deflecting a beam of electrons.
- 442, for cathode-ray tubes provided with means to focus a beam of electrons.
- SEE OR SEARCH CLASS:
- 218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclass 22 for electric switches provided with magnetic means for suppressing arcs when the circuit is opened.
- 250, Radiant Energy, subclasses 281+ for methods and apparatus for ionic separation or analysis (e.g., mass spectrometry) particularly subclass 296 for plural diverse field type ion path selecting means and subclasses 298+ which include magnetic means for detecting the movement of ionic particles, subclass 309 for positive ion microscopes and subclasses 396+ for electron or ion beam deflection or focussing means which may include a magnetic deflection or focussing member.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclass 20 for consumable electrode type discharge devices (e.g., arc

- lamps) provided with magnetic means for influencing the space discharge.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 40 and 41+ for discharge devices of the magnetron type, that is, discharge devices which are provided with magnetic means for influencing the space discharge and which have the electrodes formed as inductive impedances (e.g., resonators) or which have the electrodes connected by inductive impedances; subclasses 236, 267, 338, and 344+ for electrical systems for supplying electrical energy to electric lamps or discharge devices of the gas or vapor type, where the lamp or discharge device is provided with an electromagnet for influencing its operation.
- 327, Miscellaneous Active Electrical Non-linear Devices, Circuits, and Systems, subclasses 510+ for miscellaneous circuits which are magnetically effected.
- 331, Oscillators, subclasses 5 and 86+ for electrical oscillators utilizing a magnetically controlled space discharge device (e.g., magnetron).
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 210+.
- 373, Industrial Electric Heating Furnaces, subclasses 64 and 107, for electric arc furnaces in which the arc is deflected out of its normal path by a magnetic field.
- 376, Induced Nuclear Reactions: Processes, Systems, and Elements, subclasses 100+ for the use of magnetic devices in apparatus for containing a plasma yielding, or intended to yield, thermonuclear reactions.
- 154** This subclass is indented under subclass 153. Subject matter where the lamp or discharge device has a plurality of magnetic devices and/or having magnetic means for producing a plurality of distinct magnetic fields.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
421, 426, 427, 433, and 440, for cathode-ray tubes provided with magnetic
- means for deflecting a beam of electrons.
- 442, for cathode-ray tubes provided with means to focus a beam of electrons.
- SEE OR SEARCH CLASS:  
315, Electric Lamp and Discharge Devices: Systems, subclass 343 for systems for supplying electrical energy to discharge devices of the gas or vapor type having a plurality of electromagnetic means for influencing the discharge.
- 155** This subclass is indented under subclass 153. Subject matter in which at least a portion of the means for generating the magnetic field is an electrode of the lamp or discharge device.
- (1) Note. Examples of the devices in this subclass are devices in which a pole face of the magnet also acts as a discharge electrode and devices in which an electrode is formed into a coil so that the current therethrough will produce a magnetic field.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
342, for the structure of noninductive filaments.
- SEE OR SEARCH CLASS:  
315, Electric Lamp and Discharge Devices: Systems, subclass 40 for lamps and discharge devices which have an electrode formed as an inductive impedance. Included in subclass 40 are "magnetrons" having plural anodes, the anodes and the connection therebetween forming "cavity resonators" (e.g., inductive impedances). Similar magnetrons will be found in subclass 42 of Class 315, where the plural anodes are connected by inductive impedances.
- 156** This subclass is indented under subclass 153. Subject matter which includes a discharge device, the magnetic field generating means being arranged so that the generated magnetic field extends transversely of the discharge space between the discharge electrodes.

- SEE OR SEARCH CLASS:  
 315, Electric Lamp and Discharge Devices: Systems, subclass 39.71 for discharge, devices having an electrode formed so as to provide a structure having distributed inductance and capacitance, and operable in a magnetic field (e.g., magnetrons), the device having significant magnetic field generating or pole structure.
- 157** This subclass is indented under subclass 156. Subject matter in which one or more elongated tubular electrodes (e.g., anode and/or grid) surrounds another elongated electrode (e.g., cathode), the magnetic means being arranged to generate a magnetic field which extends along the axis of the elongated electrodes.
- 158** This subclass is indented under subclass 157. Subject matter in which the magnetic means includes magnetic poles which extend across and face the ends of the concentrically arranged elongated electrodes and are axially spaced from the electrodes.
- (1) Note. The magnetic pole piece faces are usually planar and mutually parallel.
- 159** This subclass is indented under subclass 158. Subject matter wherein at least one of the magnetic pole pieces has an opening therein and an electrode supporting member extends into the opening in the pole piece.
- 160** This subclass is indented under subclass 153. Subject matter wherein the lamp or discharge device is provided with an envelope.
- (1) Note. The magnetic field generating means may be within or without envelope.
- 161** This subclass is indented under subclass 160. Subject matter wherein the envelope contains a gas or vapor.
- (1) Note. This subclass includes discharge devices having a gas or vapor at a sufficient pressure to cause ionization of the gas or the electric discharge and devices wherein the claims state that the device contains a gas or vapor.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 567, and the subclass specified in the notes thereto for other devices under the class definition which are provided with an envelope and a gas or vapor atmosphere.
- 162** This subclass is indented under subclass 160. Subject matter where the lamp or discharge device has three or more electrodes.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 306+, and the subclasses specified in the notes thereto, for other discharge devices under the class definition which have three or more electrodes.
- 163** This subclass is indented under the class definition. Discharge devices having at least one liquid electrode.
- (1) Note. Included in this and the indented subclasses are discharge devices which have mercury or mercury amalgam electrodes and discharge devices having electrodes made of material which becomes liquid only during the operation of the discharge device.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 7, for liquid electrode discharge devices in combination with an evacuating pump.  
 16, for liquid electrode discharge devices in combination with electric heater means for heating the liquid electrode.  
 18+, for liquid electrode discharge devices such as mercury vapor rectifiers which are provided with a metallic envelope and a casing or jacket enclosing the envelope and having means for modifying the temperature of the discharge device.  
 22+, for liquid electrode discharge devices provided with a casing or jacket and means for circulating a heat transfer fluid in contact with the discharge device.  
 29, for miscellaneous liquid electrode discharge devices with means for modi-

- 33, fying the temperature of the liquid electrode.  
and the subclasses specified in the notes thereto for liquid electrode discharge devices provided with an envelope and an internal temperature modifying baffle for modifying the temperature of the vapor within the envelope.
- 34, for liquid electrode discharge devices provided with an envelope which has condensing chamber or surface for condensing the electrode vapor into liquid form.
- 150, for liquid electrode discharge devices wherein the liquid electrode is movable.
- 328, for liquid electrode receptacles for use with liquid electrode discharge devices.
- 549+, for discharge devices under the class definition which are provided with means, such as a body of mercury, which is designed to be vaporized during the operation of the device to supply the gas or vapor atmosphere in the device, see subclasses 559+ where the electrode is formed of or is coated with a material (e.g., an alkali metal) which vaporizes during the operation of the device to supply the gas or vapor atmosphere in the device.
- SEE OR SEARCH CLASS:**
- 200, Electricity: Circuit Makers and Breakers, subclasses 61.05, 61.47, 80, 81.6, and 182+ for liquid contact electric switches in which an electric circuit is made through a conducting liquid.
- 218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclasses 1+ for liquid contact electric switches in which an electric circuit is made through a conducting liquid.
- 315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses for systems for supplying electrical energy to liquid electrode lamps during the starting and operating periods. See subclasses 289+, where the system includes means for generating a surge of potential during the starting period. See subclasses 327+, where
- the electrodes are in contact with each other during the starting. See subclasses 328+, where the discharge device is tilted to flow the liquid electrode into contact with the other electrode. See subclasses 330+ and 335+ where the device is provided with an auxiliary starting electrode.
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 47+ for electromagnetically operated switches utilizing conductive liquid.
- 164** This subclass is indented under subclass 163. Discharge devices provided with means to prevent damage to the device by movement of the liquid during handling.
- 165** This subclass is indented under subclass 163. Discharge devices having a plurality of liquid electrodes.
- (1) Note. One of the liquid electrodes may be an auxiliary starting electrode, an auxiliary holding electrode, or both liquid electrodes may be principal discharge electrodes.
- 166** This subclass is indented under subclass 163. Discharge devices having an envelope and having an electrode exteriorly of the envelope.
- (1) Note. This subclass includes discharge devices provided with two electrodes within the envelope and a metal band surrounding the envelope in the vicinity of the liquid electrode. The external electrode may also be a conductor member exterior of the envelope which extends from one of the electrodes into the vicinity of the liquid electrode. Also included are envelopes having re-entrant portions, a wire or rod electrode being within the re-entrant portion and exterior to the space enclosed by the envelope. The auxiliary electrodes in the devices in this subclass are often used to electrically stress the region near the liquid electrode to facilitate the initiation of the discharge in the device.

## SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 349+ and the subclasses specified in the notes thereto, for miscellaneous systems for supplying electrical energy to discharge devices of the liquid electrode type which are provided with a discharge controlling means, (e.g., external electrode).

329, Demodulators, appropriate subclasses and particularly subclass 368 for an amplitude modulation demodulator utilizing an electron discharge device which may include an exterior liquid electrode.

**167** This subclass is indented under subclass 163. Discharge devices having a liquid electrode and another principle discharge electrode (e.g., anode) and having a grid electrode or other apertured electrode located in the discharge space between the liquid electrode and the other principle electrode.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

326, for the miscellaneous electrodes which are provided with only a single aperture.

348+, for the structure of grid electrodes and other foraminous electrodes.

356, for the structure of tubular and other hollow sleeve-like electrodes.

597+, for gas or vapor discharge devices which are provided with a grid or apertured electrode interposed in the discharge space, the grid or apertured electrode and the anode being within a hollow shield. The structures in subclasses 597+ are closely analogous to those used with liquid electrode discharge devices. Also 597+, for other discharge devices having an envelope and a confined atmosphere or gas or vapor which have a grid or other apertured electrode interposed in the discharge space between the cathode and the anode.

## SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 349+ and the subclasses specified in the notes thereto for systems for supplying electrical energy to gas or vapor discharge devices and to liquid electrode discharge devices which have control electrodes.

**168** This subclass is indented under subclass 163. Discharge devices having an envelope which is formed so as to have a portion for the liquid electrode and at least two separate anode chamber portions with anodes therein.

(1) Note. In the structures in this subclass, the anode chambers serve to shield the anodes from each other so that discharges from one anode to another are made more difficult.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

34, for liquid electrode devices which are provided with a condensing chamber and separate anode chambers for the anodes.

169, for the liquid electrode discharge devices which have a plurality of anodes with shielding means to prevent discharges between the anodes.

634+, for gas or vapor type discharge devices which are distinguished by the envelope structure.

## SEE OR SEARCH CLASS:

220, Receptacles, subclasses 2.1+, for the structure of envelopes, per se, for discharge devices.

**169** This subclass is indented under subclass 163. Discharge devices which has a plurality of anodes and which have a shield interposed between two of the anodes to prevent discharges from one anode to the other.

(1) Note. In some of the devices in this subclass, each of the anodes is surrounded by a tubular sleeve which is the anode shield.



SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 239, for miscellaneous supporting structures for shields.
- 326+, for miscellaneous shield structures, note subclass 356 for the structure of tubular or hollow sleeve-like shields.
- 590, for other gas or vapor type discharge devices which have a shield interposed between two of the anodes to prevent a discharge therebetween.
- 597+, for gas or vapor type discharge devices which are provided with a hollow shield which encloses an anode and a grid-like electrode, the shield serving to prevent undesired discharges to the anode.
- 614, for gas or vapor type discharge devices which are provided with an anode shield to prevent undesired discharges to the anode.

**170** This subclass is indented under subclass 163. Discharge devices having an auxiliary starting or holding electrode in addition to the principal discharge electrodes.

- (1) Note. See the glossary in the class definition for the definition of “auxiliary starting electrode” and “holding electrode”.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 146+, where the auxiliary electrode is movably mounted so that it may be brought into contact with the liquid electrode, see indented subclass 150, where the auxiliary electrode is a movable liquid electrode.
- 596, and 601+, for other gas or vapor type discharge devices within the class definition which have an auxiliary starting electrode.

SEE OR SEARCH CLASS:

- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclass 34, for discharge devices of the consumable electrode type (e.g., arc lamps) which are provided with an auxiliary starting electrode.

- 315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses, for systems for supplying electrical energy to liquid electrode discharge devices during the starting and operating periods; see subclasses 289+, where the systems include means for generating a surge of potential during the starting period, subclasses 330+, where the auxiliary electrode and one of the principal electrodes are brought into contact with each other during the starting operation, and subclasses 335+, for the miscellaneous systems where the discharge device is provided with an auxiliary starting or holding electrode.

**171** This subclass is indented under subclass 170. Discharge devices in which the auxiliary electrode is in contact with or is wholly or partially immersed in the liquid electrode.

- (1) Note. This subclass includes discharge devices where the auxiliary electrode is encased in an insulating covering, the insulated electrode being wholly or partially immersed in the liquid electrode. Also included are discharge devices which have a starting electrode of the “ignition” type (e.g., an electrode of high resistance material) which is in contact with the liquid electrode.

**172** This subclass is indented under subclass 163. Discharge devices in which the liquid electrode makes contact with a plurality of other electrodes.

- (1) Note. This subclass includes discharge devices having two electrodes which are wholly or partially immersed in a conducting liquid (e.g., mercury), there being no electrical contact to the liquid excepting that made by the electrodes which are immersed in it. The devices in use are intended to volatilize the liquid thereby interrupting the circuit between the two electrodes to establish a discharge, the liquid forming the gas or vapor in which the discharge is to be maintained.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

232, for discharge devices in which the electrodes are immersed in a nonconducting liquid, the discharge creating a path for itself through the liquid.

**173** This subclass is indented under subclass 163. Discharge devices provided with means to prevent the discharge from wandering over the surface of the liquid electrode.

(1) Note. Examples of the devices found in this subclass are liquid electrode discharge devices having a pointed rod extending from the liquid electrode and discharge devices having restricting means such as an apertured baffle so that the discharge must pass through the aperture to reach the liquid electrode.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

328, for liquid electrode receptacles for use with liquid electrode discharge devices.

**230** This subclass is indented under the class definition. Discharge devices which are provided with an electrode or other device for emitting positive ions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

163+, for discharge devices which have a liquid electrode (e.g., mercury), which is the source of positive ions during the operation of the device.

359.1+, for discharge devices provided with means to form and accelerate positive or negative ions.

567, for discharge devices which are provided with an envelope containing an atmosphere of gas or vapor, the gas or vapor being ionized in the operation of the device and therefore being a source of positive ions.

**231.01 FLUENT MATERIAL SUPPLY OR FLOW DIRECTING MEANS:**

This subclass is indented under the class definition. Subject matter including (a) means to direct the flow of fluent material into the dis-

charge area of a discharge device, (b) means to direct the flow of fluent material into contact with some part of the device, (c) means to direct the flow of gas vapor or smoke generated by an electrode in the operation of the device, or (d) means to direct the flow of gases or vapors which are caused to circulate due to having been heated by an electrode, the space discharge, or other part of the device.

(1) Note. This subclass includes both lamps and space discharge devices with fluent material flow directing means. The space discharge devices in this and indented subclasses are not restricted to discharge devices having discharge electrodes but include discharge devices with an electrodeless discharge, for example, an induction-type discharge device.

(2) Note. Smoke as used in this subclass includes all particles given off by the filament or an electrode in the operation of the device.

(3) Note. Patents disclosing incandescent lamps and discharge devices having an envelope enclosing a gas or vapor, the device being provided with means to direct the flow of the gas or vapor which circulates within the envelope due to the gas or vapor becoming heated are cross-referenced to this subclass.

(4) Note. See the class definition for a reference to other classes which provide for the treating of fluids with ray energy, electrons, or ions generated by space discharge devices or lamps.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

33, where the device is provided with an envelope and in internal temperature modifying baffle.

34, where the device is provided with an envelope which has a condensing chamber or surface for condensing the vapors within the envelope.

35+, for devices which are provided with means for directing the flow of a temperature modifying fluid to some part of the device.

- 120, for spark plugs provided with means to supply fluid from the exterior of the spark plug to the electrode chamber (e.g., with a priming cup).
- 143, for spark plugs having the electrode chamber shaped so as to direct the flow of gas or vapor.
- 359.1+, for ion generators with means for accelerating the ions.
- 564, where the device is provided with an envelope and contains a getter or a gas or vapor generating material within the envelope and is provided with means for causing the material deposited from the getter or vapor to deposit in a particular place within the device.
- 609+, for discharge devices which are provided with an envelope containing a gas or vapor and which have a partition, baffle, constricting means, or a portion of the envelope wall between the discharge electrodes to alter the direction of the discharge or to constrict the area of the discharge path within the device.
- 626, for devices which are provided with an envelope containing a gas or vapor and which have shielding means for the electrode lead-in or electrode support to prevent the deposited material from being deposited in contact with the electrode lead-in or support.
- SEE OR SEARCH CLASS:**
- 96, Gas Separation: Apparatus, subclasses 15+ for electrostatic precipitators having analogous structure.
- 250, Radiant Energy, subclass 251 for devices for producing and propagating a unidirectional stream of neutral molecules or atoms through a vacuum, usually with thermal velocity; subclasses 281+ for methods and apparatus for ionic separation or analysis; especially subclass 288 which includes a sample supply or invisible radiation responsive gas; subclasses 379+ for discharge device apparatus which includes means to supply the gas into the discharge devices; subclasses 396+ for means to deflect, scan, spread, or focus a performed beam of ions; and subclasses 423+ for ion generation methods and apparatus in which a material is treated or irradiated.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclass 20 for discharge devices of the consumable electrode type (e.g., arc lamps) which are provided with means for directing a fluent material into the discharge space to deflect the discharge out of its normal path; subclass 22 for consumable electrode discharge devices which have means to feed a fluent material (which may be solid particles) to the discharge space; and subclasses 26+ for consumable electrode discharge devices which are provided with a ventilator or fume director, see especially indented subclass 28.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 111.01+ for discharge device load with fluent material supply to the discharge space.
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclass 210 for ion or electron beam deflecting magnets, per se, and the search notes thereto for combinations including such magnet means.
- 376, Induced Nuclear Reactions: Processes, Systems, and Elements, subclasses 100+ for processes or devices for directing or injecting electrically charged or accelerated particles into a plasma body wherein the intent is to obtain a nuclear fusion reaction.
- 231.11 Lightning or surge arrester:**  
This subclass is indented under subclass 231.01. Subject matter including two electrodes designed and positioned to provide an internal series gap to protect an electric apparatus from high transient voltages.
- 231.21 Expulsion type:**  
This subclass is indented under subclass 231.11. Subject matter including an arcing chamber in which a gas evolving or other arc-extinguishing material is brought into contact with the arc to interrupt the follow current.

**231.31 Plasma:**

This subclass is indented under subclass 231.01. Subject matter including means for producing a plasma.

- (1) Note. Usually plasmas have a neutral net charge, but not necessarily so.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

231.71, for arc discharge devices which produce visible light.

**231.41 Arc discharge type:**

This subclass is indented under subclass 231.31. Subject matter including two electrodes between which an arc is developed and including structure to direct the produced plasma in a direction out of the device.

**231.51 With tangential fluent supply:**

This subclass is indented under subclass 231.41. Subject matter including means for directing fluent material to the area of the arc and tangentially with respect to the direction the plasma is directed.

**231.61 Electromagnetic output (i.e., light):**

This subclass is indented under subclass 231.41. Subject matter including means to provide a visible light output.

**231.71 Arc discharge lamp or radiation source:**

This subclass is indented under subclass 231.01. Subject matter including two electrodes between which an arc is developed and wherein the arc is the source of radiant energy.

**232** This subclass is indented under the class definition. Devices having an electrode which is wholly or partially immersed in a liquid.

- (1) Note. This subclass includes discharge devices which have the electrode wholly or partially immersed in a nonconducting liquid. Where the electrodes are immersed in a conducting liquid see the subclasses referred to in the search notes below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

35, and the subclasses specified in the notes thereto for devices which using liquids or which have means for directing the flow of a fluid towards some part of the device for the purpose of modifying the temperature of the device.

163+, and the subclasses specified in the notes thereto, for discharge devices which are provided with a liquid electrode. In the devices in subclasses 163+ the liquid electrode ordinarily has a lead-in wire immersed in the liquid and another electrode which may also be liquid which is not immersed in the liquid. However, see the reference to subclass 172, *infra*. See subclass 171 where the discharge device is provided with an auxiliary starting electrode which is wholly or partially immersed in the liquid electrode. See subclass 172 where a plurality of non-liquid electrodes are immersed in a liquid electrode which is vaporized during the operation of the discharge device the liquid supplying the vapor atmosphere for the device and serving to initiate the discharge between the nonliquid electrodes.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclasses 61.05, 61.47, 81.6, 141, and 182+ for liquid contact switches.

218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclasses 1+ for liquid contact switches.

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 47+ for electromagnetically actuated liquid contact switches.

361, Electricity: Electrical Systems and Devices, subclass 435 for electrolytic interrupters.

**233** This subclass is indented under the class definition. Devices which include an envelope and which are defined by the degree of vacuum in the envelope.

- (1) Note. The devices in the subclass contain no appreciable amount of gas and are intended to be operated as vacuum devices. However, merely defining a device as a vacuum device will not be sufficient to cause classification of the patent in this subclass unless the degree of vacuum is specified. Devices defined merely as vacuum devices are classified in the other appropriate subclass in this class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 567, for devices with a gas or vapor in the envelope even though the device is not intended to be operated with ionization of the gas or vapor; if the claims state that the device contains a gas or vapor, the patent is classified in subclass 567 even though the pressure is such that the device has the characteristics of a vacuum device. See (1) Note, above.
- 577, for such gas or vapor devices where the pressure is only a hundred microns (0.1 mm.) or less.

**234** This subclass is indented under the class definition. Discharge devices which include an envelope and which have at least one electrode of the device exterior to the space enclosed by the envelope.

- (1) Note. Some of the discharge devices in this subclass have one or more electrodes within the envelope and another electrode exterior to the envelope. For example, the discharge device may have a cathode and an anode within the envelope, and a control electrode exterior to the envelope.
- (2) Note. This subclass does not include devices under the class definition which have an envelope formed in whole or part of metal or other conductive material and being designed for use as an

electrode. For such devices, see the subclasses referred to under "SEARCH THIS CLASS, SUBCLASS" below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 166, where the discharge device is provided with a liquid (e.g., mercury) electrode.
- 246+, for discharge devices which include an envelope, a part of the envelope being formed of metal or conductive material which is designed for use as an electrode, the device including means for supporting and/or spacing a plurality of electrodes in the envelope.
- 607, where the envelope contains a gas or vapor (i.e., gas or vapor type discharge devices).

SEE OR SEARCH CLASS:

- 329, Demodulators, appropriate subclasses and particularly subclass 368 for an amplitude modulation demodulator utilizing an electron discharge device which may include an exterior electrode.

**235** This subclass is indented under the class definition. Devices which include a plurality of electrodes which are maintained in imperfect electrical contact, the devices being designed so that the passage of electrical current from one electrode to the other will either produce light or cause the electrodes to be heated adjacent the ends of the electrodes which are in contact with each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 315+, and the subclasses specified in the notes to the definition of those subclasses for other incandescent lamps.

SEE OR SEARCH CLASS:

- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, appropriate subclasses, for consumable electrode devices (e.g., arc lamps) which are provided with means for feeding one electrode towards the other as the electrode is consumed.

**236** This subclass is indented under the class definition. Devices which have a plurality of similar electrodes and which are provided with means other than the mere terminals of the electrodes so that one of the similar electrodes can be used to the exclusion of the other, the means being capable of selecting either of the similar electrodes for use.

- (1) Note. Some of the devices in this subclass are designed so that one electrode may be used until the electrode fails to operate properly and then another electrode may be substituted for the electrode which failed.
- (2) Note. This subclass does not include devices, which include no more structure than a device having the electrodes connected to separate terminals so that different electrodes may be selectively energized by connecting their respective terminals to proper sources of electrical current or potential without altering in any way the structure of the lamp or discharge device. For example, excluded is a multiple filament lamp which is provided with three or four terminals so that either filament may be energized by connecting the current supply conductors to the proper filament terminals. Also excluded is the control grid type discharge device which may be operated as a diode rectifier by either connecting the control grid to the anode or leaving the control grid unconnected. The devices in this subclass include some structure in the lamp or discharge device which is provided only to make it possible to selectively use the electrodes. For example, included in this subclass are two filament devices having three terminals for the filaments, one terminal being covered by insulation until one of the filaments fails when the insulation is removed and the other filament used. Also included are devices having two filaments with two terminals, one filament not being connected to a terminal, the device being provided with means for connecting the second filament to the terminals when the first filament fails.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 52, for devices under the class definition which are provided with means for converting the device into a different type of device, such as converting a three electrode discharge device so that it operates as a two electrode device.
- 121, for spark plugs having reversible parts so that a new part can be substituted for a worn part by reversing a part (e.g., as the core and center electrode).
- 128, for spark plugs having a plurality of center electrodes so that one may be used when the other is worn.
- 140, for spark plugs having a plurality of electrodes or an electrode with plural joints cooperating with another electrode so that as one electrode wears and the spark gap becomes too wide the spark will form between another electrode or electrode point (e.g., multigap spark plugs).
- 237, for devices under the class definition which are provided with means for replacing an electrode which is defective or which are provided with an envelope and parts that are made so that the device can be readily disassembled to repair a defective portion of the device.
- 306+, and the subclasses specified in the notes to the definition of those subclasses for discharge devices with three or more electrodes.
- 316, and the subclasses specified in the notes to the definition of those subclasses for lamps having a plurality of filaments or glowers.

SEE OR SEARCH CLASS:

- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 1+ for discharge devices of the consumable electrode type (e.g., arc lamps and similar devices provided with means for feeding the electrodes together) which have means for substituting one electrode for another when the first electrode is consumed or fails to operate properly.

315, Electric Lamp and Discharge Devices: Systems, subclasses 32+ for electric lamps and discharge devices which have structurally combined therewith a circuit element, such as a switch or fuse, which circuit element may be for the purpose of permitting the selective use of the electrodes of the device, see especially indented subclass 65 for lamps and discharge devices which include a plurality of filaments, one of which is maintained in nonoperated condition while another is in operative condition and which have means for automatically substituting the nonoperating filament for the operating filament when either the operating filament fails or when the conditions of the supply circuit change so that it is desirable that the nonoperating filament be substituted for the operating filament. Subclasses 88+, for systems for supplying electrical energy to lamps and discharge devices which are provided with means for automatically substituting another electrode in the lamp or discharge device for an electrode which has failed or which is provided with means for substituting another lamp or discharge device for a lamp or discharge device which has failed.

**237** This subclass is indented under the class definition. Devices which are provided with an envelope and which have means for replacing a defective electrode, or which the envelope and parts of the device made so the device can be readily disassembled to repair or replace a part of the device.

(1) Note. Included in this subclass are devices provided with glass or other envelopes which are made so that the envelope can be readily opened or an opening made therein so that a new electrode can be inserted in the device. Also included are devices which have an electrode in the envelope not mounted on its supports or in position for use and which include means so that the electrode can be brought into position on the supports to replace a defective electrode. The defective electrode is usually removed

from contact with its lead wires or supporting means and a new electrode substituted for the defective electrode, the defective electrode being stored within the device or entirely removed from the device. Where the device has a plurality of electrodes which are provided with individual lead wires or supporting means, one electrode remaining inactive while another is active, means being provided to change the connections to the terminals of the electrodes so that the inactive electrode may be used if it is so desired, see subclass 236 of this class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 118+, for spark plugs which are demountable see subclass 119 where the spark plug is provided with sealing off means so that a part (e.g., the core) can be removed and repaired without stopping the ending, subclass 121 where the repair is made by reversing the position of a part (e.g., of the insulator), subclass 122 where the spark plug has a removable electrode on the shell, and subclasses 144+ for spark plugs with particular joint structure permitting disassembly of the plug.
- 236, where the device includes a plurality of electrodes and which are provided with means so that one electrode can be used to the exclusion of another until the first electrode fails and has means for substituting the second electrode therefor. See (1) Note above.
- 314, for devices under the class definition which are especially designed to be nonrepairable.

SEE OR SEARCH CLASS:

- 220, Receptacles, subclasses 2.1+ for envelopes, per se, for lamps and discharge devices.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 1+ for discharge devices of the consumable electrode type (e.g., arc lamps and similar devices provided with means for feeding the electrodes together) which have means for replacing and electrode with another

- when the first electrode is consumed or fails to operate properly.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclass 2 for methods for repairing electric lamps and discharge devices and subclass 61 for the corresponding apparatus.
- 238** This subclass is indented under the class definition. Devices having means for supporting an electrode or a shielding structure, and/or provided with means to space an electrode, or a shield, or a support for an electrode or shield with respect to another part of the device.
- (1) Note. This and the indented subclasses provide only for patents which claim significant supporting and/or spacing structure for the electrode or shield. Where the claim broadly recites supporting and/or spacing means for the electrode and shield and no structure of the supporting and/or spacing means is included in the claim, the patent is excluded from this and the indented subclasses and will be found in one of the other appropriate subclasses of this class. Where the patent for the device discloses or claims structure in addition to the supporting and/or spacing structure for an electrode or a shield, the patent is classified in this or one of the indented subclasses, and is cross-referenced for the additional structure to the other subclasses below these subclasses. This and the indented subclasses also include cross-references of lamps and discharge devices which disclose specific supporting and/or spacing structure for an electrode or shield which are classified in the preceding subclasses.
- (2) Note. A spacer is a means, such as a rod, bar, or plate, provided to maintain an electrode or shield or a supporting member in spaced relation with respect to another part of the device, and is usually in addition to the means for supporting the electrode or shield with respect to the supporting base or envelope of the device. Members interposed between two different electrodes or electrode supports are considered spacing members.
- Members interposed between an electrode and the envelope of the device which are not intended to support the mass of the electrode with respect to the envelope are spacing members. Where one electrode is mounted upon a second electrode, as for example, being wound upon or coiled about the second electrode, the second electrode is a spacing member. Spacers are usually mounted upon, and supported by, an electrode or electrode support, but a spacer interposed between two electrodes may serve to at least partially support the third electrode with respect to a supporting base.
- (3) Note. For the definition of “electrode” and “shield”, see the glossary in the class definition.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 42, for devices under the class definition which have a heat transfer means (e.g., cooling fins) mounted upon an electrode support or which have an electrode support designed to modify the flow of heat along the electrode support (e.g., to restrict or accelerate the flow of heat).
- 49, for devices under the class definition which are provided with a support for the device.
- 118+, for spark plugs with supporting and spacing structure. 146, for devices under the class definition which have an electrode or shield movably mounted upon its support.
- 237, for devices under the class definition which have an electrode and a spare electrode, the supporting means for the electrode being designed so that the first electrode may be removed from its support when it fails to operate properly and the second electrode substituted therefor.
- SEE OR SEARCH CLASS:
- 248, Supports, appropriate subclasses for miscellaneous supports for articles.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, appropriate subclasses for discharge devices of the consumable electrode



type (e.g., arc lamps and similar devices which are provided with means for feeding the electrodes together as they are consumed) which have supporting and/or spacing structure for an electrode or shield.

**239** This subclass is indented under subclass 238. Devices having supporting and/or spacing structure for a shield.

- (1) Note. For the definition of shield, see the glossary in the class definition. Note that shields do not include shield grid electrodes, see the reference to subclass 265 below.
- (2) Note. Devices which are provided with an envelope made in whole or part of metal or conductive material and which include supporting and/or spacing structure for an electrode or shield other than the metal or conductive envelope portion (such as an electrode or shield within the envelope or an electrode or shield exterior to the envelope) are classified as follows. This subclass includes those devices with a metal or conductive envelope where the the envelope is disclosed or claimed as being provided for shielding purposes and where such envelope is not designed for use as an electrode of the device, such as the anode, and no other shielding structure is claimed. Where other shielding structure is claimed, the patent is classified in the appropriate indented subclass. Where the metal or conductive envelope is designed for use as an electrode, the patent is classified in either subclasses 246+ where the supporting and/or spacing structure for a plurality of electrodes is claimed or in subclass 317 where no other supporting or spacing structure is claimed. Where the metal or conductive envelope is not claimed not disclosed as either a shield or as an electrode, but one or more electrodes are supported by the conductive envelope portion, the patent is classified in subclass 248 where the supporting and/or spacing structure for a plurality of electrodes is claimed and in subclass 281 or 282 where the supporting and/or spacing structure for only a

single electrode is claimed. Envelopes, per se, having at least a portion of the envelope formed of metal or conductive material are in Class 220, subclass 2.3, or in one of the classes specified in the notes to the definition of that subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 11+, for devices under the subclass which are provided with means for supporting and/or spacing a heat transfer device (e.g., radiating fins), or which are provided with means for supporting and/or spacing a heat shielding means. See especially subclasses 37+ where the device is provided with a heat shield for a cathode or filament, and subclass 47 for devices with miscellaneous heat shields.
- 265, for discharge devices under subclass 238 which have means for supporting a grid electrode or other apertured electrode between two other electrodes (e.g., which have means for supporting a shield grid) but which do not have any means for supporting or spacing a shield.
- 246+, see (2) Note, above.
- 248, see (2) Note, above.
- 281, see (2) Note, above.
- 282, see (2) Note, above.
- 317, see (2) Note, above.

SEE OR SEARCH CLASS:

- 220, Receptacles, subclass 2.3, see (2) Note, above.

**240** This subclass is indented under subclass 239. Devices having the shield supported by an electrode, an electrode support, or an electrode spacing member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 11+, for devices under the subclass definition which have a heat transfer means or a heat shielding means mounted upon an electrode, electrode support or electrode spacing member. See subclasses 37+ for devices with filaments or cathodes which are provided with heat shields, subclasses 39+ where the heat transfer means or heat

shield is for an electrode within the envelope, usually being supported on or forming part of the electrode, and subclass 42 where the heat is mounted upon an electrode support.

**241** This subclass is indented under subclass 240. Discharge devices having a plurality of electrodes mounted in side by side, concentric or co-axial relation, one end of the electrodes being positioned in substantially co-planar relation, and the shield being supported so that it extends across the ends of the electrodes.

**242** This subclass is indented under subclass 239. Devices in which the device is enclosed within an envelope which is provided with a stem, the shield being either supported by the stem or the stem being formed so as to constitute a shield.

- (1) Note. A stem is the portion of the envelope which is usually used for supporting the support wires for the electrodes and for sealing in the lead-in wires for the electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

43, for devices under the class definition which are provided with a heat transfer device or a heat shield for protecting the lead-in-seal or the stem of the envelope.

219, for discharge devices which have an envelope containing an atmosphere of gas or vapor, the discharge device including a shield which is supported by the stem or which is a part of the stem for shielding the electrode support or lead-in wire.

317+, for devices under the class definition which have an enclosing envelope.

**243** This subclass is indented under subclass 238. Discharge devices having means for supporting a plurality of electrodes of the discharge device or having means for spacing a plurality of electrodes of the discharge device either from each other or with respect to another part of the discharge device.

- (1) Note. This subclass and subclasses 267 and 268 provide for the discharge devices which do not have an envelope

and which have supporting and/or spacing structure for a plurality of electrodes. Indented subclass 244 provides for discharge devices which have an envelope and supporting and/or spacing structure for plural electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

118+, for spark plugs having supporting and spacing structure for a plurality of spark electrodes.

**244** This subclass is indented under subclass 243. Discharge devices in which the device is enclosed within an envelope, the electrodes being supported by or forming part of the enclosing envelope.

- (1) Note. The electrodes need not be supported directly upon the envelope, but may be supported upon support rods or other support members which are supported by the enclosing envelope.

SEE OR SEARCH THIS CLASS, SUBCLASS:

239+, where the discharge device also includes supporting and/or spacing structure for a shield.

283, and the subclasses specified in the notes thereto for other devices under the class definition which include an envelope and an electrode, the electrode being supported by the envelope.

**245** This subclass is indented under subclass 244. Discharge devices having means for supporting and/or spacing three or more electrodes which are arranged to form a plurality of separate discharge spaces.

- (1) Note. Included in this subclass are discharge devices having a plurality of anodes and a cathode, or a plurality of cathodes and an anode. Also included are cross-references of discharge devices of the plural unit type (e.g., each cathode having a separate anode) where significant supporting and/or spacing structure is disclosed.

- (2) Note. This and the indented subclasses do not provide for the supporting and spacing structure for discharge devices which are provided only with a cathode, a second electrode (e.g., anode) with which the cathode forms a first discharge space, and a third electrode in the form of a grid or foraminous electrode interposed in the discharge space formed by the cathode and second electrode even though the disclosure and claims of the patent state that the third electrode is intended to receive electrons emitted by the cathode. The supporting and/or spacing structure for such discharge devices is in subclass 265 and the subclasses specified in the notes to the definition of that subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 1+, for plural unit discharge devices (i.e., discharge devices having a plurality of separate cathodes, each cathode having a separate anode).  
 239+, for this subject matter where the discharge device includes a shield between the separate discharge spaces and means for supporting the shield.  
 265, see (2) note, above.  
 306+, and the subclasses specified in the notes thereto for patents for discharge devices having three or more electrodes arranged to form a plurality of separate discharge spaces where no significant supporting and/or spacing structure for the electrodes is claimed.

**246** This subclass is indented under subclass 244. Discharge devices having at least one of the electrodes forming at least part of the envelope wall.

- (1) Note. This and the indented subclasses include patents for discharge devices where the device has at least a portion of the envelope formed of metal or conductive material, the metal or conductive portion of the envelope being defined as an electrode, and where the claims include the supporting and/or spacing structure for a plurality of electrodes. Where only a single electrode which

forms at least part of the envelope wall is claimed, the patent is classified in Class 220, Receptacles, subclass 2.3 if only envelope structure is claimed or in subclasses 317+ of class 313 if structure is claimed which limits the device to being a discharge device. See the class definition. Where the conductive envelope forms a shield for the enclosed electrodes, and supporting or spacing structure for the electrodes is claimed the patent is classified in subclasses 239+. (See (2) Note to the definition of subclass 239). Where the conductive envelope forms neither a shield nor an electrode, but has a plurality of electrodes supported by the conductive wall portion, the patent is classified in subclass 248. Envelopes, per se, which have a conductive wall portion are in subclasses 317+ or in one of the classes specified in the notes to the definition of that subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 18+, for discharge devices which have an electrode forming part of the envelope wall and which have a casing or jacket surrounding the electrode, the casing or jacket being designed to receive a heat transfer medium (e.g., fluid cooled metal envelope devices).  
 239+, see (1) Note above.  
 248, see (1) Note above.  
 281, for devices having an electrode supported in an aperture in a conductive wall.  
 282, for devices having an electrode supported by supports which form part of or are attached to the conductive wall of an envelope.  
 317+, see (1) Note above.

SEE OR SEARCH CLASS:

- 220, Receptacles, subclass 2.3 see (1) note above.

**247** This subclass is indented under subclass 246. Discharge devices wherein the electrode which forms part of the envelope wall is in the form of a hollow body having an open end, the open end being closed either by means of another electrode which is electrically insulated from

the hollow electrode or by a closure which supports another electrode in electrical insulating relation with respect to the hollow electrode.

- 248** This subclass is indented under subclass 244. Discharge devices which have at least part of the envelope formed of electrically conductive material, a plurality of electrodes or supports for a plurality of electrodes being supported by the conductive portion of the envelope wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:

239+, where the discharge device is enclosed within an envelope which has a conductive wall portion, and the wall portion is disclosed or claimed as being a shield. See note 2 to the definition of subclass 239.

246+, where the conductive wall portion is claimed or disclosed as being an electrode, and supporting and/or spacing structure for a plurality of electrodes is claimed.

281, for devices under the class definition having the conductive envelope portion provided with an aperture and an electrode mounted in or around the aperture.

282, for devices under subclass 238 where the device is provided with an envelope, the electrode support being either formed of or attached to a conductive wall portion of the envelope.

SEE OR SEARCH CLASS:

220, Receptacles, subclass 2.3 for envelopes, per se, with conductive wall portions.

- 249** This subclass is indented under subclass 244. Discharge devices where the envelope is elongated, the electrodes being mounted in spaced relation along the longitudinal axis of the envelope.

SEE OR SEARCH THIS CLASS, SUBCLASS:

245, for discharge devices with supporting and/or spacing structure for three or more electrodes which are arranged to form a plurality of separate discharge spaces, a plurality of the electrodes

being mounted in spaced relation along the length of another electrode.

SEE OR SEARCH CLASS:

331, Oscillators, subclass 98 for oscillators utilizing disk seal tubes (e.g., lighthouse, pencil tube) enclosed by distributed parameter resonators.

- 250** This subclass is indented under subclass 249. Devices provided with electrode spacing means interposed between different electrodes or different electrode supports.

(1) Note. For the definition of "spacer", see  
(2) Note to the definition of subclass 238.

SEE OR SEARCH THIS CLASS, SUBCLASS:

257+, for other discharge devices having a plurality of electrodes supported upon supporting rods, wires or tubes which are supported by the envelope of the device, the device being provided with spacing means for the electrodes or electrode supports.

285, for devices within the class definition which are provided with an envelope and which have an electrode supported by means of a plurality of support wires, rods, or tubes which are supported by the envelope, a spacer member being provided between the different electrode support wires, rods or tubes.

288, for devices within the class definition which are provided with an envelope and which have an electrode supported by means of a supporting wire, rod, or tube which is supported by the envelope, a spacer member being provided between the electrode or the electrode support and the envelope wall.

- 251** This subclass is indented under subclass 249. Discharge devices having a plurality of electrodes supported by a common support wire, rod or tube, the electrodes being spaced along the longitudinal axis of the supporting wire, rod or tube.

**252** This subclass is indented under subclass 244. Discharge devices having electrodes which are supported by supporting structure, such as wires, rods, or tubes, the supporting structure being supported by the envelope.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

11+, for devices under the class definition which are provided with an envelope and which have a heat transfer device (e.g., radiating fins, etc.) or means to modify the temperature of the device (e.g., heat conserving means) mounted upon the electrode or electrode support. See subclass 37 where the filament or cathode is provided with such means, subclass 39 where the heat transfer means or temperature modifying device is for an electrode, and subclass 42 where such means are mounted upon an electrode support.

245, where the discharge device has the electrodes arranged to form a plurality of separate discharge spaces (e.g., has plural cathodes and/or anodes).

246+, where at least one of the electrodes forms at least part of the envelope wall.

248, in which the envelope is formed of conductive material the electrode supports being supported by the conductive envelope wall.

249+, where the envelope is elongated and the electrodes are mounted in spaced relation along the longitudinal axis of the envelope.

284+, and the subclasses specified in the notes thereto for devices within the class definition which have an envelope and an electrode supported by a supporting member which is supported by the envelope.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclass 50.54 for miscellaneous hermetically sealed envelopes of general application which are limited to electrical use which include means to mount an electrical device within the envelope.

**253** This subclass is indented under subclass 252. Discharge devices which have at least one of the supporting wires, rods, or tubes supported by a part of the envelope wall which is opposite to or spaced at a distance from the part of the envelope wall which supports either a different portion of the same support wire, rod or tube or another supporting wire, rod or tube.

(1) Note. This and the indented subclasses do not include discharge devices where all the supporting rods, wires or tubes are sealed into a common stem or press of the envelope even though the support wires, rods or tubes are widely spaced from each other.

(2) Note. One of the common type structures found in this and the indented subclasses is the so-called "multiple ended" discharge devices, that is discharge devices having a stem or press at each end of a substantially tubular envelope, a support wire, rod, or tube being supported by each of the stems or presses.

(3) Note. The support wires, rods or tubes which are supported by the opposed parts of the envelope may support the same electrode or different electrodes.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

247, where the envelope wall includes a hollow conductive part which is designed for use as an electrode, other electrodes being supported within the envelope by means of one or more support wires, rods or tubes which are supported by the opposed end closures of the hollow electrode.

274, for devices under the class definition having a filament enclosed within an envelope, the filament being supported by supporting means which are supported by opposed or spaced parts of the envelope.

286, for devices under the class definition having an electrode enclosed within an envelope, the electrode being supported by one or more support rods, wires or tubes which are supported by opposed parts of the envelope wall.

**254** This subclass is indented under subclass 253. Discharge devices wherein electrode support wires, rods or tubes are supported by three or more opposed or spaced parts of the envelope wall.

**255** This subclass is indented under subclass 253. Discharge devices which have the support wire, rod or tube which supports an electrode supported by a plurality of spaced or opposed parts of the envelope, or which have an electrode supported by a plurality of support wires, rods or tubes, different ones of the support wires, rods or tubes being supported by different opposed or spaced parts of the envelope.

- (1) Note. This subclass provides for the patents for the discharge devices where the support structure for a plurality of electrodes is claimed, at least one electrode being supported by a support wire, rod or tube which is supported by opposed or spaced parts of the envelope. Where the discharge device has one electrode supported by support wires, rods or tubes which are supported by only one portion of the envelope, and another electrode supported by support wires, rods or tubes which are supported only by an opposed or spaced part of the envelope, the patent will be classified in subclass 253 or subclass 254.

SEE OR SEARCH THIS CLASS, SUBCLASS:

247, where the envelope wall includes a hollow conductive part which is designed for use as an electrode, another electrode being supported by means of one or more support wires, rods or tubes which are supported by the opposed end closures of the hollow electrode.

**256** This subclass is indented under subclass 252. Discharge devices where the supporting structure is a rod or tube made of insulating or ceramic material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

257+, for discharge devices under subclass 252 which have a spacing structure

which includes an insulating or ceramic member between the electrodes or electrode supports, or between one or more electrodes or electrode supports and the envelope wall. See subclass 262 where the spacing structure includes a ceramic (e.g., glass) bead.

289, for devices under the class definition which have an envelope and a supporting rod or tube which is formed of insulating or ceramic material for supporting the electrode of the device.

**257** This subclass is indented under subclass 252. Discharge devices which have a spacer member interposed between different electrodes or different electrode supports.

- (1) Note. For the definition of "spacer" see  
(2) Note to the definition of subclass 238.

SEE OR SEARCH THIS CLASS, SUBCLASS:

241, where the discharge device has a spacer member and a shielding member extending across the ends of a plurality of electrodes.

250, where the discharge device has an elongated envelope and the electrodes are supported along the longitudinal axis of the envelope, a spacer member being interposed between different electrodes or different electrode supports.

255, where the discharge device is a double ended device, that is it has an electrode supported by support wires, rods or tubes which are supported at both of two opposed or spaced parts of the envelope.

268, for discharge devices which are not enclosed within an envelope which have a spacer member interposed between the electrodes.

285+, for devices under the class definition which have an electrode supported by means of a plurality of support wires, rods or tubes within an envelope, a spacer member being interposed between at least two of the support wires, rods or tubes or between the electrode or the electrode support and

- the envelope. See subclass 288 where the spacer is between the envelope and the electrode or support.
- 292, for miscellaneous supporting and spacing elements, per se.
- 258** This subclass is indented under subclass 257. Discharge devices having a spacer member interposed between the envelope of the discharge device and an electrode or an electrode support.
- (1) Note. The spacer member which engages the envelope may be the same spacer member which it interposed between the different electrodes or electrode supports, or it may be a spacer member in addition to the inter-electrode or inter-electrode support spacer.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 288, for devices under the class definition which have an envelope and an electrode within the envelope supported by a wire, rod or tube which is supported by the envelope, a spacer member being interposed between the envelope and the electrode or electrode support.
- 259** This subclass is indented under subclass 257. Discharge devices in which the spacing member is formed by an insulating coating.
- (1) Note. In some of the discharge devices in this subclass, an electrode or electrode support is coated with an insulating coating, and another electrode is wound upon or coiled about the electrode or electrode support, the insulating coating spacing and insulating the electrode from the supporting electrode or electrode support.
- (2) Note. This subclass includes devices where the spacer member is formed of conductive material provided with an insulating coating so that the electrodes will be spaced and insulated from each other.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 355, for the structure of electrodes which have a coating thereon.
- SEE OR SEARCH CLASS:
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses for a stock material product (in the form of a single or plural layer web, sheet, rod, fiber or filament), and especially subclasses 375+ for electrodes for lamps and discharge devices which involve no more than a base with a coating thereon.
- 260** This subclass is indented under subclass 257. Discharge devices having the electrodes mounted in side by side, concentric or co-axial relation, one end of the electrodes being positioned in substantially co-planar relation, an electrode spacer having the form of a plate or bar mounted in contact with the electrodes or electrode supports to maintain the electrodes in spaced relation with each other, the plate or bar extending across the ends of the electrodes.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 241, where the discharge device is also provided with a shield member which extends across the ends of the electrodes.
- 255, where the electrode supports are supported by both of two opposed or spaced parts of the envelope (e.g., double ended discharge devices).
- 261** This subclass is indented under subclass 260. Discharge devices having a plate or bar electrode spacer which extends across the ends of the electrodes at each of the opposite ends of the electrodes.
- 262** This subclass is indented under subclass 257. Discharge devices having a plurality of the wires, rods or tubes which support the electrodes from the envelope wall joined to an insulating or ceramic bead, or which have a plurality of wires or rods attached to different electrodes and joined to an insulating or ceramic bead so that the wires or rods and the

bead serve to maintain one electrode in spaced relation to another.

SEE OR SEARCH THIS CLASS, SUBCLASS:

256, for discharge devices under subclass 252, which have an insulating or ceramic supporting rod or tube which supports the electrodes and is supported by the envelope, a plurality of electrodes having wires or rods attached to them, the wires or rods being joined to the insulating or ceramic support rod so as to space one electrode from another.

**263** This subclass is indented under subclass 252. Discharge devices having supporting means for an indirectly heated cathode.

SEE OR SEARCH THIS CLASS, SUBCLASS:

260+, where the discharge device has a plurality of electrodes including an indirectly heated cathode mounted in side by side, co-axial, or concentric relation, one end of the electrodes being positioned in substantially coplanar relation, a plate or bar electrode spacer extending across the ends of the electrodes. See subclass 261 where the discharge device has a plate or bar electrode spacer at each end of the electrode assembly.

270, for other supporting structure for indirectly heated cathodes.

**264** This subclass is indented under subclass 252. Discharge devices having supporting means for a U-shaped, V-shaped or plural section filament.

(1) Note. W-shaped filaments are included as V-shaped filaments.

(2) Note. A plural section filament is a filament which is composed of a plurality of filament wires connected to common leading-in wires. The plurality of filaments may be connected to the leading-in wires so that the filament sections are electrically connected in parallel, or a filament section may be connected to a leading-in wire and a conductive sup-

port, another filament section being connected to the same conductive support and another leading-in wire so that the filament sections are electrically connected in series.

SEE OR SEARCH THIS CLASS, SUBCLASS:

260+, where the discharge device has a plurality of electrodes including a U-shaped, V-shaped or plural section filament mounted in side by side, co-axial or concentric relation, one end of the electrodes being positioned in substantially co-planar relation, a plate or bar electrode spacer extending across the ends of the electrodes. See subclass 261 where the device has a plate or bar electrode spacer at each end of the electrode assembly.

271+, for other devices under the class definition which have supporting structure for filaments.

**265** This subclass is indented under subclass 252. Miscellaneous discharge devices having a foraminous or grid electrode supported between two other electrodes.

(1) Note. As this is the miscellaneous subclass under subclass 252 where the discharge device is provided with a grid or apertured electrode, cross-references of disclosures classified either as original copies or cross-reference copies in subclass 253 to 264 are not placed in this subclass.

(2) Note. In some of the devices in this subclass the foraminous or grid electrode is intended to be used to control the discharge between the anode and cathode of the discharge device. In other of the devices, the interposed foraminous or grid-like electrode is intended to be used as an anode in the discharge device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

241, where the discharge device is provided with a plurality of discharge electrodes which are mounted in side by side, coaxial or concentric relation, an end of the electrodes being located



- in substantially coplanar relation, a shield electrode extending across the ends of the electrodes.
- 245, where the discharge device includes four or more electrodes which are arranged to form at least two different discharge spaces, one of the discharge spaces having a foraminous or grid electrode mounted therein.
- 247, for this subject matter where the envelope of the discharge device is formed of metal or conductive material, the hollow metal or conductive portion of the envelope being designed for use as an electrode of the discharge device, and having a foraminous or grid electrode supported by the end closure of the hollow metal or conductive envelope portion.
- 248, where the envelope of the discharge device is made of metal or conductive material, and a plurality of electrodes, including a foraminous or grid electrode, are supported by the metallic or conductive envelope wall.
- 249, for this subject matter where the discharge device envelope is elongated, and a plurality of electrodes, including a foraminous or grid electrode, are supported in spaced relation along the longitudinal axis of the envelope.
- 253, through 264, see (1) Note, above.
- 293+, for patents for discharge devices within the class definition which have a foraminous or grid electrode interposed between two other electrodes and where no significant supporting and/or spacing structure for the electrodes is claimed.
- 348+, for the structure of foraminous or grid electrodes, per se.
- 266** This subclass is indented under subclass 252. Devices which have the structure of the envelope part or the envelope stem or press which supports the electrode supporting wire, rod or tube modified.
- (1) Note. This subclass includes patents where significant structure of the envelope part, stem or press which supports the electrode supporting wire, rod or tube is claimed.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 242, where the discharge device has a shield supported by or forming part of the envelope stem.
- 246+, for discharge devices under subclass 243 which have at least a portion of the envelope wall formed of metal or conductive material, the metallic or conductive portion being designed for use as an electrode, means being provided to support an electrode within the discharge device.
- 248, for discharge devices under subclass 243 which have at least a part of the envelope wall formed of metal or conductive material, a plurality of electrodes being supported by the metallic or conductive wall of the envelope.
- 271, for devices under subclass 238 where the device has an envelope and a filament supported within the envelope, the structure of the envelope part or the envelope stem or press which supports the electrode supporting structure being modified.
- 290, for miscellaneous devices under subclass 238 where the device has an envelope and an electrode supported within the envelope, the structure of the envelope part or the envelope stem or press which supports the electrode supporting structure being modified.
- 317+, and the classes and subclasses specified in the notes to the definition of those subclasses for the structure of envelopes for discharge devices and electric lamps.
- 626, for gas or vapor type discharge devices which have a shield (where may be a part of the envelope wall, stem or press) for an electrode support.
- 267** This subclass is indented under subclass 243. Discharge devices having means for supporting and/or spacing a plurality of rod-like electrodes.
- (1) Note. This subclass includes arc lamps and similar discharge devices which are provided with a plurality of rod-like

electrodes and which are usually intended to have the arc or other discharge maintained between the ends of the electrodes.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 238, for patents claiming the structure for supporting only a single rod electrode of a discharge device.
- 325, for patents claiming electric discharge devices having rod-like electrodes where no significant supporting and/or spacing structure is claimed.
- 357, and the subclasses specified in the notes to the definition of that subclass for the structure of rod electrodes, per se.

**SEE OR SEARCH CLASS:**

- 314, Electric Lamp and Discharge Devices, Consumable Electrodes, appropriate subclasses for discharge devices of the consumable electrode type (e.g., arc lamps and similar devices having means for feeding the electrodes together as they are consumed) which have supporting and/or spacing structure for a plurality of rod-like electrodes.

**268** This subclass is indented under subclass 243. Miscellaneous discharge devices which have an insulating spacer member interposed between two of the discharge electrodes.

- (1) Note. For the definition of "spacer", see  
(2) Note to the definition of subclass 238.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 246, for discharge devices which have a tubular envelope portion of insulating material, the ends of the tubular member having closures of conductive material which are designed for use as electrodes of the discharge device, the electrodes and the insulating tubular portion forming the envelope of the discharge device.
- 257+, and the subclasses specified in the notes to the definition of those subclasses for discharge devices which

are provided with an envelope and which have an insulating spacer interposed between two discharge electrodes or their supports, the electrodes being supported by support wires, rods or tubes within the envelope.

**269** This subclass is indented under subclass 238. Devices which have in addition to the supporting and/or spacing structure for the electrodes, means to damp mechanical vibrations of an electrode or an electrode support.

- (1) Note. The means provided is sometimes a weight mounted upon the electrode or electrode support so as to give the electrode a greater mass so that the vibrations are damped.
- (2) Note. Where the vibration damping means involves only the structure of the electrode or the electrode supporting means, such as providing either rigid or resilient supporting means or making the electrode or its support of a specific shape, the patent is not classified in this subclass, but will be found in subclass 238 or one of the other subclasses indented under subclass 238.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 50, for devices under the class definition which are provided with a detachable electric connector (e.g., socket) or support which includes resilient supporting means for the lamp or discharge device or which is provided with vibration damping means.

**SEE OR SEARCH CLASS:**

- 188, Brakes, for miscellaneous means for retarding the motion of moving mechanism by friction, by positive engagement of elements or by the internal resistance of a fluid or a field of force. See especially subclasses 378+ for structures which include a weight designed for attachment to a moving member to damp the vibrations of the member.
- 248, Supports, subclasses 560+ for miscellaneous resilient supports.

**270** This subclass is indented under subclass 238. Devices which have supporting and/or spacing structure for an indirectly heated cathode.

SEE OR SEARCH THIS CLASS, SUBCLASS:

263, and the subclasses specified in the notes thereto where the device is a discharge device which has a plurality of electrodes including an indirectly heated cathode supported by support structure within an envelope.

310, and the subclasses specified in the notes to the definition of that subclass for discharge devices which have an indirectly heated cathode.

337+, for the structure of indirectly heated cathodes, per se.

**271** This subclass is indented under subclass 238. Devices which have supporting and/or spacing structure for a filament.

(1) Note. Many of the patents in this and the indented subclasses are patents for incandescent lamps. Where only the supporting and spacing structure for an incandescent lamp filament is disclosed and claimed, the patent is classified in this or one of the indented subclasses and is not cross-referenced into any of the subclasses below this or the indented subclasses. Where novel structure in addition to the mere filament supporting and/or spacing structure is disclosed or claimed, appropriate cross-references are made.

SEE OR SEARCH THIS CLASS, SUBCLASS:

244+, for discharge devices under subclass 238 which have an envelope and a plurality of electrodes, one of which is a filament supported within the envelope.

315+, for miscellaneous incandescent lamps. Patents claiming incandescent lamps but which do not claim any significant supporting and/or spacing structure for the lamp filament are classified in subclasses 315+ or in one of the subclasses specified in the notes to the definition of that subclass.

SEE OR SEARCH CLASS:

248, Supports, subclasses 49+ for miscellaneous pipe or cable supports.

**272** This subclass is indented under subclass 271. Devices having supporting and/or spacing structure for a plurality of filaments at least two of which are separately energizable.

(1) Note. Where the device has a plurality of filaments all of which are connected to the same lead-in wires so that all of the filaments must be energized together, the structure is considered to be supporting and/or spacing structure for a plural section filament and classified in subclass 273.

SEE OR SEARCH THIS CLASS, SUBCLASS:

245, for discharge devices under subclass 238 which have means for supporting and/or spacing a plurality of electrodes which form a plurality of separate discharge spaces, at least two of which are emissive filaments.

273, see (1) Notes, above.

306, and the subclasses specified in the notes to the definition of that subclass for discharge devices under the class definition which have a plurality of emissive filaments and which do not include any significant supporting and/or spacing structure for the electrodes.

316, for incandescent lamps which have a plurality of separately energized filaments which do not involve any significant supporting and/or spacing structure for the filaments.

**273** This subclass is indented under subclass 271. Devices having supporting and/or spacing structure for a plural section filament.

(1) Note. A plural section filament is a filament which is composed of a plurality of filament wires connected to common leading-in wires. The plurality of filaments may be connected to the leading-in wires so that the filament sections are electrically connected in parallel, or a filament section may be connected to a

leading-in wire and a conductive support, another filament section being connected to the same conductive support and another leading-in wire so that the filament sections are electrically connected in series. One of the filament sections may have supports which are separate from the supporting structure for another filament section, the filaments being electrically connected by leading-in wires which may or may not also be supports for the filament sections.

SEE OR SEARCH THIS CLASS, SUBCLASS:

264, for discharge devices under subclass 238 having an envelope and a plurality of electrodes including a plural section filament supported within the envelope.

272, for devices under subclass 271 for supporting a plurality of separately energizable filaments.

**274** This subclass is indented under subclass 271. Devices which have the filament within an envelope, the filament being supported within the envelope by means of supports (e.g., support wires, rods, or tubes), at least one of the supports being supported by a part of the envelope wall which is opposed to or spaced at a distance from the part of the envelope wall which supports either a different portion of the same support or another support.

(1) Note. This and the indented subclass does not include devices where all the supporting and/or spacing means are sealed into a common stem or press of the envelope even though the supporting and/or spacing means are widely spaced from each other.

(2) Note. Some devices in this subclass have the lead-in wires which pass through the envelope wall at the same end of the envelope so that only a single base is needed for the device.

(3) Note. One of the more common structures found in this subclass is the so-called "multiple-ended" incandescent lamp, that is, a lamp having a stem or

press at each end of a substantially tubular envelope, the filament supports being supported by each of the stems or presses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

253+, for discharge devices having an envelope and support structure for a plurality of electrodes. The support structure being supported by opposed or spaced portions of the envelope. See subclass 255 where the same electrode is supported by supports which are supported at spaced or opposed portions of the envelope.

286, for other devices under subclass 238 which have an envelope and an electrode therein, the electrode being supported by means of supports (e.g., wires, rods or tubes) which are supported by opposed or spaced parts of the envelope wall.

288, and the subclasses specified in the notes to the definition of this subclass for other devices under subclass 238 which have an envelope and an electrode therein, a spacer member being positioned between the envelope wall and the electrode or an electrode support.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclass 99 for conduits for electrical conductors which have interior supports for supporting one or more electric conductors therein.

**275** This subclass is indented under subclass 271. Devices in which the supporting structure for the filament includes an electrically insulating member.

(1) Note. Including in this subclass are supporting structures such as glass or ceramic rods having metal hooks or anchors attached to it for supporting the filament. Also included are supporting structures wherein, a glass bead is mounted upon a metal supporting rod, the glass bead having means for supporting the filament.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

257, for discharge devices under subclass 238 which have an envelope and a plurality of electrodes supported by supports, within the envelope, an insulating spacer member being interposed between a plurality of the electrodes or electrode supports, a filament being supported by the insulating spacer member.

289, for other devices under subclass 238 which have an envelope and an electrode other than a filament supported by means of an insulating or ceramic support rod or tube within the envelope.

**276** This subclass is indented under subclass 275. Devices which have the insulating member which supports the filament supported by an electrically conductive supporting member (e.g., wire, rod or tube.)

(1) Note. The conductive wire, rod or tube may be used as one of the lead-in wires for conducting electrical current to the filament.

(2) Note. Among the structures found in this are devices having an insulating plate or bar supported by a conductive wire or rod, a filament being supported by the insulator. Sometimes, the filament is V-shaped or W-shaped, and the insulating rod is provided with means to engage and support the filament at a plurality of points.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

257, for discharge devices under subclass 238 which have an envelope and a plurality of electrodes supported by conductive supports within the envelope an insulating spacer member being interposed between a plurality of the electrodes or electrode supports, a filament being supported by the insulating spacer member.

264, for discharge devices under subclass 238 which have an envelope and a plurality of electrodes therein, the

supporting structure for the electrodes including means to support a U-shaped, V-shaped or W-shaped filament.

285, for devices under subclass 238 which are provided with an envelope and an electrode other than a filament, therein, the electrode being supported by an intermediate supporting member, such as an insulating plate, rod, or bead, the intermediate member being supported by a conductive support.

**277** This subclass is indented under subclass 275. Devices having an insulating standard or rod which supports filament anchors or brackets, the filament anchors or brackets engaging and supporting the filament.

(1) Note. The devices in this and the indented subclass include incandescent lamps which are provided with an envelope have a stem, a glass or ceramic rod or standard being supported by the stem, the rod or standard usually being fused to or being integral with the stem, filament supporting brackets or anchors being attached to the rod or standard, usually by fusing the brackets or anchors to the rod or standard, the filament being supported by the supporting brackets.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

289, and the subclasses specified in the notes to the definition of that subclass for other devices under subclass 238 which have an envelope and an electrode other than a filament supported by an insulating or ceramic support rod therein.

SEE OR SEARCH CLASS:

248, Supports, subclasses 65+ for brackets for supporting pipe or cables, subclasses 300+ for brackets formed of sheet material, and subclasses 302+ for brackets formed of wire.

**278** This subclass is indented under subclass 271. Devices which include means to apply a tension force to the filament.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

257, for discharge devices which are provided with an envelope and a plurality of electrodes supported by supports therein, a spacer member being interposed between the electrodes or the electrode supports, a filament being supported by tension applying means, the tension means being supported by the spacing member.

284+, for devices under subclass 238 which include an envelope and an electrode supported by supporting means therein, the supporting means being resilient or flexible.

**279** This subclass is indented under subclass 271. Devices which have supporting means which engage and support the filament intermediate the ends of the filament.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

273, where the device includes means for supporting a plural section filament, that is, a filament which is composed of a plurality of separate sections of filament wire.

274, where the device includes an envelope, and the filament supports are supported by opposed or spaced parts of the envelope wall.

276, where the device has the filament supported by an electrical insulating member, the insulating member being supported by an electrically conductive wire, rod or tube.

277, for this subject matter where the device is provided with an insulating standard or rod having a plurality of filament anchors or brackets supported by the rod or standard, so that the filament is supported at one or more intermediate points.

278, for this subject matter where the support which engages the intermediate portion of the filament includes means for maintaining the filament under a tension force.

**281** This subclass is indented under subclass 238. Devices which have the support for the electrode mounted in or around an aperture in a conductive wall or plate.

(1) Note. In some of the devices in this subclass, the support for the electrode or the electrode is intended to pass through the conductive wall or plate. In other devices, the electrode supporting means surrounds an aperture in the conductive wall or plate and the electrode is located in the same side of the wall or plate as the supporting means, the aperture being provided so that the electrode may cooperate through the aperture with other means located upon the opposite side of the wall or plate.

(2) Note. Neither the electrode nor its supporting means need necessarily be insulated from the conductive wall or plate.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

282, and the subclasses specified in the notes to the definition of that subclass for devices under subclass 238 which have an envelope which has a portion of the wall made of metal or conductive material and an electrode, the electrode being supported by the conductive wall portion or being supported by means of a support which is supported by the conductive wall portion.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclasses 151+ for devices for insulating a conductor from a wall or plate through which the conductor extends.

**282** This subclass is indented under subclass 238. Devices which have an envelope and an electrode, at least part of the envelope formed of electrically conductive material, either the electrode being supported by the conductive portion of the envelope wall or having the electrode supported by supporting means which is supported by the conductive portion of the envelope wall.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

239+, where the device is enclosed within an envelope which has an electrically conducting envelope wall portion, the wall portion being disclosed or claimed as being a shield.

246+, where the devices is a discharge device and the conductive envelope wall portion is disclosed or claimed as being an electrode of the device, the supporting and/or spacing structure for a plurality of electrodes which are supported by the conductive wall portion being claimed.

248, where the devices is a discharge device having a conductive envelope wall portion which is not disclosed or claimed as being either a shield or an electrode and the supporting and/or spacing structure for a plurality of electrodes which are supported by the conductive wall portion is claimed.

281, where the device has a conductive envelope portion which is provided with an aperture an electrode being mounted in or around the aperture.

## SEE OR SEARCH CLASS:

220, Receptacles, subclass 2.3 for envelopes, per se, which have conductive wall portions.

**283** This subclass is indented under subclass 238. Devices which have an envelope, the electrode being supported by the envelope.

(1) Note. The electrode need not be supported directly upon the envelope, but may be supported upon support rods or other support members which are supported by the enclosing envelope.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

239+, for devices under subclass 238 which have an envelope and a shield enclosed by the envelope, the shield being supported by the envelope.

244+, for this subject matter where the device is a discharge device and a plurality of electrodes are supported by the envelope.

269, for this subject matter where the device includes a vibration damping means for damping vibrations of the electrode or electrode support.

270, for this subject matter where the electrode is an indirectly heated cathode.

271, for this subject matter where the electrode is a filament.

281, where the envelope has a conductive wall portion with an aperture in it, the electrode support being mounted in or around the aperture.

282, where the envelope is provided with a conductive wall portion, this electrode being supported by the conductive wall portion.

**284** This subclass is indented under subclass 283. Devices which have the electrode supported by a supporting member which is supported by the envelope.

(1) Note. In the devices of this and the indented subclasses, the electrode is supported within the envelope by means of supporting member, the supporting member being attached to and supported by the envelope.

## SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclass 50.54 for miscellaneous hermetically sealed envelopes of general application which are limited to electrical use which include means to mount an electrical device within the envelope.

**285** This subclass is indented under subclass 284. Devices having the electrode supported by a supporting wire, rod, or tube, which is supported by the envelope.

(1) Note. The supporting wire, rod or tube is sometimes sealed into the stem or press of the envelope and is usually used as the lead-in wire for the electrode.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

252+, and the subclasses specified in the notes thereto where the device is a discharge device having a plurality of electrodes supported by the envelope.

- 271+, and the subclasses specified in the notes thereto where the electrode which is supported is a filament.
- 282, where the envelope is provided with a metallic or conductive part, the support wire, rod or tube being supported by the metallic or conductive part of the envelope.
- 286** This subclass is indented under subclass 285. Devices which have (1) the electrode supported by a plurality of support wires, rods or tubes at least one of the support wires, rods, or tubes being supported by a part of the envelope wall which is opposite to or spaced at a distance from the part of the envelope wall which supports another of the supporting wires, rods or tubes, or (2) which have at least one of the supporting wires, rods or tubes for the electrode supported by a part of the envelope wall which is opposite to or spaced at a distance from the part of the envelope wall which supports a different portion of the support wire, rod or tube.
- (1) Note. This subclass does not include devices where all the support rods, wires or tubes are sealed into a common stem or press of the envelope even though the support wires, rods or tubes are widely spaced from each other.
- (2) Note. One of the common types of structures found in this and the indented subclasses is the so-called "multiple ended" devices, that is devices having a stem or press at each end of a substantially tubular envelope, an electrode support wire, rod, or tube being supported by each of the stems or presses.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 255, where the device is a discharge device having a plurality of electrodes, at least one of the electrodes being supported by support wires, rods or tubes which are supported by spaced or opposed parts of the envelope wall.
- 274, where the electrode supported by the support wires, rods or tubes is a filament.
- 318.01+, for a device within the class definition which is provided with an envelope, the device having at least a base and
- an electrical connector attached to spaced or opposed parts of the envelope.
- 318.12, for a device within the class definition having an envelope and an electrical connector attached to spaced or opposed parts of the envelope
- 287** This subclass is indented under subclass 285. Devices in which the envelope has a stem or press, the support wire, rod or tube being attached to and supported by a ring shaped clamping member or collar, the ring shaped member or collar being fastened about the stem or press.
- 288** This subclass is indented under subclass 285. Devices having a spacer member interposed between the envelope of the discharge device and an electrode or electrode support.
- (1) Note. For the definition of spacer, see (2) note to the definition of subclass 238.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 258, where the device is a discharge device having a plurality of electrodes.
- 292, for miscellaneous spacing elements, per se.
- 289** This subclass is indented under subclass 285. Devices which have the supporting rod or tube formed of insulating or ceramic material.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 256, for discharge devices which have a plurality of electrodes enclosed within an envelope, an insulating or ceramic electrode supporting rod being supported by the envelope.
- 275+, where the electrode supported is a filament.
- 290** This subclass is indented under subclass 285. Devices which have the structure of the envelope part or the envelope stem or press which supports the electrode supporting wire, rod or tube modified.
- (1) Note. This subclass includes patents where significant structure of the envelope part, stem or press which supports



the electrode supporting wire, rod or tube is claimed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 266, where the device is a discharge device having a plurality of electrodes supported by supporting wires, rods or tubes.
- 271, where the electrode supported by the support wires, rods or tubes is a filament.
- 281, where the envelope includes a conductive wall portion having an aperture, the support being mounted in or around the aperture in the conductive wall portion.
- 282, where the envelope is provided with a metallic or conductive wall portion, the electrode support being attached to the conductive wall portion.
- 317+, and the classes specified in the notes to the definition of those subclasses for the structure of envelopes for lamps and discharge devices.

**291** This subclass is indented under subclass 283. Devices in which the electrode is a conductive coating upon the envelope wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 355, and the subclasses specified in the notes thereto for miscellaneous coated electrodes.
- 485, for devices under the class definition which have a fluorescent or phosphorescent material coated upon the envelope wall.
- 541+, for photosensitive discharge devices which have the cathode coated upon the envelope wall.

SEE OR SEARCH CLASS:

- 427, Coating Processes, subclasses 105+ for processes of coating the interior of hollow electrical articles.
- 428, Stock Material or Miscellaneous Articles, subclasses 34.1+ for a tube or conduct type of article which may have a coating on the internal wall thereof.

**292** This subclass is indented under subclass 238. Miscellaneous supporting and spacing elements which are not classified in any other class and which are designed for use with the devices.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclass 138 for miscellaneous supports and spacing members which are made of insulating material.
- 248, Supports, appropriate subclasses, for miscellaneous supports.

**293** This subclass is indented under the class definition. Discharge devices which are provided with three or more electrodes, at least one of the electrodes being an apertured or grid-like electrode, the apertured or grid-like electrode being interposed between two of the other electrodes so that a straight line drawn between the two other electrodes will pass through the apertured or grid-like electrode.

- (1) Note. The apertured or grid-like electrode may be formed of open work material such as wire mesh or perforated sheet material, or may be formed of wires or bars, such as coiled wire or otherwise provided with one or more openings in the wall of the electrode.
- (2) Note. To be classified in this subclass the claims must state that the grid electrode is interposed between two other electrodes. Where a patent claims only that the discharge device includes a cathode, an anode, and a grid electrode, the patent is excluded from this and the indented subclasses and will be classified in subclass 308 or one of the subclasses specified in the notes to the definitions of that subclass.
- (3) Note. In some of the devices in this and the indented subclasses the foraminous or grid-like electrode is intended to be used to control the discharge between the cathode and anode of the discharge device. In other of the devices, the interposed foraminous or grid-like electrode is intended to be used as an anode in the discharge device.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 5+, where the device includes a plurality of separate discharge devices which are structurally combined to form a single unitary device (e.g., multiple unit devices), one or more of the discharge devices having an apertured or grid electrode interposed in the discharge space between two of the electrodes.
- 146+, where the apertured or grid electrode is mounted so that it is movable.
- 153+, where the discharge device is also provided with a magnetic device for influencing the space discharge.
- 167, where the discharge device has a liquid electrode.
- 238+, for patents for discharge devices which include an apertured or grid electrode interposed between two other electrodes where significant supporting and/or spacing structure for the electrodes is claimed. Where the claims include significant supporting and/or spacing structure for the electrodes, the patent is classified in subclasses 238+ and cross-referenced to this or one of the indented subclasses when structure in addition to the supporting and/or spacing structure for the electrodes is claimed or disclosed. See especially indented subclass 265.
- 308, and the subclasses specified in the notes to the definition of that subclass for other discharge devices which are provided with a discharge control electrode. Also see note 2 above.
- 325, for discharge devices provided with an electrode which is formed of non-foraminous material which is permeable to electrons.
- 326, for electrode structures which have only a single aperture.
- 348+, for the structure of foraminous and grid-like electrodes, per se.
- 356, for the structure of tubular and other hollow sleeve-like electrodes.
- 441, and the subclasses specified in the notes thereto, for cathode ray devices which have an apertured electrode interposed between the cathode and

the target for concentrating, shaping, accelerating, or decelerating the cathode-ray beam.

- 537, for photosensitive discharge devices which have an apertured or grid electrode interposed between two other electrodes.
- 597+, and the subclasses specified in the notes thereto where the discharge device is provided with an envelope containing an atmosphere of gas or vapor.

## SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclasses 33 through 63 for discharge devices which have a grid or other apertured electrode interposed in the discharge space between two electrodes and which also have a circuit element (e.g., inductance switch, resistor) structurally combined with the discharge device so as to form a unitary device. See subclass 34 where the discharge device includes an antenna, subclasses 35+ where the structural combination includes a plurality of such discharge devices and a circuit element, subclass 39 where the discharge device includes a wave guide, coaxial cable or resonate parallel wire transmission line, subclass 39.63 where the discharge device has an electrode formed so as to provide a structure having distributed inductance and capacitance, and operable in a magnetic field (e.g., magnetrons), subclasses 41+ where the discharge device has an inductive impedance connected between the electrodes, 51+, where the discharge device has structurally combined therewith an electric generator or piezo-electric device, and subclasses 56+ for the miscellaneous discharge devices which have an apertured or grid electrode interposed in a discharge space between two other electrodes and which have a circuit element structurally combined therewith.

**294** This subclass is indented under subclass 293. Discharge devices which have a foraminous or grid-like electrode interposed in the inter-electrode space and spaced from one of the other electrodes so that different parts of the foraminous or grid-like electrode are at different distances from such other electrode.

- (1) Note. The foraminous or grid electrode may be uniformly spaced from one of the other electrodes, the second of the other electrodes begin nonuniformly spaced from the foraminous or grid electrode and from the other electrode. This subclass includes discharge devices where the foraminous or grid electrode is eccentrically spaced in the space between the cathode and anode, and discharge devices where the foraminous or grid-like electrode is spaced in parallel relationship with the cathode and anode but has a different cross-section configuration from that of the cathode or anode (e.g., where the anode is circular and concentric with the cathode, the grid electrode being oval in cross-section).
- (2) Note. Some of the devices in this subclass are intended to be used as variable-mu discharge devices.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 349, for structure of foraminous and grid-like electrodes where the electrode wall surface which is provided with the openings does not form a straight hollow sleeve and is of a nonstraight surface configuration with the openings in the electrode lying in at least two different planes, and for the structure of foraminous and grid-like electrodes having the wall surface of the electrode which contains the openings in the form of a hollow sleeve, the sleeve having a cross-sectional area at one region of the electrode, which is different from the cross-sectional area at another region of the electrode, such as electrodes which are in the form of a truncated cone, sphere, or which are barrel shaped or hour-glass shaped.

**295** This subclass is indented under subclass 293. Discharge devices which have a foraminous or grid-like electrode interposed in the inter-electrode space, the foraminous or grid-like electrode having the ratio of area of free passage through the openings in the electrode to the obturating area of the electrode in one region different from such ratio in another region of the electrode.

- (1) Note. This subclass includes discharge devices having a foraminous or grid-like electrode interposed between two other electrodes where the foraminous or grid-like electrode has at least one opening in the electrode of a different area from the area of another of the openings, or where the openings in the electrode are nonuniformly spaced with respect to each other, or where the electrode is formed of a wire coil or helix which has a nonuniform pitch for the turns of the coil or helix.
- (2) Note. Some of the devices in this subclass are intended to be used as variable-mu discharge devices.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 349, for foraminous and grid-like electrodes which have a ratio of free passage area to obturating area in one region of the electrode which is different from such ration in another region of the electrode.

**296** This subclass is indented under subclass 293. Discharge devices which have a plurality of apertured or grid-like electrodes interposed in the inter-electrode space defined by other electrodes.

**297** This subclass is indented under subclass 296. Discharge devices having a plurality of apertured or grid-like electrodes interposed in superimposed relation with respect to each other in the inter-electrode space so that a straight line drawn between the electrodes which define the inter-electrode space will pass through both of the apertured or grid-like electrodes.

- (1) Note. This subclass includes, for example, plural grid discharge devices such as discharge devices provided with a screen grid and a control grid, discharge devices with two control grids, discharge devices with a control grid and a suppressor grid, and discharge devices where one of the apertured or grid-like electrodes is intended to be used as a first anode and another apertured or grid-like electrode is intended to be used as a control grid, one of the electrodes defining the inter-electrode space being a second anode.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 295, where one of the grid-like electrodes has the ratio of area of free passage through the openings in the electrode to the obturating area of the electrode different from such ratio in another region of the electrode (e.g., variable-mu discharge devices).
- 447, for cathode ray devices which have a plurality of apertured or grid-like electrodes interposed between the cathode and the target.
- 599, where the discharge device is provided with an envelope containing an atmosphere of gas or vapor.

- 298** This subclass is indented under subclass 297. Discharge devices which are provided with either a plurality of separate cathode or a plurality of separate nonemissive electrodes (e.g., anodes) in addition to the interposed apertured or grid-like electrodes, so that the discharge device has at least two separate inter-electrode spaces, at least two apertured or grid-like electrodes being interposed in one of the inter-electrode spaces in superimposed relation with respect to each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 5+, for plural unit discharge devices which have at least two cathodes and an anode for each of the cathodes, at least one of the discharge devices having a plurality of serially arranged apertured or grid-like electrodes interposed in the inter-electrode space.

- 301, for other discharge devices which are provided with a plurality of inter-electrode spaces, at least two of the inter-electrode spaces having an apertured or grid-like electrode disposed therein, or at least one of the inter-electrode spaces having a plurality of apertured or grid-like electrodes in nonsuperimposed relation.

- 299** This subclass is indented under subclass 297. Discharge devices where the openings in at least two of the apertured or grid-like electrodes are located in aligned relation upon a straight line drawn between the electrodes defining the inter-electrode space so that the effective obstructing area of such two apertured or grid-like electrodes to the space discharge is not greater than the effective obstructing area of either of the two foraminous or grid-like electrodes.

- (1) Note. This subclass includes only patents as originals which claim the aligned relationship of the openings in the two apertured or grid-like electrodes. Only patents where there is a definite statement in the specification that the openings in the two apertured or grid-like electrodes are aligned along a straight line are cross-referenced into this subclass.

- (2) Note. This subclass includes discharge devices of the type known as beam power tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 409+, for plural beam generators which may include control electrons.
- 447+, for control electrodes between the cathode and target.

- 300** This subclass is indented under subclass 297. Discharge devices having three or more apertured or grid-like electrodes interposed in superimposed relation with respect to each other in the inter-electrode space.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 447, for cathode-ray tubes which have three or more apertured or grid-like

- electrodes interposed between the cathode and target.
- 599, where the discharge device has an envelope containing an atmosphere of gas or vapor
- 301** This subclass is indented under subclass 296. Discharge devices which have either a plurality of separate cathodes or a plurality of separate nonemissive electrodes (e.g., anodes) in addition to the interposed apertured or grid-like electrodes so that the discharge device has at least two separate inter-electrode spaces.
- (1) Note. In the discharge devices in this subclass there may be a plurality of apertured or grid-like electrodes in one of the inter-electrode spaces, the apertured or grid-like electrodes being in nonsuperimposed relation, or there may be only one apertured or grid-like electrode in each of the inter-electrode spaces.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 6, for plural unit discharge devices which have at least two cathodes and a separate anode for each cathode there being an apertured or grid-like electrode interposed in the discharge space between each anode and cathode.
- 239+, and 245, for discharge devices which include significant supporting and/or spacing structure for a plurality of discharge electrodes which form a plurality of separate inter-electrode discharge spaces. See subclasses 239+ where the device includes supporting and/or spacing structure for a shield member which is interposed between two of the separate discharge spaces.
- 245, see the reference to subclass 239 above.
- 296, for discharge devices having only one inter-electrode discharge space and which have a plurality of apertured or grid-like electrodes in the inter-electrode discharge space in nonsuperimposed relation.
- 298, where at least one of the inter-electrode spaces contains a plurality of apertured or grid-like electrodes in
- superimposed relation with respect to each other.
- 302, and 303, for discharge devices having a plurality of inter-electrode spaces, an apertured or grid-like electrode being interposed in only one of the inter-electrode spaces. See subclass 302 where the discharge device has a plurality of cathodes, and subclass 303 where the discharge device has a plurality of nonemissive electrodes (e.g., anodes).
- 597+, where the discharge device has an envelope containing a gas or vapor.
- 302** This subclass is indented under subclass 293. Discharge devices which have a plurality of separate cathodes.
- (1) Note. The discharge device may be provided with a nonemissive electrode (e.g., anode) in addition to the apertured or grid-like electrode so that the discharge device has a plurality of separate inter-electrode spaces and the apertured or grid-like electrode may be interposed in both of the inter-electrode spaces or may be interposed in only one of the inter-electrode spaces, or the discharge device may have only a plurality of separate cathodes with the apertured or grid-like electrode disposed in the space between two of the cathodes.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 5+, for plural unit discharge devices which have at least two cathodes and an anode for each cathode, one or more of the inter-electrode spaces having an apertured or grid-like electrode therein.
- 245, for discharge devices which have significant supporting and/or spacing structure for a plurality of electrodes which form a plurality of separate discharge spaces.
- 298, where the discharge device has a plurality of separate discharge spaces with a plurality of superimposed apertured or grid-like electrodes in at least one inter-electrode space.
- 301, where the discharge device has a plurality of inter-electrode spaces with a

- plurality of apertured or grid-like electrodes interposed in the inter-electrode space in nonsuperimposed relation.
- 306+, and the subclasses specified in the notes thereto for other discharge devices provided with a plurality of separate cathodes.
- 409+, for cathode ray tubes which have a plurality of cathodes and an apertured or grid-like electrode interposed in the space between one of the cathodes and the target.
- 597+, where the discharge device has an envelope containing a gas or vapor.
- 303** This subclass is indented under subclass 293. Discharge devices which have a plurality of separate nonemissive electrodes (e.g., anodes) in addition to the interposed apertured or grid-like electrode.
- (1) Note. In the discharge devices in this subclass which have a plurality of anodes, the apertured or grid-like electrode may be interposed in only one of the inter-electrode spaces (e.g., the device having a triode section and a diode section) or the apertured or grid-like electrode may be interposed in a plurality of the inter-electrode spaces.
- (2) Note. This subclass includes discharge devices which have a cathode, an anode, an apertured or grid-like electrode interposed between the cathode and anode, and an electrode or shield (e.g., shield grid) disposed outside of the inter-electrode discharge space (e.g., having a shield grid which surrounds a cylindrical anode).
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 5+, for plural unit discharge devices which have at least two anodes and a cathode for each anode, one or more of the inter-electrode spaces having an apertured or grid-like electrode therein.
- 245, for discharge devices which include significant supporting and/or spacing structure for a plurality of discharge
- electrodes which form a plurality of separate discharge spaces.
- 298, for this subject matter where the discharge device has a plurality of apertured or grid-like electrodes interposed between two other electrodes in superimposed relation with respect to each other.
- 301, where the discharge device has a plurality of apertured or grid-like electrodes, the discharge device having either an apertured or grid-like electrode in each inter-electrode space or a plurality of apertured or grid-like electrodes in one discharge space in nonsuperimposed relation.
- 302, for discharge devices provided with a plurality of cathodes and an apertured or grid-like electrode interposed in one of the discharge spaces.
- 306+, and the subclasses specified in the notes thereto for other discharge devices provided with a plurality of anodes.
- 304** This subclass is indented under subclass 293. Discharge devices which have a cathode which is composed of a plurality of parallel sections, the apertured or grid-like electrode being provided with a plurality of tubular parts, each tubular part of the apertured or grid-like electrode completely surrounding a different one of the parallel sections of the cathode.
- (1) Note. The tubular apertured or grid-like electrode sometimes has the form of a figure 8 in cross-section, a cathode section being disposed within each loop of the figure 8 with the cathode extending parallel to the longitudinal axis of the tubular apertured or grid-like electrode.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 264, for discharge devices which include significant supporting and/or spacing structure for a plural section filament.
- 302, for discharge devices having a plurality of separate cathodes and a foraminous or grid-like electrode interposed in the inter-electrode space.

**305** This subclass is indented under the class definition. Discharge devices which have an anode or target which is designed to be heated by the electron bombardment from the cathode.

- (1) Note. This subclass includes discharge devices of the cathanode type i.e., discharge devices which have an electrode, known as the cathanode, which is the anode with respect to a cathode which bombards it with electrons, the electron bombardment being designed to heat the cathanode to electron emission temperature so that another surface of the cathanode will emit electrons to a third electrode which serves as the anode for the cathode surface of the cathanode.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 8, for discharge devices which are provided with a separate body which is not intended to be used as an electrode and which is designed to be heated to incandescence by the space discharge.
- 39+, and 47, for discharge devices which are provided with means for preventing the flow of heat away from an electrode. See subclasses 39+ where the electrode is within an envelope.
- 103+, and the subclasses specified in the notes thereto for discharge devices having an electrode which emits secondary electrons when bombarded by primary electrons.
- 337+, for the structure of indirectly heated cathodes, per se.
- 347, for the structure of electrodes which are designed to be incandescible upon electron bombardment.
- 464, for cathode-ray tubes having anodes or targets which are designed to be heated to incandescence by the cathode beam.
- 588, for discharge devices which have an envelope and an atmosphere of gas or vapor, the discharge device having two electrodes between which an ionizing discharge is to be maintained, the ionizing discharge being a source of electrons for a discharge to a third electrode, the discharge to the third

electrode being nonionizing (electronic).

- 627+, for discharge devices which contain a gas or vapor and which have an electrode designed to be used alternately as a cathode and as an anode when the discharge device is used with alternating current, the electrode being designed to be heated to electron emissive temperature by the ionic bombardment. Also, 627+, for discharge devices containing an atmosphere of gas or vapor which have an incandescible anode.

**306** This subclass is indented under the class definition. Discharge devices which have three or more electrodes.

- (1) Note. See the glossary in the class definition for the definition of a three or more electrode discharge device.
- (2) Note. This is a residual subclass and provides only for discharge devices having three or more electrodes which are not provided for in the subclasses above. The search should include the subclasses providing for special types of discharge devices where a specific type of discharge device is involved. For example, secondary emissive discharge devices (e.g., electron multipliers) having three or more electrodes are classified in subclasses 103+ above and not cross-referenced to this subclass. Where the discharge device is provided for in some general subclass above, such as subclasses 11+ (with temperature modifier), or subclasses 238+ (with support and/or spacing structure for electrode and/or shield) and structure in addition to that provided for in the general subclass being disclosed, and the patent is not cross-referenced to a subclass providing for a special type of discharge device, the patent is cross-referenced into this subclass. The notes below refer to some of the subclasses which specifically provide for three or more electrode discharge devices.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 1+, for plural unit discharge devices which have at least two cathodes and an anode for each cathode.
- 103+, and the subclasses specified in the notes thereto, for discharge devices of the secondary emitter type (e.g., electron multiplier) which have three or more electrodes.
- 123+, and 140, for spark plugs having 3 or more electrodes.
- 162, for discharge devices which have three or more electrodes and a magnetic device for influencing the space discharge.
- 166, 167 through 169, 170+ and 172, for liquid (e.g., mercury) electrode discharge devices having three or more electrodes. See subclass 166 where one of the electrodes is external of the envelope, 167 where one of the electrodes is an apertured or grid-like electrode, 168 and 169, where a plurality of the electrodes are anodes, 170+ where one of the electrodes is an auxiliary starting electrode, and subclass 172 for liquid electrode discharge devices which have two electrodes immersed in the liquid electrode, the liquid electrode being vaporized to initiate the discharge and to supply the gas or vapor atmosphere in the device.
- 234, where the discharge device has one of the three or more electrodes exterior to the envelope of the device.
- 236, for discharge devices which are provided with three or more electrodes and means for selectively using the electrodes so that the discharge device may be operated without one of the electrodes being operated, one electrode being substituted for the other when the first operated electrode becomes defective.
- 238+, for discharge devices which include supporting and/or spacing structure for three or more electrodes. If structure in addition to the electrode supporting and/or spacing structure is disclosed or is claimed, the patent is cross-referenced to this or one of the

indented subclasses where the discharge device has three or more electrodes if it is not specifically provided for in a subclass other than subclasses 238+ which precedes this subclass (306).

- 293+, for discharge devices which have an apertured or grid-like electrode interposed in the inter-electrode space between two other electrodes.
- 305, for discharge devices which have an electrode designed to act as a cathode with respect to one electrode and an anode with respect to a cathode, the electrode being heated by the bombardment of electrons from the cathode and emitting electrons to the anode.
- 364+, for cathode-ray tube having three or more electrodes.
- 531, for photosensitive discharge devices which have a plurality of photosensitive electrodes.
- 540, for photosensitive discharge devices which have a plurality of cathodes, at least one of which is not photosensitive and 540, for photosensitive discharge devices which have a plurality of anodes.
- 581, where the discharge device has an envelope which contains a gas or vapor.

## SEE OR SEARCH CLASS:

- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclasses 7+ for consumable electrode discharge devices (e.g., arc lamps and similar devices having means to feed the electrodes together as they are consumed) where the structure includes at least two cathodes each having a separate anode, subclass 31 for polyphase A. C. type consumable electrode type devices, subclass 33 where the consumable electrode discharge device is provided with three or more series connected electrodes, and subclasses 36+ for the consumable electrode discharge devices which have a plurality of cathodes or a plurality of anodes.



- 315, Electric Lamp and Discharge Devices: Systems, subclasses 5.16+, 5.27, 5.28, and 5.39+ for cathode-ray tube circuits including a plurality of hollow distributed parameter devices such as a wave guide, cavity resonator, or co-axial line through or in which the ray passes; and subclasses 34 to 63 for discharge devices which have three or more electrodes and which have structurally combined therewith a circuit element such as an electric switch or an impedance.
- 378, X-Ray or Gamma Ray Systems or Devices, subclass 124 and 134 for X-ray devices which have a plurality of cathodes or anodes.
- 307** This subclass is indented under subclass 306. Discharge devices which have four or more electrodes.
- (1) Note. In some of the discharge devices in this subclass, one or more of the electrodes are intended to be used merely as discharge control electrodes.
- (2) Note. This is a residual subclass and provides only for discharge devices having four or more electrodes which are not provided for in the subclasses above. The search should include the subclasses above which provide for special types of discharge devices where a specific type of discharge device is involved. For example, secondary emissive discharge devices (e.g., electron multipliers) having four or more electrodes are classified in subclasses 103+ above and not cross-referenced to this subclass. Where the discharge device is provided for in some general subclass above, such as subclasses 11+ (with temperature modifier), or subclasses 238+ (with support and/or spacing structure for electrode and/or shield), and is not cross-referenced to a subclass providing for a special type of discharge device, the patent is cross-referenced into this subclass. The notes below refer to some of the subclasses which specifically provide for four or more electrode discharge devices.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 1+, for plural unit discharge devices which have at least two cathodes and an anode for each cathode.
- 103+, and the subclasses specified in the notes thereto, for discharge devices of the secondary emitter type (e.g., electron multiplier) which have four or more electrodes.
- 238+, for discharge devices which include supporting and/or spacing structure for three or more electrodes. If structure in addition to the electrode supporting and/or spacing structure is disclosed or is claimed, the patent is cross-referenced to this subclass where the discharge device has four or more electrodes if it is not specifically provided for in a subclass other than subclasses 238+ which precedes this subclass.
- 293, for discharge devices which have an apertured or grid-like electrode interposed in the discharge space between a cathode and another electrode (e.g., anode), a fourth electrode being located outside of the discharge space (e.g., a shield grid around a cylindrical anode).
- 296+, for discharge devices which have four or more electrodes, at least two of the electrodes being apertured or grid-like electrodes which are interposed in the inter-electrode space defined by other electrodes.
- 364+, for cathode-ray tube having four or more electrodes.
- 581, where the discharge device has an envelope which contains a gas or vapor.
- SEE OR SEARCH CLASS:
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclass 7 for consumable electrode discharge devices (e.g., arc lamps and similar devices having means to feed the electrodes together as they are consumed) where the structure includes at least two cathodes each having a separate anode; subclass 33 where the consumable electrode dis-

- charge device is provided with four or more series connected electrodes and subclasses 36+ where the consumable electrode discharge device has a plurality of cathodes or a plurality of anodes and has four or more electrodes.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 34 through 63 for discharge devices which have four or more electrodes and which have structurally combined therewith a circuit element such as an electric switch or an impedance.
- 308** This subclass is indented under subclass 306. Discharge devices which have a discharge control electrode.
- (1) Note. This is the residual subclass providing for discharge devices having three electrodes, one of the electrodes being designated as a control electrode. As pointed out in the glossary, a control electrode is an electrode designed to influence or control the discharge current flowing between other electrodes. Accordingly, whether or not an electrode is a control electrode will depend upon the system which is used with the discharge device. The search should include the subclasses above which provide for special types of discharge devices where a specific type of discharge device is involved. For example, secondary emissive discharge devices (e.g., electron multipliers) having a control electrode are classified in subclasses 103+ above. Where the control electrode is an apertured or grid-like electrode interposed in the discharge space between two other electrodes, the patent is classified in subclasses 293+ above. Where the discharge device is provided for in some general subclass above, such as subclasses 11+ (with temperature modifier), or subclasses 238+ (with support and/or spacing structure for electrode and/or shield), and is not cross-referenced to a subclass providing for a special type of discharge device, the patent is cross-referenced into this subclass. The notes below refer to some of the subclasses which specifically provide for four or more electrode discharge devices.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 5+, for plural unit discharge devices (e.g., discharge devices having at least two cathodes and an anode for each cathode) at least one of the discharge devices having a control electrode.
- 153+, for discharge devices having a control electrode and also a magnetic device for influencing the space discharge.
- 166, 167 and 170+, for liquid electrode discharge devices which are provided with a control electrode. See subclass 166 where the control electrode is external of the envelope of the device; 167, where the control electrode is an apertured or grid-like electrode interposed between the cathode and anode and 170+, where the control electrode is an auxiliary starting or holding electrode.
- 234, where the control electrode is exterior to the envelope of the discharge device.
- 243+, for discharge devices having significant supporting and/or spacing structure for a plurality of electrodes, one of which is a control electrode. If structure in addition to the electrode supporting and/or spacing structure is disclosed or claimed, the patent is cross-referenced to this subclass where the discharge device has a control electrode unless the device is specifically provided for in a subclass other than subclasses 243+ which precedes this subclass.
- 293+, where the control electrode is an apertured or grid-like electrode interposed in the discharge space defined by two other electrodes.
- 307, where the discharge device has four or more electrodes, one of which is a control electrode.
- 447, and the subclasses specified in the notes thereto for cathode-ray tubes which have a control electrode.
- 537, for photosensitive discharge devices which have a control electrode.

- 581, where the discharge device has an envelope containing an atmosphere of gas or vapor and a control electrode.
- 309** This subclass is indented under the class definition. Discharge devices having an electrode which has a plurality of pointed needle-like portions or which has a serrated edge.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 140, for this subject matter in spark plugs.  
 351, for the structure of multipointed or serrated edge electrodes, per se.
- 310** This subclass is indented under the class definition. Discharge devices which have a thermionic or emissive cathode.
- (1) Note. This subclass is the residual subclass providing for discharge devices which have thermionic or emissive cathodes which are not provided for in the above subclasses. This subclass does not contain cross-references of devices classified in the preceding subclasses where the sole novelty in the cathode is in the structure or the cathode. For such cross-references, see subclasses 337+ where the cathode is an indirectly heated cathode, 341+, where the cathode is a filament or resistance heated electrode, 346 for cathodes which contain or are coated with electron emissive material. This subclass does not contain cross-references of devices classified in the preceding subclasses where the sole novelty in the cathode is the composition of the cathode. For such cross-references, see the classes referred to in the class definition. Neither does this subclass contain cross-references to patents where the sole novelty is in the supporting and/or spacing structure for either the cathode or the cathode and the other electrodes. The search should include the subclasses above which provide for special types of discharge devices where a specific type of discharge device is involved. For example, cathode-ray tubes with thermionic or emissive cathodes are classified in subclasses 364+ above. Where the discharge device is provided for in some general subclass, such as subclasses 11+ (with temperature modifier) and structure of the cathode is claimed in addition to that provided for in either the general or specific subclasses preceding this subclass, the patent is cross-referenced into this subclass. See the search notes below for a reference to some of the subclasses which provide for discharge devices having a thermionic or emissive cathode.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 1+, for plural unit discharge devices which have at least two cathodes and at least one anode for each cathode.  
 16, for discharge devices which have a liquid electrode and an electric heater for the liquid electrode.  
 37+, where the cathode is provided with means other than the mere filament or heater for modifying the temperature of the cathode (e.g., a heat shield).  
 103+, for secondary emitter discharge devices (e.g., electron multiplier) which have emissive cathodes.  
 163+, for discharge devices which have a liquid (e.g., mercury cathode) 616, 627+ and 630 for discharge devices which contain a gas or vapor and which have a thermionic or emissive cathode. See subclass 616 where the device is provided with means to shield the cathode from positive ion bombardment, subclasses 627+ where the device has a heated or thermionic cathode, and subclass 630 for the miscellaneous gas or vapor discharge devices with emissive cathodes.  
 233, for discharge devices which are defined by the degree of vacuum and which include a thermionic or emissive cathode.  
 244+, for discharge devices which are provided with means for supporting and/or spacing a plurality of electrodes, one of which may be a thermionic or emissive cathode. See (1) Note above.  
 270, for discharge devices which are provided with means for supporting and/or spacing an indirectly heated cathode. See (1) Note above.

- 271, for devices having means for supporting and/or spacing a filament. See (1) Note above.
- 293+, for discharge devices which have a thermionic or emissive cathode and other electrode and an apertured or grid-like electrode interposed between the cathode and the other electrode. See subclass 302 where the discharge device has a plurality of cathodes and subclass 304 where the discharge device is provided with a plural section cathode having the cathode wires parallel to each other.
- 305, for discharge devices which have a cathode and other electrode which is designed to be used as an anode with respect to the first cathode and to be heated by the electron bombardment from the first cathode, the electrode having another surface which when heated emits electrons to a third electrode, (e.g., cathanode type discharge device).
- 315+, for incandescent lamps which have a filament or glower.
- 337+, see (1) Note, above.
- 341+, see (1) Note, above.
- 346, see (1) Note, above.
- 364+, for cathode-ray tubes which have a thermionic or emissive cathode. See subclass 409 where the cathode-ray tube has a plurality of cathodes.
- 523+, for photosensitive devices which have an emissive cathode.

## SEE OR SEARCH CLASS:

- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 121+ for X-ray tubes which have a thermionic or emissive cathode.

**311** This subclass is indented under the class definition. Discharge devices which have an electrode defined by the composition of which it is composed.

- (1) Note. This subclass provides only for patents for discharge devices but which specify that the device has an electrode formed of a particular composition or material. Electrode composition and materials are classified in Class 252, Compositions, subclasses 500+ or in one

of the related classes as pointed out in the class definition. Consequently, patents disclosing electrode compositions and materials for discharge devices are not cross-referenced into this subclass solely for the composition or material, but are cross-referenced in one of the classes specified in the class definitions. However, this subclass does contain some cross-references of patents where the electrode is specified as being made of some well known material, such as brass or zinc which is novel in its relationship in the discharge device although the composition, per se, is not new. This subclass is restricted to disclosures where there is some significance in the use of the particular material or composition in a discharge device.

- (2) Note. This subclass includes patents either as originals or cross-references for discharge devices which specify that one electrode is composed of a specified composition or material and another electrode is composed of a specified composition or material and another electrode is composed of a different composition.
- (3) Note. The composition or material may be a coating upon the electrode.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 54, where the electrode includes a radio active material.
- 103+, where the electrode includes a material which emits secondary electrons when bombarded by primary electrons.
- 107, where the electrode includes a material which does not emit secondary electrons when bombarded by primary electrons.
- 150, and 163+, where the electrode is a liquid electrode (e.g., mercury).
- 230, and 359.1+ for discharge devices having an evacuated envelope and an electrode which will emit positive ions.
- 483+, where the electrode includes a fluorescent or phosphorescent material.

- 523+, where the electrode includes a photo-sensitive material.
- 559, where the electrode includes a getter material or a material designed to generate a gas or vapor within the envelope of the device.
- 561, where the device has an envelope which contains a getter or a gas or vapor generating material which is defined by its composition and also has an electrode defined by its composition.
- 627+, and 630, where the device has an envelope containing a gas or vapor and an electron emissive cathode. See subclasses 627+ where the cathode is a heated or thermionic cathode.
- 633, where the device is provided with an envelope containing a gas or vapor and has an electrode defined by the composition or material of which it is composed.

**SEE OR SEARCH CLASS:**

252, Compositions, see (1) Note, above.

**312** This subclass is indented under the class definition. Devices having envelopes and having a separable casing or jacket surrounding the envelope or a portion thereof.

- (1) Note. This subclass is the residual subclass providing for lamps and discharge devices which have an envelope and a separable casing or jacket surrounding the envelope or a portion thereof and which are not provided for in specific subclasses above. This subclass contains cross-references of lamps and discharge devices classified in the preceding subclasses which do not specifically provide for the combination of a lamp or discharge device with an envelope having a casing therefor. The structures of envelopes in combination with a casing therefor are classified in other classes as set forth in the class definition. Accordingly the cross-references are placed in this subclass of lamps and discharge devices which have envelopes and a casing therefor only when there is some significance in the fact that the device enclosed within the envelope is a lamp or discharge device. To complete the search

for this subject matter the specific subclasses referred to in the notes below must be searched.

- (2) Note. This subclass does not provide for lamps or discharge devices which have an integral double wall envelope. For this excluded subject matter see subclasses 317+ below.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 17+, where the lamp or discharge device is provided with an envelope and has a casing or jacket for the envelope, the space between the casing and the envelope being designed to contain either a heat transfer medium, a heat insulating medium or to be evacuated.
- 317+, for envelopes which have double spaced walls. See (2) Note, above.
- 324, for devices under the class definition which do not have an envelope but which are provided with a casing or jacket which is not gas tight and which wholly or partially surrounds the device.

**313** This subclass is indented under the class definition. Devices provided with electrical shielding means or with means for distributing the static charges which accumulate upon the parts of the device or for the prevention of the accumulation of static charges upon parts of the device or for preventing undesired electric space discharges, such as arcs, between the parts of the device.

- (1) Note. For a definition of shield, see the glossary.
- (2) Note. This subclass includes devices provided with means to prevent the accumulation of undesired static discharges upon the envelope of the device. This subclass also includes devices provided with means to prevent electric space discharges between the lead wires for the electrodes of the device.
- (3) Note. This is the residual subclass and provides for all lamp and discharge devices which are not specifically provided for in the preceding subclasses

which have an electrical shield or a static charge distribution means combined therewith. Accordingly, cross-references have been placed in this subclass of patents classified in the preceding subclasses of lamps and discharge devices having an electrical shield or static charge distribution means excepting in the case where such patent is classified in a specific subclass preceding this subclass which provides for such subject matter. A complete field of search for this subject matter will therefore include the subclasses set forth in the notes below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 11+, where the shield is a heated shield or is provided with means for modifying the temperature of the shield (having a heat radiating surface), see indented subclass 33 for devices having an envelope and an internal temperature modifying baffle, and subclass 38 for devices having a heat shield for the filament or heated cathode.
- 134, for spark plugs having an electrical shield (e.g., radio shielding).
- 168, for liquid electrode discharge devices (e.g., mercury) which have the anodes shielded from each other by being placed in separate chambers of the envelope.
- 169, for liquid electrode discharge devices having a plurality of anodes with one or more anode arc shields.
- 590, 592, 597+, 608, 609+, 614, 616, and 626, where the device includes an envelope containing a gas or vapor. Where the device is a discharge device having three or more electrodes see subclasses 590, 592 and 597+. See subclass 590 where a shield is interposed between two of the electrodes to prevent a discharge therebetween, subclass 592 where there is a hollow shield which surrounds at least a part of the discharge path and which has an apertured or grid-like electrode within the shield and subclasses 597+ where an apertured or grid-like electrode (e.g., shield electrode) is interposed

between two other electrodes. See subclass 608 where a discharge device has particulate material between the discharge electrodes, subclasses 609+ where a discharge device has a partition, baffle, constricting means or a portion of the envelope wall interposed in the discharge space between the electrodes, subclass 614 for discharge devices provided with an anode shield, subclass 616 for discharge devices which are provided with a positive ion or cathode shield, and subclass 626 for lamps and discharge devices which have a shield for the electrode or an electrode support.

- 239+, where the device is provided with significant supporting and/or spacing structure for the shield.
- 293+, for discharge devices which have an apertured or grid-like electrode (e.g., a shield electrode) interposed in the discharge space between two electrodes, see subclass 293, where the discharge device has in addition a fourth electrode or shield disposed outside of the discharge space.
- 326+, for the structure of shields, per se.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 140+ for insulators provided with conductive means to modify the electrical characteristics of the insulator, including arcing horns, means for preventing the concentration of electrical stresses, means for modifying surface resistance, and grading means for modifying the voltage gradient; and subclasses 350-397 for miscellaneous electrical shields or screens, per se, and for envelopes, boxes, and housings which are of general utility (including those similar to those used for electric lamps and discharge devices) which are provided with or include as a part thereof an electromagnetic or electrostatic shielding means.
- 315, Electric Lamp and Discharge Devices: Systems, subclass 32 for electric lamps and space discharge devices which have a condenser,

inductance or other circuit element structurally combined therewith so as to form a unitary device. Electric lamps and discharge devices which are provided with a condenser or other circuit impedance to modify the distribution of electrostatic charges upon the parts of the lamp or discharge device are in Class 315, subclasses 32+. Note indented subclasses 58+ of Class 315 and the subclasses specified in the notes to the definition of those subclasses where a discharge device is structurally combined with a condenser or other circuit impedance, and subclass 85 for electrical systems for electric lamps and electric space discharge devices having shielding means for part of the system to prevent radiation of electromagnetic waves from and/or to the system or some part thereof.

378, X-Ray or Gamma Ray Systems or Devices, subclass 139 for X-ray discharge devices having electrostatic field stress distributing means for increasing the impedance of the dielectric paths between the electrodes and subclass 143 for X-ray tubes having means for absorbing the secondary X-ray radiation.

**314** This subclass is indented under the class definition. Devices which are provided with means for preventing the repair of the device.

- (1) Note. Some of the devices in this subclass are provided with means to cause the envelope of the device to shatter when an attempt is made to open the envelope for the purpose of repairing or replacing the filament or other electrode. Other of the devices are provided with means to prevent the filament or other electrode from being attached to the lead wires.

SEE OR SEARCH THIS CLASS, SUBCLASS:

236, for devices within the class definition which are provided with a spare or extra electrode which is to be substituted for a defective electrode.

237, for devices within the class definition which have an envelope and parts which are especially designed so that the device may be disassembled to repair an electrode or another part of the device and for devices within the class definition which are provided with means for replacing a defective electrode.

SEE OR SEARCH CLASS:

220, Receptacles, subclasses 2.1+, for envelopes, per se, for lamps and discharge devices.

**315** This subclass is indented under the class definition. Lamps which are provided with a glower or filament adapted to be heated to incandescence by the passage of an electric current therethrough.

- (1) Note. The glower or filament may be but need not be contained within an enclosing envelope.

- (2) Note. This is residual subclass and provides only for incandescent lamps which are not specifically provided for in the subclasses above. Where the incandescent lamp is provided for in some general subclass above such as subclasses 11+ (with temperature modifier), and is not cross-referenced to a subclass specifically providing for incandescent lamps and structure of the lamp is claimed in addition to that provided for in either the general or specific subclass, the patent is cross-referenced into this subclass. The notes below refer to subclasses above which specifically provide for incandescent lamps.

- (3) Note. Where the only significant lamp structure recited is the envelope, or the envelope and the base for the envelope, the filament or light emitting body being recited broadly or by name only, and where there is no relationship recited between the filament or the light emitting body and the envelope except that the filament or body is within the envelope, the patent is classified in subclasses 317+. For example, a claim directed to a particular shaped envelope which states

merely that there is a filament or light emitting body within the envelope is classified in subclass 317. A claim which includes an envelope, either broadly or specifically recited, and a base and which state merely that the envelope contains a filament or light emitting body is classified in subclasses 318.01+.

- (4) Note. Where the only significant lamp structure recited is the structure of the filament or glower with or without a lead wire or connector, the claim merely stating that the filament or glower is within or a part of an incandescent lamp, the patent is classified in subclasses 326+, especially in subclasses 341+. For example, a claim which recites an incandescent lamp provided with a filament of a particular structure without stating any other relationship of the filament to the other parts of the lamp is classified in subclasses 326+. Where the patent claims an envelope having a filament or glower being defined by either its structure or by its composition, the patent is classified in this subclass (315).

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 1+, for plural unit devices under the class definition which include at least one incandescent lamp unit and a discharge device unit. Note that incandescent lamps having only plural filaments or glowers are not classified in subclasses 1+ but are in indented subclass 316.
- 9, for incandescent lamps which include a filament or glower and a separate body, not an electrode, which is designed to be heated to incandescence by the filament or glower.
- 110+, for incandescent lamps which have integrally combined therewith an optical device or which have the envelope made of a material which transmits a particular portion of the spectrum (e.g., ultraviolet light). See subclass 112 where the optical device is a polarizer, a filter or where the envelope is special ray transmissive. See subclasses 113+ where the optical

device is a reflector; subclass 116 where the optical device is a light diffusing means and subclass 117 where the optical device is a light valve or light obscuring means.

- 235, for incandescent lamps which include two electrodes which are maintained in imperfect contact, the lamps being designed so that the passage of electric current from one electrode to the other produces light adjacent the ends of the electrodes which are in contact with each other.
- 271+, for incandescent lamps having supporting and/or spacing structure for the filament or glower. Where the only significant lamp structure recited is the supporting and/or spacing structure for the filament or glower either with or without the enclosing envelope, the patent is classified in subclasses 271+ of this class. Where the structure is disclosed or claimed in addition to the filament or glower supporting and/or spacing structure, the patent is classified in subclasses 271+ and cross-referenced to this or the indented subclass.
- 313, for incandescent lamps provided with means for preventing the accumulation of static charges upon parts of the lamp or for preventing undesired arc or other discharges between the parts of the lamp.
- 314, for incandescent lamps which are provided with means which prevents repair of the incandescent lamp.
- 331+, for the structure of lamp filaments and glowers which have combined therewith a lead wire or connector. See (4) Note above.
- 341+, for the structure of filaments and glowers. See (4) Note above.
- 549+, where the incandescent lamp has an envelope which contains a getter, a gas or vapor generating material or is provided with means for regulating the pressure within the envelope.
- 578+, where the incandescent lamp has an envelope which contains a gas or vapor.



## SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 32+ especially subclasses 32, 46+, 49, 51+, and 64 through 74 for incandescent lamps which have structurally combined therewith a circuit element such as an electric switch or an impedance. See subclasses 46+ for the structural combination of an incandescent lamp and a discharge device where the lamp filament is connected in shunt relation to the discharge electrode, subclass 49 for the structural combination of an incandescent lamp and a discharge device where the lamp filament is connected in series with the discharge device. See subclasses 51+ where the incandescent lamp has a plurality of circuit elements combined therewith.

**316** This subclass is indented under subclass 315. Lamps which are provided with a plurality of filaments or glowers, the filaments or glowers being provided with separate terminals so that the filaments or glowers are adapted to be independently energized.

- (1) Note. One terminal may have a plurality of filaments or glowers connected to it, the filaments or glowers being provided with separate terminals for the other ends of the filaments or glowers so that they may be independently energized.
- (2) Note. See notes (2) to (4) in the definition of subclass 315 with respect to the classification of multiple filament lamps in the subclasses which precede subclass 315 and this indented subclass.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

115, where the lamp has a reflector integrally combined therewith.  
 236, for multiple filament electric lamps which are provided with means, other than the mere terminals of the lamp, so that one of the filaments or glowers may be used to the exclusion of the other, the means being capable of

selecting either of the filaments or glowers for use.

272, for lamps which including significant supporting and/or spacing structure for a plurality of filaments or glowers. Where the only significant lamp structure claimed is the supporting and/or spacing structure for the filaments or glowers, either with or without the enclosing envelope, the patent is classified in subclass 272. Where structure is disclosed or claimed in addition to the supporting and/or spacing structure for the filaments or glowers, the patent is classified in subclass 272 and cross-referenced to this subclass.

## SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 64+ where the lamp has structurally combined therewith a circuit element such as an electric switch or impedance. Note that indented subclass 65 has multiple filament or glower lamps which include switch means in the lamp to energize one filament when another filament fails to operate properly.

**317** This subclass is indented under the class definition. Devices provided with an envelope which encloses the electrodes of the device.

- (1) Note. This subclass provides only for lamps and discharge devices which are provided with an envelope when there is some significance in the use of the envelope in a lamp or discharge device. Also, included are lamps and discharge devices which are provided with a specific envelope where the claims state that the envelope contains one or more electrodes of a discharge device, a lamp filament, or other structure sufficient to exclude the patent from the classes which provide for the envelope and envelopes with bases, per se. Envelopes, per se, for lamps and discharge devices are classified in Class 220, Receptacles, subclasses 2.1+, or Class 174, Electricity: Conductors and Insulators if claimed in combination with the lead-in

structure, or in Class 439, Electrical Connectors, if claimed in combination with electrical connector structure as pointed out in the class definition. See the class definition for the line between Class 313 and the other classes with respect to the subject matter provided for in this subclass. Consequently, patents disclosing envelopes for electric lamps and discharge devices are not cross-referenced into this subclass solely for the envelope structure of for the structure of the envelope and its base (electrical connector), but are cross-referenced in one of the classes specified in the class definition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

17+, where the envelope of the device is provided with a jacket or casing for modifying the temperature of the envelope (e.g., cooling, heating or insulating the device), see subclasses 25+ where the envelope is provided with spaced double walls and includes means (e.g., vacuum, gas, insulating material) in the space between the envelope walls for modifying the temperature of the lamp or discharge device.

33, where the envelope is provided with an internal temperature modifying baffle.

34, where the envelope is provided with a condensing chamber or surface to cool the gas or vapor within the envelope.

44, where the envelope wall is provided with means to modify the temperature of the device (e.g., heat radiating means, etc.).

109, where the envelope is coated or contains a fluorescent or phosphorescent material.

110+, where the envelope is provided with optical means (e.g., lens, etc.) to modify the ray energy passing through the envelope wall, see subclass 112 where the optical means is a polarizer, or filter, subclass 113 where the optical means is a reflector, subclass 116 where the envelope wall is light diffusing, and subclass 117 where the

optical means is a light valve or light obscuring means.

148, where the device has a movable electrode and a portion of the envelope wall is moveable to transmit motion to the movable electrode.

168, for liquid electrode (e.g., mercury) discharge devices having a plurality of anodes, the envelope being provided with separate anode chambers.

237, where the envelope and the parts of the device are made so that the device can be readily disassembled to repair or replace a part of the device.

242, for devices under the class definition which have means for supporting a shield, the shield being supported by or forming part of the stem of the envelope.

246+, and 248, for discharge devices having an envelope and means for supporting and/or spacing a plurality of electrodes therein, the envelope being formed of conductive material. See subclasses 246+ where the conductive envelope portion is an electrode of the device.

266, for discharge devices under the class definition having a plurality of electrode supported by wires, rods, or tubes within an envelope, the structure of the envelope or the envelope stem which supports the electrode supports being modified.

282, for devices which have an envelope with an electrically conductive (e.g., metal) envelope portion which supports an electrode within the envelope.

290, for devices under the class definition having an electrode supported by a wire, rod or tube within an envelope, the structure of the envelope or the envelope stem which supports the electrode support being modified.

312, where the device is provided with an envelope and has a separable casing or jacket which wholly or partially surrounds the envelope.

313, for devices under the class definition provided with means for preventing the accumulating of static charges upon the envelope.

- 314, for devices under the class definition provided with envelopes which shatter when an attempt is made to open the envelope for the purpose of repairing the electrodes of the device.
- 315+, for incandescent lamps provided with an envelope. See (3) Note to the definition of subclass 315 for the incandescent lamps which are classified in this and the indented subclass.
- 530, where the device is a photo-sensitive discharge device having the cathode on the envelope wall.
- 547, where the envelope is provided with valve means for introducing a gas or vapor into or withdrawing a gas or vapor from the envelope.
- 609+, for gas or vapor discharge devices where the envelope is shaped so that a portion of the envelope is interposed in the straight line path between the electrodes (e.g., coiled, U-shaped, etc.) or where the envelope is provided with a restricted cross-sectional portion so as to provide a partition or baffle between the discharge electrodes.
- 626, where the device includes an envelope containing an atmosphere of a gas or vapor and a lead-in wire, the stem of the envelope being formed so as to shield the lead-in wire from deleterious influences, such as sputtered particles, vaporized metals, etc.
- 634+, and 636, where the device includes an envelope containing an atmosphere of gas or vapor. See subclasses 634+ where the device is defined by the structure of the envelope and subclass 636 where the device is defined by the composition of the envelope.

**SEE OR SEARCH CLASS:**

- 174, Electricity: Conductors and Insulators, see (1) Note, above.
- 220, Receptacles, subclasses 2.1+ see (1) Note, above.
- 439, Electrical Connectors, and see (1) Note, above.

**318.01 Having base and connector:**

This subclass is indented under subclass 317. Devices wherein the envelope is provided with a base attached to the envelope, the base being

provided with contact means for making electrical connection to the electrodes of the device.

- (1) Note. This subclass provides only for lamps and discharge devices which have an envelope and the base therefor when there is some significance in the fact that the device within the envelope is a lamp or discharge device. This subclass, therefore, is subject to all the limitations set forth in the notes to the definition of subclass 317. As pointed out in the class definition, lamps and discharge devices having an envelope with a base therefor where the base includes electrical connector means (e.g., contact prongs) are classified in Class 439, Electrical Connectors, where no significant structure of the lamp or discharge device is claimed. Likewise, lamps and discharge devices having an envelope with an attached base where the structure claimed relates solely to the joint between the base and the envelope are classified in Class 403, Joints and Connections, as pointed out in the class definition. Envelopes having a base thereon are classified in Class 220, Receptacles, subclasses 2.1+ where electrical features are not claimed. See the class definition. Consequently patents disclosing lamps and discharge devices which have an envelope and the base thereon are not cross-referenced into this subclass solely for the structure of the envelope and its base (electrical connector) but are cross-referenced in one of the classes specified in the class definition.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 247, 253+, 274, and 286, for devices under the class definition which have an envelope and an electrode which is supported by support structure such as lead-in conductors, wires, rods, or tubes which are supported by opposed or spaced parts of the envelope wall (double-ended devices). See subclass 247 where the device is a discharge device and the envelope has a portion of the wall formed of conductive material which is designed for use as

an electrode, subclasses 253+ for other discharge devices having supporting means for a plurality of electrodes, at least one of which is so supported, subclass 274 where the device has a filament so supported, and subclass 286 for miscellaneous devices under the class definition having an electrode so supported.

315, for incandescent lamps provided with a base where the base is accurately located with respect to the filament or light emitting body so as to form a prefocused lamp.

**SEE OR SEARCH CLASS:**

220, Receptacles, subclasses 2.1+, and see (1) Note above.

403, Joints and Connections, see (1) Note above.

439, Electrical Connectors, subclasses 611+ for electrical connectors having a vitreous envelope secured to an electrical contact or coupling part (i.e., lamp or tube base type), and see subclasses 660+ for various types of connectors, per se, which may or may not be disclosed as being subcombinations of a lamp or space discharge device. Also, see (1) Note above.

**318.02 Secure to each end of a double-ended or tubular envelope:**

This subclass is indented under subclass 318.01. Devices wherein the envelope has a cylindrical form or a particular form that has two opposite ends and wherein the base is supported by one end of the envelope which is opposite to the other end of the envelope which is secured to either a different portion of the same base or another base.

**318.03 Having an annular contact disposed concentrically about the longitudinal axis of the envelope:**

This subclass is indented under subclass 318.01. Devices wherein the base has at least two contacts, at least one of which is annular and concentric about a longitudinal axis of the envelope or about an axis of engagement to a corresponding socket.

**318.04 Having screw thread coupling contact:**

This subclass is indented under subclass 318.03. Devices wherein the annular contact is concentrically disposed about a central contact and is in the form of a sleeve having grooves or threads which function to mechanically and electrically couple the base to a corresponding socket having a mating annular grooved or threaded contact and a central contact.

**318.05 Having spaced, longitudinally engaging, pronglike contacts:**

This subclass is indented under subclass 318.01. Devices wherein the base has extending therefrom at least two elongated, fingerlike contacts which are spaced apart and electrically insulated one from another.

**318.06 Having three or more electrical contacts:**

This subclass is indented under subclass 318.01. Devices wherein the base includes three or more electrical contacts.

**318.07 Associated with pinch (or press) seal of envelope:**

This subclass is indented under subclass 318.01. Devices wherein the base is attached to a sealed portion of the envelope, the seal portion being flat and having two major surfaces and two minor surfaces.

**318.08 Base attached to the envelope with cement or adhesive:**

This subclass is indented under subclass 318.01. Devices wherein the base is attached to the envelope with a cement or adhesive-type material.

**318.09 Base attached to the envelope with friction or other mechanical means:**

This subclass is indented under subclass 318.01. Devices wherein the base is friction fitted to the envelope or is secured to the envelope using other mechanical means such as a screw, nut, bolt, etc..

**318.1 Resilient mechanical means for attaching the base to the envelope:**

This subclass is indented under subclass 318.09. Devices wherein the base is secured to the envelope with mechanical means, the mechanical means being resilient (or elastic or flexible) and the resilience of the mechanical

means enabling the attachment of the base to the envelope.

**318.11 Having a reflector in combination with base:**

This subclass is indented under subclass 318.01. Devices wherein the base is formed as a part of a radiant energy reflecting structure or is attached to an end portion of a radiant energy reflecting structure.

**318.12 Having a connector:**

This subclass is indented under subclass 317. Devices wherein the envelope is provided with electrical contact means for making electrical connection to the electrodes of the device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

318.01, for an envelope having both a base and a connector means.

**323** This subclass is indented under the class definition. Lamps and discharge devices claimed in combination with structure classifiable, per se, in other classes when such combinations are not classified in any of the subclasses in this class preceding this subclass.

(1) Note. In this and the indented subclass, for example, are lamps and discharge devices which have a casing (other than an envelope or a casing provided for temperature modifying purposes), and combinations with signal or indicator means.

(2) Note. This and the indented subclass contains cross-references of patents for lamps and discharge devices classified in the preceding subclasses which do not specifically provide for combined subject matter.

**324** This subclass is indented under subclass 323. Subject matter where the lamp or discharge device is provided with a jacket or casing which wholly or partially surrounds the lamp or discharge device.

(1) Note. This subclass does not provide for lamps (including those of the discharge device type) in combination with a separable casing or jacket for the lamp. For the classification of the excluded subject

matter, see the class definition. Likewise, this subclass does not provide for certain types of discharge devices such as cathode-ray tubes and photo-cells in combination with a separable casing or jacket therefor. For the classification of this excluded subject matter, see the class definition. See the class definition where the structure includes means for modifying the temperature of the lamp or discharge device. Separable casings and jackets, per se, are provided for in other classes. See the class definition where the casing or jacket is designed for use with temperature modifying means for the lamp or discharge device or includes temperature modifying means and for the classification of miscellaneous separable casings and jackets, per se.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

36, where the device is provided with a jacket or casing for directing the flow of a temperature modifying medium about some part of the device.

312, and the subclasses specified in the notes thereto, where the lamp or the discharge device is provided with an envelope and a casing or jacket which wholly or partially encloses the envelope.

313, where the casing includes means for shielding the enclosed device or is provided with means for preventing the accumulation of static charges upon the casing or jacket.

317+, and the subclass specified in the notes thereto where the casing or jacket is an envelope for the lamp or discharge device.

**325** This subclass is indented under the class definition. Discharge devices which are not classifiable in any of the subclasses above.

(1) Note. This subclass includes discharge devices having an electrode formed of solid material which is electron permeable, discharge devices which have an insulating material in the discharge space and miscellaneous lightning arrestors of

the space discharge type which are not provided for in the preceding subclasses.

**326** Electrodes and shields for electric lamps and electric space discharge devices which are defined by their structure.

- (1) Note. For the definition of “electrodes” and “shields”, see the glossary in the class definition.
- (2) Note. This and the indented subclasses do not include electrodes and shields which are defined solely by their composition. Also excluded are electrodes and shield which are defined by their composition and the only structure defined is that the electrode is a wire, rod, strip, cylinder. Also excluded are electrodes and shields which involve no more structure than a base having a coating thereon. For the classes which provide for the excluded subject matter and the distinction between such classes, see the class definition.
- (3) Note. Joints and connections between an electrode or shield and a lead wire or connector are not included in this or the indented subclass unless the structure claimed includes some significant structure of the electrode or shield beyond that which is provided for making the joint or connection. Where the structure of the electrode or shield is not involved excepting such structure as is necessary for the joint, even though the joint is claimed as being for electrically connecting the parts, see the classes referred to in the class definition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 11+, where the electrode structure includes means for modifying the temperature of the electrode (e.g., hollow electrodes having conduits therein for circulating a cooling fluid therethrough, electrodes having heat radiating surfaces, electrodes provided with heat insulating means).
- 54, where the electrode contains or is coated with a radio-active material.

631+, for devices under the class definition having an envelope containing a gas or vapor and an electrode of particular structure.

SEE OR SEARCH CLASS:

- 96, Gas Separation: Apparatus, subclasses 95 and 98 for electrodes for electrical precipitators.
- 219, Electric Heating, subclasses 145.1+ and 146.1+ for electrodes designed for use in arc welding.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclass 60 for electrodes limited by claimed structure to use in discharge devices of the consumable electrode type, where the feed of an electrode towards another of the electrodes is accomplished by the consummation of the electrode material or by the destruction of obstructions to the motion of the electrode.
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 121+ and 143+ for X-ray tube electrodes; and subclasses 145+ and 203 for shields.
- 428, Stock Material or Miscellaneous Articles, subclasses 364+ for a rod, strand, fiber or filament which is coated or is structurally defined, but omits structure (e.g., terminals or leads) which defines an electrode or a shield, or a product for classification elsewhere, and subclass 560 for a metallic composite in which a component has metal particles held in a non-metal which acts as a binder.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 35+, 46+ and 60+ and the classes specified in the notes thereto for processes and apparatus for making electrodes and shield for electric lamps and space discharge devices.

**327** This subclass is indented under subclass 326. Electrodes which are composed at one end of an unbaked material, the unbaked material being designed to be baked by heat applied to the electrode during the use of the electrode.

- (1) Note. The heat to bake the electrode may be generated by a space discharge, or by

the heat generated by the resistance to the passage of the current which flows from the end of the electrode to the lead-in conductor for the electrode.

- (2) Note. With respect to the subject matter of this subclass, there is little distinction between the process of making the article and the process of using the article. Therefore, any claims relating to processes of making self-baking electrodes will be deemed to be directed to a process of using the same where the process includes the baking in the use of the electrode article. For classes which relate to processes of using self-baking electrodes, see the search notes below. Processes of using the electrodes are classified with the art to which the process relates.

SEE OR SEARCH CLASS:

- 204, Chemistry: Electrical and Wave Energy, subclasses 280+ for self-baking or Soederberg electrodes limited to use in electrolytic apparatus. Where the disclosure is that the electrode can be used in an electrolytic device and the claimed structure does not necessarily so limit the electrode to such use, the patent is classified in Class 313 and cross referenced to Class 204.
- 264, Plastic and Nonmetallic Article Shaping or Treating: Processes, appropriate subclasses, for processes within the class definition, for molding or shaping plastic materials, particularly subclasses 104+ and 614+ pertaining specifically to molding of electrical articles.
- 373, Industrial Electric Heating Furnaces, subclasses 89 and 97 for self-baking electrodes in electric furnaces.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 1+ and 60+ for Methods and Apparatus for the miscellaneous manufacture of electric light and space discharge devices and the electrodes therefor.
- 328** This subclass is indented under subclass 326. Structures designed for use as a receptacle for a liquid electrode (e.g., mercury).

- (1) Note. The structures in this subclass include receptacles for liquid electrodes where the receptacle is to be attached to an envelope of the discharge device, receptacles for liquid electrodes which are designed to be placed within the envelope, and the structure of the envelope portion which is to receive the liquid electrode.
- (2) Note. The receptacles in this subclass usually include means to conduct electricity to the liquid electrode.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 16, for liquid electrode discharge devices which have an electric heater for the liquid electrode.
- 29, for liquid electrode discharge devices which have means for modifying the temperature of the liquid electrode.
- 150, for liquid electrode discharge devices which have a movable liquid electrode.
- 163+, for the miscellaneous liquid electrode discharge devices, see subclass 173 where the liquid electrode includes means to prevent the space discharge from wandering over the liquid electrode surface.

**329** This subclass is indented under subclass 326. Electrodes where the electrode surface is in the form of minute conductive areas insulated electrically from each other and arranged in the manner of a mosaic surface.

- (1) Note. The insulation may be of high resistance so as to allow the leakage of electricity from one area to another.
- (2) Note. In many of the patents in this subclass, the small minute areas are photosensitive, but they need not be photosensitive.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 367+, for cathode-ray tubes having a photosensitive mosaic electrode.

531+, for miscellaneous photosensitive discharge devices having a photosensitive mosaic electrode.

**SEE OR SEARCH CLASS:**

427, Coating Processes, subclasses 77+ for processes of coating wherein the product is electron emissive or suppressive.

428, Stock Material or Miscellaneous Articles, subclass 376 for an electrode having a discontinuous coating thereon which may be of the mosaic type, and which includes no more structure than a base having one or more coatings thereon.

445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 52 and 60+ and the classes specified in the notes thereto, for processes and apparatus for making mosaic electrodes.

**331** This subclass is indented under subclass 326. Electrodes and shields which have combined therewith a lead-wire or an electrical connector.

(1) Note. An electrical connector is defined for the purpose of classification in these subclasses as any device or means which is provided for the purpose of attaching a lead wire or conductor to the electrode or shield. The connector may be a part of the electrode or shield structure or may be merely attached mechanically to the electrode or shield.

(2) Note. Joints and connections between an electrode or shield and a lead wire or connector are not included in this or the indented subclasses unless the structure claimed includes some significant structure of the electrode or shield beyond that which is provided for making the joint or connection. Where the structure of the electrode or shield is not involved excepting such structure as is necessary for the joint, even though the joint is claimed as being for electrically connecting the parts, see the classes referred to in the class definition.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

238+, for devices under the class definition which have supporting and/or spacing structure for the electrode or shield. In some of the devices in subclasses 238+ the electrode support is made of electrically conductive material and is used as a lead-in conductor to conduct electricity to the electrode.

**SEE OR SEARCH CLASS:**

174, Electricity: Conductors and Insulators, subclass 144 for arcing rings and electrodes which include as a part thereof electrical connector structure, per se, which are specifically designed for use with the insulators of Class 174.

252, Compositions, subclasses 500+ for electrically conductive compositions even if they are coating or plastic compositions such as electrically conductive cements specialized for use in joining an electrode to its lead wire or connector.

420, Alloys or Metallic Compositions, subclass 591 for alloys designed for use in soldering, brazing or welding an electrode to its lead wire or connector.

**332** This subclass is indented under subclass 331. Structure having, (1) a connector or coupling section mounted between and joined to the electrode or shield and the lead wire or connector, or (2) a material interposed between the electrode or shield and the lead wire or connector.

(1) Note. In some of the patents in this subclass, the interposed section or material is used to join the electrode or shield to the lead wire where the electrode or shield and the lead wire will not unite directly to each other because of the material used for the electrode or shield or lead wire. In others, the interposed section or material is used only to secure a better electrical or mechanical joint.



## SEE OR SEARCH CLASS:

403, Joints and Connections, appropriate subclasses for joints and connections of general utility even though designated as an electrical connection.

**333** This subclass is indented under subclass 331. Structure where the electrode or shield is a filament or formed of wire and the lead wire or connector is attached to the filament or wire.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

271+, for devices under the class definition which have significant supporting and/or spacing structures for a filament. In some of these devices, the supporting members are formed of electrically conductive material and are designed to be used as the lead-in conductor to conduct electricity to the electrode.

332, when there is, (1) a connector or coupling section mounted between and joined to the filament or wire and the lead wire or connector, or (2) a material is interposed between the electrode or shield and the lead wire or connector.

341+, for the structure of filaments for electric lamps and discharge devices.

348+, for electrodes and shields for electric lamps and discharge devices other than filaments which are made of wire (e.g., grids).

## SEE OR SEARCH CLASS:

403, Joints and Connections, appropriate subclasses for a mere connection between a filament or wire and another wire even though designated as an electrical connection.

439, Electrical Connectors, appropriate subclasses for an electrical connector, generally, and for the combination of an electrical connector with a "named" electric lamp. See the class definition of that class (439), section IV, for the line between Class 439 and other classes which provide for joint structure.

**334** This subclass is indented under subclass 331. Structure where the electrode or shield is formed at least in part of a nonmetallic material and the lead wire or connector is connected to the nonmetallic part of the electrode or shield.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

333, where the electrode is a filament, or an electrode or shield formed of filamentary strands which has its end structure modified to facilitate connecting the lead wire or connector to the filament, electrode or shield.

## SEE OR SEARCH CLASS:

252, Compositions, subclasses 500+ for electrically conductive compositions even if they are coating or plastic compositions such as electrically conductive cements specialized for use in joining a nonmetallic electrode or shield to a connector.

403, Joints and Connections, appropriate subclasses for a joint of general utility even though designated as an electrical connection.

428, Stock Material or Miscellaneous Articles, subclasses 416, 418, 432+, 444, 450, and 457+ for a nonstructural composite web or sheet embodying a layer of metal next to a nonmetal.

**335** This subclass is indented under subclass 331. Structure where the electrode or shield is in the form of a rod-like body.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

238+, for devices under the class definitions which are provided with supporting and/or spacing structures for a rod electrode. In some of these devices, the supporting member is designed for use as the lead-in conductor to conduct electricity to the rod. See indented subclass 267 where the supporting structure for supporting a plurality of rod electrodes is claimed. See subclass 238 where the support structure for a single rod electrode is claimed.

- 333, where the electrode or shield is a filament or is formed of wire.
- 357, for the structure or rod electrodes or shields, per se.
- 336** This subclass is indented under subclass 326. Cathodes where the cathode is designed so that the electron emission from the cathode is restricted to a point-like area.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
364+, for cathode-ray tubes having point source cathodes.
- SEE OR SEARCH CLASS:  
378, X-Ray or Gamma Ray Systems or Devices, subclasses 121+ for X-ray tubes having point source cathodes.
- 337** This subclass is indented under subclass 326. Cathodes which include a cathode member and a source of heat energy for heating the cathode member, the heating means being a member or device separate from the cathode member.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
270, and the subclasses specified in the notes thereto for devices under the class definition which include supporting and/or spacing structure for an indirectly heated cathode.
- 305, for discharge devices provided with at least three electrodes, a cathode emitting electrons to a first anode which is heated by the space discharge, the heated anode having a surface which when heated emits electrons to a second anode (the third electrode). These devices are sometimes known as "cathode" devices.
- 310, and the subclasses specified in the notes to the definition of that subclass for discharge devices which have an indirectly heated cathode.
- 336, where the cathode is designed so that the electron emission is restricted to a point-like area.
- 341+, for filaments and other resistance heated electrodes for electric lamps and space discharge devices.
- 338** This subclass is indented under subclass 337. Cathodes where the cathode is provided with a plurality of electron emissive sections which are electrically insulated from each other so that the cathode affords a plurality of electrically independent cathode sections.
- 339** This subclass is indented under subclass 337. Cathodes where the cathode member is formed with a hollow cavity, the cathode member being designed to emit electrons from the interior walls of the hollow cavity.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
346, for cathodes under subclass 643 which include a body or mass of electron emissive material which is at least partly enclosed within a support or carrier member, the support or carrier being permeable to electrons, or being permeable to the electron emissive material so that the material can permeate the support or carrier and form a coating thereon.
- 340** This subclass is indented under subclass 337. Cathodes which are provided with an electrical insulating material between the cathode member and the heating means for the cathode.
- SEE OR SEARCH CLASS:  
174, Electricity: Conductors and Insulators, subclasses 137+ for insulators, note subclass 138 for cathode heater insulators, per se, and subclasses 110+ for insulated electric conductors.
- 219, Electric Heating, subclass 531 for electric heaters provided with insulating means including the combination of an electrical heater and insulating means for an indirectly heated cathode where the cathode is not included in the claims.
- 252, Compositions, subclasses 570+ for fluent electrical insulating materials and compositions.
- 338, Electrical Resistors, subclasses 226+ for electrical resistors having a casing or housing around the resistance element.

- 427, Coating Processes, subclasses 58+ for processes of coating, per se, wherein the product is an electrical product.
- 428, Stock Material or Miscellaneous Articles, subclasses 375+ for a filament or electrode for electric lamps and space discharge devices which have an insulating coating thereon.
- 501, Compositions: Ceramic, appropriate subclasses for ceramic electrical insulating compositions, especially subclasses 127+ and 134+ for clay containing compositions; and subclasses 141+ for titanates and similar material containing compositions.
- 341** This subclass is indented under subclass 326. Electrodes which are either, (1) filaments, or (2) of the type which are designed to be heated by the flow of electric current through the electrode.
- (1) Note. For the other classes which provide for filaments and resistance heated electrodes including those for use in electric lamps and discharge devices, and for the processes and apparatus for making filaments and resistance heated electrodes, see the class definition.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 271+, for devices under the class definition which have a filament and which have supporting and/or spacing structure for the filament.
- 310, and the subclasses specified in the notes thereto for discharge devices which are provided with a filament or resistance heated cathode.
- 315+, for incandescent lamps with filaments or resistance heated glowers.
- 336, where the electrode is electron emissive, the electrode being designed so that the electron emission is restricted to a point-like area.
- 337+, and the subclasses specified in the notes thereto where the electrode is an indirectly heated cathode, that is, the cathode includes an electron emissive part and a separate heating means to heat the emissive part to the electron emitting temperature.
- SEE OR SEARCH CLASS:
- 428, Stock Material or Miscellaneous Articles, subclasses 364+ for a filament which is coated or is structurally defined, but omits structure (e.g., terminals or leads), which defines an electrode for Class 313 or a product elsewhere classified.
- 342** This subclass is indented under subclass 341. Filaments and electrodes where the parts of the filament and electrodes are arranged so as to reduce to a minimum the electromagnetic or electrostatic field which is generated by the current flowing through the filament or electrode.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 337+, for indirectly heated cathodes which are provided with means to shield the electrons emitted by the cathode from the electromagnetic or electrostatic field generated by the heating means.
- SEE OR SEARCH CLASS:
- 174, Electricity: Conductors and Insulators, subclasses 32+ for conductors of the noninductive type.
- 343** This subclass is indented under subclass 341. Filaments and electrodes which are composed of a plurality of inter-engaged wires or strands assembled to form a single electrode structure.
- SEE OR SEARCH CLASS:
- 57, Textiles: Spinning, Twisting, and Twining, subclasses 200+ and the classes specified in the notes thereto for spun, twisted or twined strands.
- 174, Electricity: Conductors and Insulators, subclasses 128.1+ for plural strand conductors.
- 428, Stock Material or Miscellaneous Articles, subclass 608 for metallic stock material which embodies interengaged fibers.
- 344** This subclass is indented under subclass 341. Filaments and electrodes where the filament is formed into a coil.

- (1) Note. A coil is defined for the purpose of classification in this subclass as a filament or electrode having at least one convolution.

SEE OR SEARCH THIS CLASS, SUBCLASS:

341, for mere U-shaped, V-shaped or looped filaments and electrodes within the definition of subclass 341.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclass 592 for metallic stock material in the shape of a helix or which has a helical component.

**345** This subclass is indented under subclass 341. Filaments and electrodes where the filament or electrode is provided with a coating.

- (1) Note. The coating may be either electron emissive or not electron emissive.
- (2) Note. This subclass includes only those patents which claim structure of the filament or electrode other than merely reciting that the electrode is a filament, rod cathode, electrode or base, which is provided with a coating. Where no more is claimed than the mere base with a coating thereon, the patent is classified in one of the classes specified in the class definition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

346, for the structure of other electrodes under subclass 326 which are provided with an electron emissive coating.

355, for the structure of other electrodes under subclass 326 which have a coating thereon.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclass 554 for a metal particle-containing stock material composite.

**346** This subclass is indented under subclass 326. Electrodes which are made at least in part of electron emissive material or which are coated with electron emissive material.

- (1) Note. Where no structure other than the mere composition of the electrode is claimed, or no structure other than the mere composition of the base and/or coating is claimed, the patent is excluded from Class 313. Merely naming the electrode as a wire, rod, filament, plate or electrode will not cause classification in Class 313. For the classification of electrodes defined only by their composition, and for coated electrodes involving only a base with a coating thereon, see the class definition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 310, and the subclasses specified in the notes thereto for discharge devices which are provided with an emissive cathode.
- 329, for the structure of electron emissive mosaic electrodes.
- 336, for the structure of electron emissive electrodes where the electron emission is restricted to a point-like source.
- 337, for the structure of electron emissive indirectly heated cathodes.
- 341, for the structure of electron emissive filaments and resistance heated electrodes, see indented subclass 345 where the filament or resistance heated electrode has an emissive coating thereon.
- 353, for electrode structure where a portion of the electrode is a nondischarge sustaining portion.

SEE OR SEARCH CLASS:

- 427, Coating Processes, subclasses 58+ for processes of coating, per se, wherein the product is an electrical product.
- 428, Stock Material or Miscellaneous Articles, subclasses 375+ for a filament or electrode which may be made at least in part from electron emissive material or which is coated with electron emissive material, and subclass 553

for an electrode comprising a particulate metal component adjacent to a nonparticulate metal component.

**347** This subclass is indented under subclass 326. Electrodes which are constructed so that at least a small area of the electrode becomes incandescent when bombarded by electrons.

- (1) Note. This subclass is limited to electrodes which are especially designed to have a portion of the electrode become incandescent when bombarded by electrons and does not include electrodes, such as anodes, which may become heated only as an undesired incident of their operation.
- (2) Note. Some of the electrodes in this subclass are intended for use as targets in cathode-ray tubes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

346, for electrodes containing and/or coated with electron emissive material designed for use in discharge devices, usually of the type containing a gas or vapor, and which are designed to become heated by the bombardment of the electric space discharge so that they become thermionic electrodes.

305, for miscellaneous discharge devices which have an anode which is designed to be heated by the space discharge. Included in subclass 305 are discharge devices where the heated anode has a surface designed to emit electrons to a second anode (an electrode other than the cathode which emits electrons to the heated anode).

464, for cathode ray devices provided with targets adapted to be rendered incandescent by the cathode beam.

627+, for discharge devices of the gas or vapor type having a thermionic cathode which is heated by the space discharge. Also 627+, for discharge devices of the gas or vapor type having an anode which is heated to incandescence by the space discharge.

SEE OR SEARCH CLASS:

378, X-Ray or Gamma Ray Systems or Devices, for X-ray tube targets or anticathodes.

**348** This subclass is indented under subclass 326. Electrodes and shields which are formed of open-work material such as wire mesh or perforated sheet material, or which are formed of wires or bars, or which are otherwise provided with openings in the wall of the electrode or shield.

- (1) Note. Some of the electrodes in this subclass are intended for discharge control electrodes or grid electrodes, but also included are all foraminous and grid-like electrode structures even though claimed as being used for anodes, cathodes or other electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

293+, and the subclasses specified in the notes thereto for discharge devices which have a foraminous or grid-like electrode disposed in the inter-electrode space between two other electrodes.

346, where the foraminous or open-work electrode forms a support or carrier for a body or mass of electron emissive material, the body or mass of electron emissive material being at least partly enclosed within the foraminous or open-work electrode contains or is coated with electron emissive material.

SEE OR SEARCH CLASS:

245, Wire Fabrics and Structure, appropriate subclasses for flexible wire or slat-and-wire fabrics.

442, Fabric (Woven, Knitted, or Non-woven Textile or Cloth, etc.), subclasses 1+ for an open mesh material.

**349** This subclass is indented under subclass 348. Electrodes and shields, (1) having the ratio of area of free passage through the openings in the electrode or shield to the obturating area of the electrode or shield in one region of the electrode or shield different from such ratio in

another region of the electrode or shield, (2) where the electrode or shield wall surface is not a cylindrical hollow sleeve and is of a non-straight surface configuration with the foraminous wall of the electrode or shield lying in at least two different planes, or (3) having the foraminous wall surface of the electrode or shield in the form of a hollow sleeve, the sleeve having the cross-sectional area at one region of the electrode or shield different from the cross-sectional area at another region of the electrode or shield.

- (1) Note. Under (1) in the subclass definition is included electrodes and shields having at least one opening in the electrode or shield of a different area from the area of another of the openings, or electrodes and shields having the openings in the electrode or shield nonuniformly spaced with respect to each other, or electrodes and shields formed of a wire coil or helix which has a nonuniform pitch for the turns of the coil or helix. Under (3) in the subclass definition is included electrodes and shields the wall surface of which is conical, in the form of a truncated cone, barrel-shape or spherical.
- (2) Note. Many of the electrodes in this subclass are intended for use as discharge control electrodes in discharge devices of the variable- $\mu$  type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 294, for discharge devices having a foraminous or grid electrode interposed in the discharge space between two other electrodes, the foraminous or grid electrode being nonuniformly spaced from the other electrodes (e.g., the foraminous or grid electrode being eccentrically mounted, or being noncylindrical with respect to concentric electrodes, etc.).
- 295, for discharge devices having a foraminous or grid electrode interposed in the discharge space between two other electrodes, the foraminous or grid electrode having a nonuniform mesh area.

348, and 350, for foraminous or open-work electrodes and shields where the wall surface is a straight hollow sleeve and is uniformly foraminous over its surface.

- 350** This subclass is indented under subclass 348. Electrodes and shields where the electrode or shield is formed of rods, wire or mesh material which is attached to one or more rods or posts so as to give the desired rigidity to the electrode or shield.

SEE OR SEARCH CLASS:

245, Wire Fabrics and Structure, subclass 11 for slat and wire fabrics.

- 351** This subclass is indented under subclass 326. Electrodes and shields where the electrode or shield is provided with, (1) a plurality of pointed needle-like portions, or (2) with a serrated edge.

SEE OR SEARCH THIS CLASS, SUBCLASS:

309, for discharge devices which have a multipointed or serrated edge electrode.

- 352** This subclass is indented under subclass 326. Electrodes and shields which are composed of a plurality of parts or sections, one of the parts or sections being composed of a different material from the material of which another part or section is composed.

(1) Note. This and the indented subclasses includes the structure of electrodes and shields which are formed of one material and which are coated with another material.

(2) Note. This and the indented subclasses do not include electrodes or shields which are composed of a plurality of materials which are mere constituents of a single composition or alloy.

SEE OR SEARCH THIS CLASS, SUBCLASS:

337+, where the electrode is an indirectly heated cathode.

343, for this subject matter where the electrode is a filament or resistance heated

electrode which has a wire or strand wound upon another filament or rod which is of a different composition from the composition of the filament or rod.

- 346, for this subject matter where the electrode is made of a material containing or is coated with electron emissive material or includes a body or mass of electron emissive material which is at least partly enclosed by a support or carrier which is permeable to electrons or to the electron emissive material.

SEE OR SEARCH CLASS:

- 378, X-Ray or Gamma Ray Systems or Devices, where the electrode is an X-ray target or anti-cathode.  
428, Stock Material or Miscellaneous Articles, subclasses 548+ for composite metallic stock having metal particles, and subclasses 615+ for other composite metallic stock.

- 353** This subclass is indented under subclass 352. Electrodes where the electrode is provided with a part or section which is formed of a material which will not sustain an electric space discharge.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 106+, for discharge devices having means for preventing the emission of secondary electrons, note subclass 107 where the electrode is formed of or coated with a nonemissive material.

- 354** This subclass is indented under subclass 352. Electrodes where the electrode is formed in the shape of a rod, the rod being provided with a core part which is formed of a material which is of different composition from the material of which the body part of the rod is composed.

- (1) Note. This subclass includes cored rods designed for use as arc lamp electrodes.

SEE OR SEARCH CLASS:

- 428, Stock Material or Miscellaneous Articles, subclasses 375+ for a rod which has a coating, impregnation or core.

- 355** This subclass is indented under subclass 352. Electrodes and shields where, (1) the electrode is provided with a coating, or (2) the electrode or shield is formed of a plurality of laminations.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 329, where the electrode is a mosaic electrode.  
336, where the electrode is electron emissive electrode and is provided with a coating, the electrode being designed to emit electrons only from a small point-like area.  
337+, where the electrode is an indirectly heated cathode.  
345, where the electrode is a filament or resistance heated electrode which is provided with a coating.  
346, where the electrode is provided with an electron emissive coating.

SEE OR SEARCH CLASS:

- 428, Stock Material or Miscellaneous Articles, subclasses 98+ for a stock material product in the form of a single or plural layer which has structure (e.g., dimension or aperture), subclasses 221+ for such a product embodying an element or component which is structurally defined (e.g., porous or size of fiber), subclasses 357+ for a structurally defined or coated rod, strand, fiber, filament or other element, and subclasses 411.1+ and 615+ for nonmetallic and metallic composites, respectively, defined in terms of the composition of their components.

- 356** This subclass is indented under subclass 326. Electrodes and shields which are in the form of tubes or hollow sleeves.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 331, where the tubular or hollow sleeve electrode or shield is provided with a lead wire or connector.  
337+, where the tubular or hollow sleeve electrode is part of an indirectly heated cathode.

- 341, where the tubular or hollow sleeve electrode is a filament or resistance heated electrode.
- 346, where the tubular or sleeve electrode is made of a material containing or is coated with electron emissive material or at least partially encloses a body or mass of electron emissive material.
- 348+, where the tubular or hollow sleeve is formed of foraminous or open work material.
- 354, where the tubular or sleeve electrode contains a core made of a different composition from the composition of the tube or sleeve material.

## SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclass 39.77 for discharge devices having a hollow tubular electrode formed so as to provide a structure having distributed inductance and capacitance (e.g., cavity resonator), and operable in a magnetic field (e.g., magnetrons), and for the electrode, per se.

- 357** This subclass is indented under subclass 326. Electrodes and shields which are in the form of rods.

- (1) Note. Where no structure of the electrode or shield is recited except that it is a rod formed of a particular composition, the patent is excluded from Class 313 and will be found in Class 252, Compositions, subclasses 502+ or one of the classes specified in the notes to the definition of those subclasses. See the class definition of Class 313.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 238+, for devices under the class definition which are provided with a rod electrode and supporting and/or spacing structure for the rod electrode. See indented subclass 267 where the device is provided with supporting and/or spacing structure for a plurality of rod electrodes. See subclass 238 where the supporting structure for a single rod electrode is claimed.

- 335, where the rod is provided with a lead wire or connector.
- 341+, for filaments and resistance heated electrodes.

## SEE OR SEARCH CLASS:

- 428, Stock Material or Miscellaneous Articles, subclasses 364+ for a rod which is structurally defined or coated, and not elsewhere provided for.

- 358** This subclass is indented under the class definition. Miscellaneous subject matter which is not provided for in any of the preceding subclasses in this class.

- (1) Note. This subclass includes electrolytic light sources.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 315+, for miscellaneous incandescent lamps.
- 325, for miscellaneous discharge devices.

**359.1 WITH POSITIVE OR NEGATIVE ION ACCELERATION:**

This subclass is indented under the class definition. Subject matter which are provided with means for generation positive or negative ions and which are provided with means to accelerate the ions.

- (1) Note. Many of the devices in this subclass are provided with means such as an ion transparent window for allowing ions to emerge from the envelope of the discharge device.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 62, for cyclotrons.
- 230, for discharge devices which are provided with an evacuated envelope and which have means for generating positive ions.
- 231.01+, for discharge devices with means for supplying fluent material to the discharge space.
- 364+, for cathode-ray tubes which may include means for controlling or deflecting an electron beam.
- 567, for discharge devices which include an envelope and a confined atmo-



- sphere of gas or vapor and which necessarily generate positive ions in their operation.
- 588, for gas or vapor-type discharge devices which are provided with an envelope having two portions, one of the portions containing electrodes designed to generate an ionizing discharge, the ionizing discharge supplying electrons to an electrode in the second portion of the device; the second portion being designed to operate with an electronic discharge. The two portions of the envelope may be separated by a barrier which is permeable to ions but impermeable to the gas or vapor in the first envelope portions.
- SEE OR SEARCH CLASS:**
- 250, Radiant Energy, subclass 251 for devices for producing and propagating a unidirectional stream of neutral molecules or atoms through a vacuum, usually with thermal velocity; subclasses 281+ for methods and apparatus for ionic separation or analysis; especially subclass 288 which includes a sample supply or invisible radiation responsive gas; subclasses 379+ for discharge device apparatus which includes means to supply the gas into the discharge device; subclasses 396+ for means to deflect, scan, spread, or focus a performed beam of ions; and subclasses 423+ for ion generation methods and apparatus in which a material is treated or irradiated.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 111.01+ for discharge device load with fluent material supply to the discharge space.
- 327, Miscellaneous Active Electrical Non-linear Devices, Circuits, and Systems, subclasses 510+ for miscellaneous circuits which are magnetically effected.
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclass 210 for ion or electron beam deflecting magnets, per se, and the search notes thereto for combinations including such magnet means.
- 376, Induced Nuclear Reactions: Processes, Systems, and Elements, appropriate subclasses, especially subclasses 100+ for the utilization of a plasma in fusion reactions or where it is intended to obtain a nuclear fusion reaction; and subclasses 156+ and apparatus for processes for changing the nucleus of a substance by the use of ray energy including an ion beam.
- 360.1 Plural apertured electrodes:**  
This subclass is indented under subclass 359.1. Subject matter including two or more apertured electrodes.
- (1) Note. In general, the electrodes here are accelerating electrodes.
- 361.1 Means for deflecting or focusing:**  
This subclass is indented under subclass 359.1. Subject matter including means to deflect, scan, spread, or focus the ions.
- SEE OR SEARCH CLASS:**
- 250, Radiant Energy, subclasses 396+ for the deflection or focusing of a preformed beam of ions.
- 362.1 Supplying ionizable material (e.g., gas or vapor):**  
This subclass is indented under subclass 359.1. Subject matter including means for delivering an ionizable fluent material to a discharge device.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**  
231.01+, for means for supplying or directing fluent material to a discharge device.
- 363.1 Extraction or target electrode:**  
This subclass is indented under subclass 359.1. Subject matter including an electrode for removing or receiving ions.
- 364** This subclass is indented under the class definition. Subject matter including means to generate a beam of electrons in the form of a ray or to exchange energy therewith.
- (1) Note. Cathode-ray tubes in general are characterized by being provided with

one or more focusing electrodes or electromagnets for forming the electric space discharge into a restricted beam or ray of elemental cross-section. However, some cathode-ray tubes utilize the gas pressure within the envelope of the discharge device to form the cathode stream into a restricted pencil ray beam and such devices are included in this and the indented subclasses.

- (2) Note. This and the indented subclasses do not include discharge devices of the so-called beam power type where the sole means for forming the electron stream into a restricted beam or ray is a plurality of grid electrodes or other apertured electrodes between the cathode and anode, with the apertures of the grid or other electrodes in alignment. However, this and the indented subclasses do include discharge devices similar in structure where in addition to the plurality of grid or apertured electrodes, other means (e.g., electrodes) are provided for the sole purpose of forming the discharge into a restricted beam or ray. The excluded subject matter will be found in subclass 299 of this class.
- (3) Note. This and the indented subclass do not include discharge devices which are provided only with means for varying the width of the electron stream and which do not include any means whose purpose is to form the discharge into a restricted beam or ray. See subclass 107.5, for the excluded subject matter including discharge devices of the "magic eye" type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 2.1, for plural unit devices under the class definition where one of the devices is a cathode-ray tube.  
 107.5, see (3) Note, above.  
 299, see (2) Note, above.  
 359.1, for discharge devices with means to accelerate positive or negative ions.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 251 for neutron generators, subclasses 281+ for

methods and apparatus for mass spectrometers which use discharge devices in the separation and analysis of material, subclass 305 for methods and apparatus for analyzing electrons by separating them on a velocity or momentum basis, subclasses 306+ for the inspection of solids or liquids by discharged particles and particularly subclass 311 for electron microscopes, subclasses 396+ for electron or ion beam deflection or focussing, means, subclasses 440.11+ for object supports used in charged particle inspection systems, subclasses 493.1+ for evacuable chamber device with radiation detectors or detector supports and subclasses 492.1+ methods and apparatus to irradiate object or materials generally.

- 315, Electric Lamp and Discharge Devices: Systems, subclasses 3+ for cathode ray devices which have structurally combined therewith a circuit element, (e.g., a switch, impedance, cavity resonator, etc.).
- 347, Incremental Printing of Symbolic Information, subclasses 226+ for cathode-ray oscilloscopes (e.g., cathode-ray tubes having means, such as photographic film, to make a record of the trace of the cathode ray), and subclasses 121+ for electrostatic recorders using electron beam in an air tight envelope for creating a charged pattern.
- 348, Television, subclasses 325+ and 805+ for cathode-ray tubes utilized in television systems in combination with optical elements, supports, and specific circuitry peculiar to television.
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 121+ for X-ray tubes.

**365** This subclass is indented under subclass 364. Subject matter including structure responsive to electromagnetic radiation or compressional waves.

- (1) Note. Included here are structures which emit electrons or change conductivity when irradiated with light, and structures

responding piezoelectrically to compressional waves.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 2.1, for plural unit devices within the class definition which include a cathode ray device with a fluorescent screen and a photosensitive device, the light emitted by the fluorescent screen activating the photosensitive electrode.
- 346, and the classes and subclasses specified in the notes thereto, for photo-emissive cathodes, per se.
- 523+, for other photosensitive devices under the class definition.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 330+ and 361+ for light amplifiers responsive to invisible radiation, subclass 213 for "light amplifiers", i.e., devices having a photosensitive cathode, and a fluorescent screen which is excited by the emission from the cathode so that there is correspondence between the light falling on the cathode and the light output of the fluorescent screen, and subclasses 216+ for cathode-ray tubes which are provided with a photosensitive electrode in combination with a separable optical means for controlling the light impressed upon the photosensitive electrode.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 10+ for systems for supplying electrical energy to cathode-ray tubes, the system including light sensitive means to control the operation of the cathode-ray tube. The cathode-ray tube in the system may have a light sensitive electrode.
- 366** This subclass is indented under subclass 365. Subject matter including a semiconductor depletion layer device responsive to irradiation.
- (1) Note. The barrier may be induced or formed by doping.
- 367** This subclass is indented under subclass 366. Subject matter wherein the semiconductor depletion layer devices are disposed in a mosaic.
- (1) Note. The term mosaic is intended to include strips, stripes, or bands.
- 368** This subclass is indented under subclass 367. Subject matter wherein more than one depletion layer form an element of the mosaic.
- 369** This subclass is indented under subclass 365. Subject matter including structure responsive to pressure
- (1) Note. Devices responsive to compressional waves are included here.
- 370** This subclass is indented under subclass 365. Subject matter including a conductive light previous film, layer or element adjacent the responsive structure specified in terms of chemical composition or construction.
- 371** This subclass is indented under subclass 365. Subject matter including an optical element associated with the responsive structure to filter, reflect, refract, or restrict light.
- (1) Note. Included here are filters, masks, lenses, reflectors and light conducting elements.
- 372** This subclass is indented under subclass 371. Subject matter wherein the optical means conducts light by total internal reflection.
- (1) Note. The light conducting element is generally in the form of a fiber or rod.
- 373** This subclass is indented under subclass 365. Subject matter including a cathode element which emits electrons in response to light.
- 374** This subclass is indented under subclass 373. Subject matter wherein the photo-emissive cathode is formed of small discrete emissive elements in a mosaic pattern.
- (1) Note. A mosaic pattern includes strips, stripes, or bands.

- 375** This subclass is indented under subclass 373. Subject matter wherein the photo-emissive cathode is in the form of more than one film, coating or layer on a substrate each being photo-emissive.
- 376** This subclass is indented under subclass 373. Subject matter including an electrode which receives the electron cloud emitted by the photo-emissive cathode and forms a latent electrical image corresponding to the image on the photo-emissive cathode.
- (1) Note. The target receives the cathode ray.
- 377** This subclass is indented under subclass 376. Subject matter including means for providing electron multiplication at the target in response to the electron cloud from the photo-emissive cathode or means for providing electron multiplication of electrons returning from the target.
- (1) Note. The means providing the electron multiplication at the target may be located between the photo-emissive cathode and the target or be part of the target.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
379, for an electron multiplier receiving electrons returning from the photo-emissive cathode.
- 378** This subclass is indented under subclass 376. Subject matter including structure to support the target.
- 379** This subclass is indented under subclass 373. Subject matter including an electron multiplier responding to electrons returning from the photo-emissive cathode.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
377, for an electron multiplier receiving electrons returning from a target.
- 380** This subclass is indented under subclass 373. Subject matter wherein the photo-emissive cathode is adapted to respond to electromagnetic radiation other than visible light.
- (1) Note. Included here is structure of or associated with the cathode to make it particularly sensitive to, for example, infrared radiation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
388, for photoconductive elements made sensitive to particular frequencies of electromagnetic radiation.
- 381** This subclass is indented under subclass 373. Subject matter including an aperture across which an electron cloud from the photo-emissive cathode may be scanned, an elemental part of the scanned cloud emanating as a ray from the opposite side of the aperture.
- 382** This subclass is indented under subclass 373. Subject matter including structure to focus the electron beam.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
389, for similar structure including a photo-conductive element.  
414, for plural beam generators with a focusing electrode.  
442, for cathode-ray tubes with magnetic focus.
- 383** This subclass is indented under subclass 373. Subject matter including an additional electrode or support for the additional electrode or the photo-emissive cathode.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
390, for similar subject matter with a photo-conductive element.
- 384** This subclass is indented under subclass 365. Subject matter including an element which changes in conductivity in response to light.
- 385** This subclass is indented under subclass 384. Subject matter wherein the photoconductive element is in the form of a layer having a specified chemical composition.
- 386** This subclass is indented under subclass 385. Subject matter wherein the photoconductive element is composed of plural layers.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
375, for plural photo-emissive layers forming the cathode.
- 387** This subclass is indented under subclass 384. Subject matter including an element which emits electrons in response to electrons reflected from the photoconductive element.
- (1) Note. Included here are photomultipliers.
- 388** This subclass is indented under subclass 384. Subject matter wherein the photoconductive element is adapted to respond to electromagnetic radiation other than visible light.
- (1) Note. Included here is structure of or associated with the photoconductor to make it particularly sensitive to, for example, infrared radiation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
380, for photo-emissive cathode made sensitive to particular frequencies of electromagnetic radiation.
- 389** This subclass is indented under subclass 384. Subject matter including structure to focus the cathode ray.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
382, for similar structure including a photo-emissive cathode.  
414, for plural beam generator with a focusing electrode.  
442, for cathode-ray tubes with magnetic focus.
- 390** This subclass is indented under subclass 384. Subject matter including an additional electrode or support for the additional electrode or the photoconductive element.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
383, for similar subject matter with a photo-emissive cathode  
417, for electrode support structure in a plural beam tube.
- 438, for means for supporting electrostatic deflection structure.
- 456+, for means for supporting an electrode in the electron gun structure.
- 391** This subclass is indented under subclass 364. Subject matter including an electrode capable of converting the energy from a cathode ray to a charge distribution.
- (1) Note. In general, a writing and reading cathode-ray beam is required to place the charge on the storage electrode and to derive information from it.
- 392** This subclass is indented under subclass 391. Subject matter wherein the storage electrode is a depletion layer device.
- (1) Note. The depletion layer may be induced or formed by doping.
- 393** This subclass is indented under subclass 391. Subject matter wherein the storage electrode is located intermediate two electron guns with one gun on each side of the storage electrode.
- 394** This subclass is indented under subclass 391. Subject matter wherein the storage element is the anode or is contiguous with the anode in the form of a separate continuous layer.
- (1) Note. The continuous type storage element requires scanning to read the stored charge distribution.
- 395** This subclass is indented under subclass 391. Subject matter wherein the storage element is in the form of a mesh having voids or a sheet having perforations and coated with a storage material.
- 396** This subclass is indented under subclass 391. Subject matter including means for flooding the storage electrode with electrons.
- 397** This subclass is indented under subclass 391. Subject matter including a display screen for providing an image corresponding to the storage electrode charge distribution, storage and display are effected by the same element or contacting elements.

- 398** This subclass is indented under subclass 397. Subject matter wherein storage and display are effected by the same element or contacting elements.
- 399** This subclass is indented under subclass 364. Subject matter which includes a secondary emissive electrode.
- (1) Note. Included here are electron multipliers.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 346, and the classes and subclasses specified in the notes thereto for secondary emissive electrodes, per se.  
 377, 379 and 387, for secondary emissive electrodes in pick-up tubes.  
 391, for storage tubes which may include a secondary emissive electrode.
- SEE OR SEARCH CLASS:  
 315, Electric Lamp and Discharge Devices: Systems, subclasses 11, 12.1, for systems for supplying electrical energy to cathode-ray tubes which include a secondary emissive electrode.  
 329, Demodulators, appropriate subclasses, for demodulators with secondary emission.  
 330, Amplifiers, subclass 42 for amplifiers having a secondary emissive tube.
- 400** This subclass is indented under subclass 399. Subject matter including an element producing a visual display in response to electron irradiation from the secondary emissive electrode.
- 401** This subclass is indented under subclass 399. Subject matter wherein the emissive material is in the form of a picture or symbol or the emissive material is masked to provide a signal indicative of a picture or symbol.
- (1) Note. The subject matter of this subclass is generally for the purpose of providing a video signal of a test pattern or the like.
- 402** This subclass is indented under subclass 364. Subject matter including an electrode having apertures, correlated with groups of color emissive elements of display screen, structure securing the electrode, or electrode frame; or an electron shield associated with the electrode or frame.
- (1) Note. The nominal recitation of a supported or unsupported shadow mask is not sufficient for classification in this subclass.
- 403** This subclass is indented under subclass 402. Subject matter wherein the shadow made has noncircular apertures.
- 404** This subclass is indented under subclass 402. Subject matter including a resilient element securing the mask or mask frame to the cathode ray device.
- 405** This subclass is indented under subclass 404. Subject matter wherein the resilient support comprises dissimilar metals associated in such a way as to move the mask in response to temperature changes.
- 406** This subclass is indented under subclass 404. Subject matter including studs to which the resilient elements are attached, secured, or connected.
- 407** This subclass is indented under subclass 402. Subject matter including a frame for supporting the shadow mask or shield.
- 408** This subclass is indented under subclass 402. Subject matter including a phosphor screen.
- 409** This subclass is indented under subclass 364. Subject matter including structure to produce or control a plurality of electron beams.
- (1) Note. These devices may have a plurality of beam forming cathodes, each with beam forming means associated therewith, or a single cathode with means associated therewith for forming the discharge into a plurality of separate beams directed severally toward different targets or different parts of the same target.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 2.1, for plural unit devices under the class definition which include two cathode

ray devices, each being provided with its own beam forming means and provided with a separate target for each beam.

SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclasses 5.14+ for cathode-ray tube circuits which include a plurality of beam forming cathodes and a hollow distributed parameter device such as a wave guide, resonator, or co-axial line, the beams formed by the cathodes passing through or in the device; and subclasses 368.11+ for a cathode-ray device having convergence control circuitry. See also (1) Note under subclass 5.14 and subclasses 13.1+ for systems for supplying electrical energy to cathode-ray tubes which are provided with means for forming a plurality of separate cathode-ray beams.
- 378, X-Ray or Gamma Ray Systems or Devices, subclass 134 for X-ray devices under the class definition which include a plurality of cathodes.
- 410** This subclass is indented under subclass 409. Subject matter including means to define a pattern in the form of a number or letter.
- 411** This subclass is indented under subclass 409. Subject matter including means for deriving plural beams from a single cathode.
- 412** This subclass is indented under subclass 409. Subject matter including means for affecting the beam paths so that all beams strike the same point.
- 413** This subclass is indented under subclass 409. Subject matter including means for deflecting one or more beams.
- (1) Note. Focusing is not considered deflection.
- 414** This subclass is indented under subclass 409. Subject matter including means for focusing and accelerating one or more of the electron beams.

**415** This subclass is indented under subclass 409. Subject matter including a fluorescent or phosphorescent screen.

**416** This subclass is indented under subclass 415. Subject matter including elements having sub-elements in more than one plane which geometrically discriminate between or among electron beams.

**417** This subclass is indented under subclass 409. Subject matter including means for supporting one or more, of the beam generating or controlling electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

383, and 390, for electrode support structure in an image pickup tube.

438, for means for supporting electrostatic deflection structure.

456+, for means for supporting an electrode in the electron gun structure.

**418** This subclass is indented under subclass 364. Subject matter including an output electrode for supplying electrical information which is a function of cathode intensity or position.

**419** This subclass is indented under subclass 418. Subject matter including more than one output electrode.

**420** This subclass is indented under subclass 364. Subject matter having a window which is permeable to electrons so that the electrons may pass through the window and out of the envelope containing the discharge electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

317, for other devices under the class definition provided with an electron permeable envelope.

359.1+, for discharge devices under the class definition which are provided with means for accelerating positive ions and which may be provided with an ion transparent envelope.

588, for gas or vapor type discharge devices provided with one chamber in which an ionizing discharge is adapted to be maintained, an electron

permeable barrier being provided so that electrons from the ionizing discharge can pass into a second chamber where an electronic discharge is designed to be maintained.

**SEE OR SEARCH CLASS:**

- 220, Receptacles, subclasses 2.1+, for envelopes, per se, for lamps and discharge devices, note that subclass 2.3 provides for such envelopes where a portion of the envelope is made of conductive material.
- 250, Radiant Energy, subclasses 306+ for methods and apparatus to inspect solids or liquids by charged particles and subclasses 492.1+ for the irradiation of objects and material generally.

**421** This subclass is indented under subclass 364. Subject matter having means to deflect the beam.

- (1) Note. A pair of electrodes, one on each side of the beam path so that a potential applied to them causes one to attract and the other to repel the beam is considered to be a single deflecting means. Two such pairs of electrodes each pair operable separately of the other pair are considered to constitute two deflecting means. In general any means capable of deflecting the beam out of its path in a single direction is considered a single deflecting means, and any means capable of deflecting the beam out of its path in two dimensions is considered to be plural deflecting means. Also considered to be cathode-ray tubes with plural deflecting means are cathode-ray tubes which are provided with means to deflect the cathode ray into different directions in a single plane.
- (2) Note. This subclass includes cathode-ray tubes which are provided with a single magnetic means for deflecting the cathode ray.
- (3) Note. For the classification of deflection magnets, per se, see the class definition.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 153, for other discharge devices provided with magnetic means for influencing the discharge.

**SEE OR SEARCH CLASS:**

- 315, Electric Lamp and Discharge Devices: Systems, subclasses 364+ and indented subclasses for electric systems for supplying electric current and/or potentials to cathode-ray tubes, which are provided with ray deflecting circuits, subclasses 393+ where the cathode ray is swept in different planes (e.g., horizontal and vertical sweeping), subclasses 391+ where the cathode ray is merely deflected (e.g., bent) and also swept in one plane or is swept in two different directions in a single plane, and subclasses 399+ for the systems for supplying electric currents to the deflecting electromagnets of a cathode-ray tube.
- 331, Oscillators, subclass 80 for oscillator systems utilizing a cathode-ray tube of the ray sweeping or deflecting type.
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 210+ for magnetic deflecting or focusing structure external to a cathode-ray tube.

**422** This subclass is indented under subclass 421. Subject matter wherein the deflection is greater than 110 degree or the cathode ray is asymmetrically deflected.

- (1) Note. The general purpose of these tubes is to minimize the front to back dimension.

**423** This subclass is indented under subclass 421. Subject matter wherein the beam deflecting means causes the cathode ray to have a vector component opposite to the direction it was traveling before deflection.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 422, for deflection arrangements used in flat type tubes.



- 424** This subclass is indented under subclass 421. Subject matter wherein ions are deflected out of the electron beam to prevent undesirable effects.
- 425** This subclass is indented under subclass 421. Subject matter wherein the deflecting means is utilized to center the cathode ray beam.
- 426** This subclass is indented under subclass 421. Subject matter including a plurality of beam deflecting means.
- (1) Note. The plurality of deflecting means may deflect one or more beams.
- 427** This subclass is indented under subclass 426. Subject matter including three or more beam deflecting means.
- (1) Note. The deflecting means may all be electrostatic, all electromagnetic or may include both electrostatic and electromagnetic.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
409+, and in particular 413 for the deflection of plural cathode rays.
- 428** This subclass is indented under subclass 427. Subject matter including means for causing plural beams to intersect at a specified point.
- 429** This subclass is indented under subclass 427. Subject matter wherein the deflecting means is positioned near the viewing screen.
- (1) Note. Such placement of the deflecting means is termed "post deflection".
- 430** This subclass is indented under subclass 429. Subject matter wherein the deflecting means is located external to the tube.
- 431** This subclass is indented under subclass 427. Subject matter wherein at least two of the deflecting means are magnetic.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
440, for cathode-ray tube with yoke.
- 432** This subclass is indented under subclass 426. Subject matter wherein at least two of the deflecting means provide electrostatic attraction or repulsion of the cathode ray.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
439, for single electrostatic deflection means.
- 433** This subclass is indented under subclass 432. Subject matter including magnetic deflecting means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
413, for means for deflecting plural beams.  
431, for two or more magnetic means for deflecting the electron beam.  
440, for cathode-ray tube with yoke.
- SEE OR SEARCH CLASS:  
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 210+ for magnetic deflecting or focusing structure external to a cathode-ray tube.
- 434** This subclass is indented under subclass 432. Subject matter wherein the deflecting members include plates or areas of plate surfaces which are nonparallel or asymmetric.
- 435** This subclass is indented under subclass 434. Subject matter wherein at least one surface of the deflecting means is nonplanar.
- 436** This subclass is indented under subclass 432. Subject matter wherein the deflecting means overlap each other or are enclosed by other electrodes or shielding.
- 437** This subclass is indented under subclass 432. Subject matter including means to correct distortion due to deflection.
- 438** This subclass is indented under subclass 432. Subject matter including structure for supporting the deflecting means.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
383, and 390, for electrode support structure in an image pickup tube.  
417, for electrode support structure in a plural beam tube.  
456+, for means for supporting an electrode in the electron gun structure.
- 439** This subclass is indented under subclass 421. Subject matter wherein the deflecting means provides electrostatic attraction or repulsion of the cathode ray.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
432, for plural electrostatic deflection means.
- 440** This subclass is indented under subclass 421. Subject matter including coil laminations surrounding the cathode ray to provide deflection.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
413, for means for deflecting plural beams.  
431, for two or more magnetic means for deflecting the beam.  
433, for one or two magnetic means combined with electrostatic means for deflecting the beam.
- SEE OR SEARCH CLASS:  
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 210+ for means external of a cathode-ray tube to deflect or form the beam.
- 441** This subclass is indented under subclass 364. Subject matter including a cathode source of electrons, electrodes or magnetic elements for controlling electron velocity or beam cross section.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
409, for similar subject matter where more than one beam is generated or controlled.  
421, for similar subject matter including means for deflecting the beam.
- 442** This subclass is indented under subclass 441. Subject matter including magnetic means for defining beams cross-section.
- 443** This subclass is indented under subclass 442. Subject matter wherein the magnetic focus structure forms part of or is located within the envelope.
- 444** This subclass is indented under subclass 441. Subject matter including a plurality of electrodes and one or more insulating members serially disposed relative to the beam and secured together in a contiguous fashion.
- 445** This subclass is indented under subclass 441. Subject matter including an electrode or electrode surface positioned at an acute angle with respect to a plane perpendicular to the electron beam axis for the purpose of deflecting ions off axis.
- 446** This subclass is indented under subclass 441. Subject matter including a cathode.
- 447** This subclass is indented under subclass 446. Subject matter including an electrode located immediately adjacent the cathode for regulating the velocity of an electron or electron beam density.
- 448** This subclass is indented under subclass 447. Subject matter including an anode.
- 449** This subclass is indented under subclass 448. Subject matter including an additional electrode.
- 450** This subclass is indented under subclass 449. Subject matter wherein the additional electrode is a conductive coating on the envelope wall or is a conductive helical wire.
- 451** This subclass is indented under subclass 448. Subject matter including support structure for the anode.
- 452** This subclass is indented under subclass 446. Subject matter including a focus electrode immediate the cathode.

- 453** This subclass is indented under subclass 452. Subject matter wherein the focus electrode and cathode produce a beam that is noncircular in cross-section.
- 454** This subclass is indented under subclass 452. Subject matter wherein the cathode surface is curved.
- 455** This subclass is indented under subclass 454. Subject matter wherein the cathode and associated electrodes produce a hollow beam in which the electron density increases radially from the beam center.
- 456** Subject matter under 441 including structure for supporting an electrode.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
383, and 390, for electrode support structure in an image pickup tube.  
417, for electrode support structure in a plural beam tube.  
438, for means for supporting electrostatic deflection structure.
- 457** This subclass is indented under subclass 456. Subject matter wherein the support structure is in the form of an insulating rod or rods supporting an electrode and extending parallel to the electron beam.
- 458** This subclass is indented under subclass 441. Subject matter including an electrode.
- 459** This subclass is indented under subclass 458. Subject matter including structure to provide for movement of an electrode.
- 460** This subclass is indented under subclass 458. Subject matter including more than one electrode.
- 461** This subclass is indented under subclass 364. Subject matter including means for converting the energy of a cathode ray into light or for modulating light in accordance with the ray energy.
- 462** This subclass is indented under subclass 461. Subject matter including indicia on or embedded in the screen.
- 463** This subclass is indented under subclass 461. Subject matter wherein the light output of the screen capable of luminescence in an electric field is modified by a cathode ray.
- 464** This subclass is indented under subclass 461. Subject matter wherein the screen is of a material which incandesces when heated by the bombardment of electrons.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
305, and the subclasses specified in the notes thereto for other discharge devices under the class definition having anodes adapted to be heated by the discharge.  
347, and the subclasses specified in the notes thereto for electrodes, per se, which are designed to be incandescent upon electron bombardment.
- 465** This subclass is indented under subclass 461. Subject matter in which the screen includes means to regulate the amount of light which can pass through it; the regulation of the light transmissibility of the screen being controlled by the cathode ray.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
117, for other devices under the class definition which have structurally combined therewith a light valve.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
483+, for noncathode ray devices including a luminescent solid or liquid material.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclasses 483.1+ for luminescent devices responsive to invisible radiation.  
348, Television, subclasses 744+ for television projection devices that may utilize a cathode-ray beam to modulate light.

SEE OR SEARCH CLASS:			
348,	Television, subclasses 744+ for television projection devices that may use a cathode-ray beam to regulate the light transmissibility of a screen, which screen regulates the amount of light transmitted.	474	This subclass is indented under subclass 461. Subject matter including optical means combined with the screen.
359,	Optics: Systems (Including Communication) and Elements, subclasses 227+ and 238+ for light valves, per se.	475	This subclass is indented under subclass 474. Subject matter wherein the optical means includes a light conducting fiber or rod which conducts light by total internal reflection.
466	This subclass is indented under subclass 461. Subject matter including a layer which is not luminescent overlying the luminescent layer.	476	This subclass is indented under subclass 461. Subject matter including means for securing the screen relative to the cathode ray device.
467	This subclass is indented under subclass 461. Subject matter including a particular phosphor composition.	477	This subclass is indented under subclass 364. Subject matter including an envelope.
468	This subclass is indented under subclass 467. Subject matter wherein the phosphor composition is formed from a rare earth element.	478	This subclass is indented under subclass 477. Subject matter including optical means external of the envelope for reflecting, refracting, or transmitting light.
469	This subclass is indented under subclass 467. Subject matter including a face plate and the phosphors composition is dispersed in the face plate material.	479	This subclass is indented under subclass 477. Subject matter including means for protecting the envelope or preventing radiation from entering or leaving the envelope.
470	This subclass is indented under subclass 461. Subject matter including discrete phosphor elements arranged in a mosaic pattern.	480	This subclass is indented under subclass 477. Subject matter wherein the chemical composition of the envelope is specified.
471	This subclass is indented under subclass 470. Subject matter including a phosphor positioned on the screen which when excited gives an indication of the position of the electron beam.  (1) Note. In operation light from the beam indexing element or elements is generally received by a detector.	481	This subclass is indented under subclass 477. Subject matter including means to increase the degree of vacuum or including a gas.
472	This subclass is indented under subclass 470. Subject matter wherein the mosaic is a dot pattern.	482	This subclass is indented under subclass 477. Subject matter including means integral with and internal the envelope for supporting or attaching electrodes or means integral with and external the envelope particularly adapted for mounting the envelope or for supporting deflecting structure thereof.
473	This subclass is indented under subclass 461. Subject matter wherein the screen comprises more than one light-generating or modulating layers.	483	This subclass is indented under the class definition. Subject matter which include a liquid or solid material that produces radiant energy in response to excitation.  (1) Note. Included here, for example, are electroluminescent and electrochemiluminescent devices.  (2) Note. See the class definition for fluorescent and phosphorescent screens,

coatings, and compositions, and the method for coating bases with fluorescent or phosphorescent materials.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

461+, for cathode ray devices having a fluorescent screen.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses, for electric systems for supplying electric energy to electric lamps which are provided with a fluorescent or phosphorescent material. Note that systems for supplying electric energy to electronic tubes which are provided with a fluorescent or phosphorescent material for the purpose of emitting light are considered to be lamp systems classified in Class 315.

345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 36, 37, 41+, 44+, 47, 60+, 73, 74.1+, 76+, and 82+ for selective electrically controlled visual display systems.

362, Illumination, subclass 84 for illuminating devices which have combined therewith a fluorescent or phosphorescent material.

**484** This subclass is indented under subclass 483. Subject matter including a gaseous medium in which a discharge is developed.

**485** This subclass is indented under subclass 484. Subject matter which includes an envelope and fluorescent or phosphorescent material applied to or embedded in the wall of the envelope.

(1) Note. The fluorescent or phosphorescent material may be in direct contact with the envelope wall or separated from it by a layer or coating on the envelope for example, a phosphor layer overlying a protective layer disposed directly on the envelope wall.

(2) Note. The fluorescent or phosphorescent material may be applied as a coating to

either the interior or the exterior of the envelope.

(3) Note. Included here are devices having two envelopes where the fluorescent or phosphorescent material may be applied to or embedded in either envelope wall, however, generally a high pressure discharge tube is enclosed and supported within a sealed outer envelope which is internally coated with a phosphor.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

461+, for cathode-ray tubes which have a fluorescent or phosphorescent material applied to the envelope wall.

**486** This subclass is indented under subclass 485. Subject matter wherein the chemical composition, size, shape, or optical property of the phosphor is specified.

**487** This subclass is indented under subclass 486. Subject matter wherein there are plural phosphors.

**488** This subclass is indented under subclass 485. Subject matter wherein an aperture or discontinuity is provided in the fluorescent or phosphorescent layer or coating or wherein some other means is provided to permit or direct light from the interior of the envelope.

**489** This subclass is indented under subclass 485. Subject matter including a film, coating, or element on the envelope or the fluorescent or phosphorescent material for protection or an optical filter to limit the frequency of the emitted light.

**490** This subclass is indented under subclass 485. Subject matter wherein mercury or an alloy of mercury with another metal is provided within the envelope to maintain the mercury-vapor pressure.

**491** This subclass is indented under subclass 485. Subject matter including one or more electrodes having a particular structure or chemical composition.

- 492** This subclass is indented under subclass 491. Subject matter including an additional electrode or shielding structure mounted adjacent an electrode to protect either the electrode, the envelope, or the fluorescent or phosphorescent coating.
- (1) Note. The additional electrode may be a starting electrode.
- 493** This subclass is indented under subclass 485. Subject matter wherein the envelope has a particular configuration or chemical composition.
- 494** This subclass is indented under subclass 483. Subject matter wherein the electrodes are in the same plane.
- 495** This subclass is indented under subclass 483. Subject matter including an evacuated envelope, a fluorescent or phosphorescent material within the envelope, an electron source, and an anode cooperating to bombard the fluorescent or phosphorescent material.
- 496** This subclass is indented under subclass 495. Subject matter wherein the anode is segmented and wherein the fluorescent or phosphorescent material is applied to the segments.
- 497** This subclass is indented under subclass 496. Subject matter including an electrode between cathode and anode segments to direct or permit electrons to strike a particular segment.
- 498** This subclass is indented under subclass 483. Subject matter in which the luminescent material is an insulating material that emits light based on the principle of intrinsic luminescence, i.e., where an applied electric field generates free carriers in the device (since the material, being an insulator, has no free carriers to be accelerated by the applied field) to initiate light emission mechanism(s) in the material, or other solid-state material (e.g., semiconductor) which either operates by a mechanism not elsewhere classified, or only nominally recites a mechanism (e.g., injection luminescence) elsewhere classified.
- (1) Note. Intrinsic luminescence is to be distinguished from injection luminescence, the latter being the mechanism of operation of incoherent luminescent active solid state devices which are properly classified as ORs in Class 257. Typical injection luminescence devices include pn junctions (including), Schottky barriers, metal-insulator-semiconductor (MIS) structures, and traveling high speed domains, e.g., Gunn domain and acoustoelectric wave generated domains.
- (2) Note. When structural details of an incoherent light emitting injection solid-state type luminescent element are claimed, classification as an original (OR) is in Class 257.
- (3) Note. When structural details of a coherent light emitting solid-state type luminescent element are claimed, classification as an original (OR) is in Class 372.
- SEE OR SEARCH CLASS:  
257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclasses 10, 11, 21, 53-56, 113-118, 184-189, 225-234, 257, 258, 290-294, and 414-466 for radiation-sensitive active semiconductors injection luminescent devices, and subclasses 613+ for active semiconductor injection luminescent devices containing group II-VI compounds.
- 499** This subclass is indented under subclass 498. Subject matter in which the solid-state luminescent material is a semiconductor that emits light based on the principle of intrinsic luminescence, e.g., pn junction semiconductor type.
- (1) Note. This subclass is limited to subject matter with only nominal recitation of a luminescent element, i.e., with no significant structural details thereof, but with recitation of details of a light modifier, envelope, encapsulation, header, or other peripheral feature.
- SEE OR SEARCH CLASS:  
427, Coating Processes, subclasses 64+ for fluorescent or phosphorescent base coating, subclasses 74+ for a coating process to form a photoemissive ele-

- ment, and subclasses 77+ for a coating process to form an electron emissive element.
- 438, Semiconductor Device Manufacturing: Process, subclass 29 for methods of making a semiconductor solid-state device having combined therewith a luminescent material layer.
- 500** This subclass is indented under subclass 499. Subject matter including a plurality of semiconductor luminescent material devices disposed in a regular spaced relationship in two or more dimensions with respect to each other.
- SEE OR SEARCH CLASS:  
345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 44+ and 82+ for selective electrically controlled visual display systems.
- 501** This subclass is indented under subclass 499. Subject matter including another luminescent material which emits light in response to being irradiated by light from the semiconductive luminescent material device.
- 502** This subclass is indented under subclass 498. Subject matter including a material in which a phosphor is implanted.
- 503** This subclass is indented under subclass 498. Subject matter wherein the phosphor or electrode composition is specified.
- 504** This subclass is indented under subclass 503. Subject matter wherein the phosphor is an organic compound.
- 505** This subclass is indented under subclass 498. Subject matter including a plurality of electrodes between which the luminescent material is disposed and wherein at least some of the electrodes are arranged in rows and columns.
- 506** This subclass is indented under subclass 498. Subject matter including more than one layer of material disposed between two electrodes and wherein one of the layers is luminescent.
- (1) Note. The plural layers may, for example, be two or more luminescent layers.
- 507** This subclass is indented under subclass 506. Subject matter including a photosensitive layer.
- (1) Note. The photosensitive layer may be photoconductive or photo-emissive.
- 508** This subclass is indented under subclass 506. Subject matter including a piezoelectric layer.
- 509** This subclass is indented under subclass 506. Subject matter including a dielectric layer.
- 510** This subclass is indented under subclass 498. Subject matter including an electrode in the shape of a character or wherein the luminescent material is so shaped.
- SEE OR SEARCH CLASS:  
345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 33+ for selective electrically controlled visual display systems having segmented display elements.
- 511** This subclass is indented under subclass 498. Subject matter including two electrodes between which the luminescent material is disposed and wherein the electrodes and luminescent material are flexible.
- 512** This subclass is indented under subclass 498. Subject matter including protective envelope or encapsulation means surrounding the luminescent material.
- 513** This subclass is indented under the class definition. Subject matter including an indicia or indicating scale formed on or within the envelope of the device.
- (1) Note. The filament or electrodes of the device may be formed into the shape of indicia or have indicia or a scale formed thereon.
- (2) Note. See the class definition for the classification of electric lamps including those of the discharge device type, and cathode ray discharge devices combined with a separable support for the lamp or discharge device (e.g., electric signs

- which include a lamp and a mounting panel).
- (3) Note. See the class definition for the classification of electric lamps, including those of the discharge device type, and cathode ray discharge devices combined with a separable casing or jacket for the lamp or discharge device (e.g., electric signs which include a lamp and a casing, oscillographs with casings).
- (4) Note. See the class definition for the classification of electric lamps including those of the discharge device type and cathode ray discharge devices in combination with a separable optical device (e.g., mirror, reflector, etc.), for the lamp or discharge device.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 107.5, for variable width electron stream discharge device which have a fluorescent screen or other anode having a scale or indicia formed thereon (e.g., magic eye-type tubes).
- 462, for cathode-ray tubes which are provided with targets or ray receiving means which have a scale or indicia formed thereon.
- SEE OR SEARCH CLASS:
- 40, Card, Picture, or Sign Exhibiting, subclasses 541+ for illuminated signs which include electric lamps of the type classified in this subclass in Class 313 in combination with separable sign supporting structure for the lamp.
- 315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses, for miscellaneous systems, for supplying electrical energy to electric lamps and gas or vapor type discharge devices, including such lamps and discharge devices as have indicia as a part thereof.
- 324, Electricity: Measuring and Testing, subclass 122 for spark gaps having scales for indicating the separation of the electrodes, and designed for use as voltmeters.
- 345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 33+ for selective electrically controlled visual display systems having segmented display elements.
- 514** This subclass is indented under subclass 513. Subject matter including a gaseous medium in which a discharge may take place.
- 515** This subclass is indented under subclass 514. Subject matter including an envelope in the shape of a character confining the gaseous discharge medium.
- 516** This subclass is indented under subclass 514. Subject matter including at least one electrode having a character shaped aperture.
- 517** This subclass is indented under subclass 514. Subject matter including a plurality of electrode segments which form a character.
- 518** This subclass is indented under subclass 517. Subject matter including a dielectric (insulating) layer of material between electrode segments.
- 519** This subclass is indented under subclass 517. Subject matter including a plurality of character displays juxtaposed.
- 520** This subclass is indented under subclass 514. Subject matter including a display electrode wherein a single electrode is in the shape of a character.
- 521** This subclass is indented under subclass 520. Subject matter including a plurality of integrant display electrodes arranged one behind the other.
- 522** This subclass is indented under subclass 513. Subject matter including a filament in the shape of a character.
- 523** **PHOTOSENSITIVE:** This subclass is indented under the class definition. Subject matter which includes an electric lamp or discharge device having an electrode or electrical element which will react photoelectrically to electromagnetic radiation of the



visible and certain invisible types not classified elsewhere.

- (1) Note. "Photoelectric" is the effect of electromagnetic radiation on material which causes photoconductive, photoemissive, photovoltaic and photoelectromagnetic effects.
- (2) Note. Included are lamp or discharge devices responsive to X-ray, ultraviolet, visible and infrared radiation.
- (3) Note. Also included are subcombinations of an electric lamp or discharge device having a photosensitive member, incomplete photosensitive devices of this class which will react photoelectrically when completed and photocathodes not classified elsewhere.
- (4) Note. Included are photocathodes, per se.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 1+, for a structurally combined lamp and discharge device, plural lamps or plural discharge devices.
- 7+, for a lamp or discharge device with a vacuum pump.
- 11+, for a lamp or discharge device with a temperature modifier.
- 54+, for a lamp or discharge device with radioactive material.
- 93, for a geiger-mueller counter tube.
- 373+, for a cathode-ray tube with a photoemissive cathode.
- 384+, for a cathode-ray tube with a photoconductive cathode.

**SEE OR SEARCH CLASS:**

- 65, Glass Manufacturing, subclasses 138+ for electronic envelope header, terminal or stem making means.
- 136, Batteries: Thermoelectric and Photoelectric, subclasses 243+ for a photoelectric device, particularly subclass 254 for photoemissive devices.
- 148, Metal Treatment, subclasses 317+ for coated stock material which can be a photocathode.

- 204, Chemistry: Electrical and Wave Energy, subclasses 192.1+ for forming a photosensitive member by cathode sputtering.
- 220, Receptacles, subclass 2.1 for an envelope of an electric lamp or similar device.
- 250, Radiant Energy, subclass 200 for photocell circuits and apparatus, subclasses 330+ for infrared to visible imaging, and subclasses 336.1+ for invisible radiant energy responsive electric signalling.
- 252, Compositions, subclass 501.1 for light sensitive electrically conductive or emissive compositions.
- 257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclasses 10, 11, 21, 53-56, 113-118, 184-189, 225-234, 257, 258, 290-294, and 414-466 for radiation-sensitive active semiconductor devices, subclasses 13, 79-103, and 918 for incoherent light emitting injection luminescent devices, subclasses 80-85 for semiconductor light emitting sources combined with semiconductor light responsive devices, and subclasses 613+ for active semiconductor injection luminescent devices containing group II-VI compounds.
- 307, Electrical Transmission or Interconnection Systems, subclass 117 for switching systems responsive to light or radiant energy.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 149+ for such a system with radiant energy sensitive control means.
- 318, Electricity: Motive Power Systems, subclass 640 for photoelectric or optical error detecting positional servo systems, and subclass 480 for radiant energy responsive automatic and/or with time delay means motive power systems.
- 324, Electricity: Measuring and Testing, subclasses 403+ for electric lamp or discharge device testing.
- 327, Miscellaneous Active Electrical Non-linear Devices, Circuits, and Systems, subclasses 514+ for miscellaneous circuits responsive to light.

- 331, Oscillators, subclass 66 for a light responsive oscillator.
- 338, Electrical Resistors, subclasses 15+ for electric resistors which change resistance responsive to electromagnetic radiation.
- 348, Television, appropriate subclasses.
- 356, Optics: Measuring and Testing, particularly subclasses 402+ for testing shade or color and subclasses 213+ for photometers.
- 361, Electricity: Electrical Systems and Devices, subclasses 173+ for control circuits for electromagnetic devices including light responsive control circuits.
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 1+ for specific applications.
- 396, Photography, subclasses 213+ for a photographic exposure control circuit which is light responsive.
- 427, Coating Processes, subclasses 74+ for processes of making photocathodes by coating a base and subclasses 160+ for X-ray, ultraviolet or infrared responsive coatings.
- 428, Stock Material or Miscellaneous Articles, subclasses 98+ for a structurally defined web or sheet which may have photosensitive properties.
- 438, Semiconductor Device Manufacturing: Process, subclass 20 for methods of making semiconductor-based electron emitters, subclasses 22+ for methods of making light emissive semiconductor devices, and subclasses 57+ for methods of making light responsive semiconductor devices.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 1+ for a method of manufacture, repair or salvage and subclasses 66+ for apparatus used in manufacture, repair or salvage
- 455, Telecommunications, subclass 600 for light wave communications.

**524 With optical device:**

This subclass is indented under subclass 523. Subject matter wherein the lamp or discharge device includes an optical element of the physical type integral therewith.

- (1) Note. See the class definitions for an optical device not integral with a Class 313 device.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 110+, for electric lamp or discharge with an integral optical device or special ray transmissive envelope.
- 371+, for a cathode-ray tube with an optical element.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclasses 216+ for optical or photocell systems.
- 348, Television, subclasses 195+ for mechanical optical scanning.
- 356, Optics: Measuring and Testing, particularly 73.1 for optical fiber testing, subclasses 124+ for a lens or reflective image former testing and subclasses 128+ for refraction testing.
- 359, Optics: Systems (Including Communication) and Elements, subclasses 350+ for optics having significant infrared or ultraviolet properties, subclasses 838+ for a reflector, subclasses 885+ for a filter, subclasses 642+ for a lens.
- 362, Illumination, subclass 551 for a light source and modifier and subclasses 317+ for a light modifier.
- 378, X-Ray or Gamma Ray Systems or Devices, subclass 140 for an X-ray discharge device having a special ray transmissive window.
- 385, Optical Waveguides, appropriate subclasses for a light transmitting fiber, waveguide or rod.

**525 Having phosphor screen:**

This subclass is indented under subclass 523. Subject matter wherein the lamp or discharge device includes within an envelope a photoemissive cathode or element which responds to electromagnetic radiation to emit electrons and a phosphor screen which converts, (1) the electrons emitted by the electrode or device into electromagnetic radiation, or (2) electromagnetic radiation into different electromagnetic radiation to which the electrode or member is responsive to emit electrons.

- (1) Note. The envelope is transmissive to electromagnetic radiation received through it from outside the envelope and transmissive of the electromagnetic radiation released by the screen from the inside of the envelope.
- (2) Note. See the class definitions, "Fluorescent and Phosphorescent Coating and Compositions" for a classification of such fluorescent and phosphorescent compositions, coatings, methods of coating and electrical devices using the same.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 461+, for cathode-ray tube with phosphor screen.
- 483+, for an electric lamp or discharge device with a luminescent solid or liquid material.

SEE OR SEARCH CLASS:

- 216, Etching a Substrate: Processes, subclass 25 for the manufacturing of a phosphor screen involving etching.
- 250, Radiant Energy, subclasses 213+ for light amplifier circuits, subclasses 337+ for invisible radiant energy responsive signalling with heating of luminophors, subclasses 361+ for invisible radiant energy responsive electric signalling including a luminophor, particularly subclass 366 having plural or composite phosphors, subclasses 458.1+ for a radiation source and a luminophor responsive to the source and subclasses 483.1+ for nonelectrical luminescent devices, per se, which detect invisible radiation.
- 252, Compositions, subclass 301.16 for organic luminescent material containing compositions, subclass 301.36 for inorganic luminescent compositions with organic nonluminescent material and subclasses 301.4+ for inorganic luminescent compositions.
- 362, Illumination, subclass 34 for chemiluminescent light, subclass 84 for a light source or light source support and luminescent material and subclass 260

- for a fluorescent type light source or light source support and modifier.
- 378, X-Ray or Gamma Ray Systems or Devices, subclass 42 for stereofluoroscopy and subclasses 44+ for fluorescent applications.
- 427, Coating Processes, subclasses 64+ for coating processes, per se, wherein the product is an electrical product with a fluorescent or phosphorescent base or coating.

**526 Proximity focus type:**

This subclass is indented under subclass 525. Subject matter wherein the electrode is a photocathode having an extensive area so that an electromagnetic radiation image external to the device may be projected onto the photocathode, through the envelope, to emit electrons in the shape of the electromagnetic radiation image and the screen is placed close enough to the cathode so that no focusing is required to have the electron image impact the screen.

**527 Photocathode responsive to phosphor:**

This subclass is indented under subclass 525. Subject matter wherein the phosphor screen is responsive to electromagnetic radiation hitting the phosphor to convert the radiation to a lower frequency of radiation to which the photoemissive cathode is responsive, the lower frequency electromagnetic radiation upon hitting the photoemissive cathode causes the photoemissive cathode to emit electrons in the response to the lower frequency.

**528 With electron multiplier:**

This subclass is indented under subclass 525. Subject matter which includes between the photoemissive cathode and the phosphor screen an electrode which emits, upon being hit by an electron emitted by the photoemissive cathode, a plurality of secondary electrons to increase the magnitude of the electron current which impact on the phosphor screen.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 103+, for a secondary emitter type discharge device.
- 399+, for a cathode-ray tube having a secondary emissive electrode.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclass 207 for a circuit having a photocell with an electron multiplier.
- 329, Demodulators, appropriate subclass 359 for a demodulator using secondary emission.
- 330, Amplifiers, subclass 42 for an amplifier with a secondary electron emission amplifying device.

**529 With control electrode:**

This subclass is indented under subclass 525. Subject matter which includes between the photoemissive cathode and the phosphor screen an electrical element to control the photoemissive electrons emitted by the cathode.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 103+, for a secondary emitter type lamp or discharge devices.
- 399+, for a cathode-ray tube with a secondary emissive electrode.
- 532+, for a photosensitive lamp or discharge device having a secondary electron emissive electrode.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclass 207 for a photocell controlled circuit having a secondary emissive electron multiplier.
- 329, Demodulators and Detectors, subclasses 148+ for a demodulator and detector with secondary emission.
- 330, Amplifiers, subclass 42 for an amplifier with secondary electron emission tube amplifying device.

**530 With photocathode on envelope:**

This subclass is indented under subclass 525. Subject matter wherein the photoemissive cathode is on the envelope wall.

**531 Having plural photosensitive electrodes:**

This subclass is indented under subclass 523. Subject matter wherein the lamp or discharge device includes a plurality of photosensitive electrodes within a common envelope.

- (1) Note. Included here are a plurality of photosensitive cathodes with one or more anodes within a common envelope.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 329, for a photosensitive mosaic electrode, per se.
- 375, for a cathode-ray tube with plural photoemissive layers.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclasses 208.2+ for a photocell controlled circuit having plural photocells or plural photosensitive electrodes.

**532 Photomultiplier:**

This subclass is indented under subclass 523. Subject matter wherein the discharge device includes a secondary electron emissive electrode which emits secondary electrons as a result of the photoelectrons from a photocathode hitting the secondary electron emissive electrode.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 103, for secondary emitter type electric lamp or discharge device.
- 399+, for a cathode-ray tube with a secondary emissive electrode.
- 538, for gas phototubes wherein the ionized gas is an electron secondary emission multiplier.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclass 207 for a photocell controlled circuit with an electron multiplier.
- 315, Electric Lamp and Discharge Devices: Systems, subclass 11 for cathode-ray tube circuits with radiant energy sensitive control means having a secondary emission stage in the cathode-ray tube, and subclass 12.1 for a cathode-ray tube with a secondary emission stage in the cathode-ray tube.
- 329, Demodulators, subclass 359 for such a device with secondary emission.

330, Amplifiers, subclass 42 for an amplifier with a secondary electron emission amplifying device.

**533 Having plural dynodes:**

This subclass is indented under subclass 532. Subject matter wherein there are a plurality of secondary emissive electrodes.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

104+, for a lamp or discharge device having plural secondary emissive electrodes.

**534 Channel or circular type:**

This subclass is indented under subclass 533. Subject matter including, (1) a plurality of passageways to direct the photoelectrons emitted by the photocathode and each passageway has a surface which emits secondary electrons as a result of the photoemitted electrons hitting the secondary electron emissive surface in its travel through the passageway, or (2) plural dynodes placed serially in a circular manner.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

103, for a lamp or discharge device having a channel multiplier.

105, for a lamp or discharge device with three or more channel multipliers.

**535 Venetian blind type:**

This subclass is indented under subclass 533. Subject matter wherein there are a plurality of spaced slat-like secondary electron emissive electrodes at an angle to the direction of movement of photoemissive electrons emitted by the photoemissive cathode.

**536 Box or linear type:**

This subclass is indented under subclass 523. Subject matter wherein there are plural serial secondary electron electrodes wherein, (1) there are two successive box-like secondary electroemissive electrodes alternately on each side of an imaginary plane, or (2) there is a secondary electron emissive electrode alternately on each side of an imaginary plane.

**537 Having a control electrode:**

This subclass is indented under subclass 523. Subject matter including an electrical element to control the electrical current flow in the operation of the lamp or discharge device.

(1) Note. In addition to electrodes to control the current produced by the lamp or discharge device, there are elements which emit electrons under the action of radiation to control the current produced by the lamp or discharge device.

(2) Note. The term "control" includes the rate of current flow, the focusing of the current in the device, and separation of positive ions resulting from gas bombardment within the device.

(3) Note. The control electrode may be photosensitive rather than acting in an electrostatic manner to influence the current within the device. The control electrode can be controlled by photosensitive means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

308, for discharge device including a control electrode.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 222.1+ for photocell circuit or apparatus.

315, Electric Lamp and Discharge Devices: Systems, subclasses 149+ for systems having a lamp or discharge device to control a lamp or discharge device.

**538 Gas phototube:**

This subclass is indented under subclass 523. Subject matter wherein there is an ionizable gas within an envelope and the electrode is photoemissive so that photoelectrons hitting the gas causes the gas to ionize to release additional electrons.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

532+, for a vacuum tube photomultiplier.

567+, for a lamp or discharge device having gas or vapor.

## SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 200+ for a gas phototube circuit or apparatus, subclasses 374+ for invisible radiant energy responsive electric signalling device having a gas responsive to the invisible radiant energy rather than a photocathode.

315, Electric Lamp and Discharge Devices: Systems, subclasses 149+ for an electric lamp or discharge device system including a radiant energy sensitive control means.

**539 Responsive to ultraviolet radiation:**

This subclass is indented under subclass 523. Subject matter wherein the electrode is a photoemissive cathode responsive to ultraviolet radiation.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

110+, for a lamp or discharge device with an optical device or a special ray transmissive envelope.

## SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 372+ for an invisible radiant energy responsive electric signalling system having ultraviolet responsive means.

**540 Having plural anodes or cathodes:**

This subclass is indented under subclass 523. Subject matter wherein the lamp or discharge device includes a plurality of anodes or cathodes within a common envelope.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

302, for discharge devices with an apertured electrode interposed between two electrodes where there are plural cathodes.

303, for discharge devices with an apertured electrode interposed between two electrodes where there are plural anodes.

306, for other discharge devices having a plurality of anodes or cathodes.

## SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 208.2+ for photocell controlled circuit having plural anodes or cathodes.

**541 Having photocathode on tube wall:**

This subclass is indented under subclass 523. Subject matter wherein the photoemissive cathode is on the envelope wall.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

530, for a photosensitive lamp or discharge device having a phosphor screen and a photocathode on the lamp or discharge envelope.

538, for a gas phototube having a photocathode on the envelope wall.

544, for a photocathode combined with an envelope.

## SEE OR SEARCH CLASS:

427, Coating Processes, subclasses 74+ for photoelectric coating on a member which is an electrical product.

**542 Photocathode:**

This subclass is indented under subclass 523. Subject matter wherein the electrode absorbs infrared, visible, or ultraviolet electromagnetic radiation so that some of the electrons of the material absorb enough energy as a result of the electromagnetic radiation to escape from the surface of the material.

(1) Note. Photocathodes claimed as bases with coatings or layers which emit electrons upon irradiation by electromagnetic radiation of the ultraviolet, visible, infrared light are classified here.

(2) Note. See the class definition for a discussion on electrodes.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

326+, for an electrode, per se, which may be a photocathode or photosensitive and used in a lamp or discharge device, particularly subclass 329 for mosaic electrodes which includes photosensitive mosaic electrodes.

329, for mosaic photosensitive electrodes.

- 365+, for a cathode-ray tube with a photo-sensitive electrode.
- 367+, for cathode-ray tubes having mosaic photosensitive electrodes.

**SEE OR SEARCH CLASS:**

- 140, Wireworking, subclass 71.5 for electric lamp or discharge device electrode making or forming.
- 148, Metal Treatment, subclasses 317+ for coated stock material.
- 252, Compositions, subclass 501.1 for electrically emissive photosensitive compositions.
- 427, Coating Processes, subclasses 74+ for photoelectric coating processes.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 35+ for processes of assembling an electrode, subclasses 46+ for processes of making an electrode and subclasses 60+ for corresponding apparatus, especially subclass 67 for electrode assembly means.

**543 With phosphor:**

This subclass is indented under subclass 542. Subject matter which includes a phosphor screen which is, (1) responsive to electromagnetic radiation to change the frequency of the electromagnetic radiation to electromagnetic energy to which the photoemissive electrode is responsive to emit photoemissive electrons from its surface, or (2) responsive to the photoemissive electrons emitted by the photoemissive electrode as a result of the bombardment by the electromagnetic radiation.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 483+, for a lamp or discharge device with a luminescent solid or liquid material.
- 525+, for a lamp or discharge device of the photosensitive type having a phosphor screen responsive to a photocathode or a photocathode responsive to a phosphor screen.

**544 With envelope:**

This subclass is indented under subclass 543. Subject matter which includes a container generally to enclose the photocathode.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 364+, for an image pickup tube with a photoemissive cathode.
- 532+, for a photomultiplier which includes a photoemissive cathode within an envelope.
- 538, for a gas or vapor phototube which includes a photoemissive cathode within an envelope.
- 541, for a phototube having a photocathode on the tube wall.

**545 HAVING VALVE WITH GETTER, GAS/VAPOR GENERATING MATERIAL OR PRESSURE CONTROL MEANS:**

This subclass is indented under the class definition. Subject matter which includes an electric lamp or a discharge device having an envelope with an opening, a passageway with a device to close or open the passageway connected to the opening to permit the passage of gas or vapor including a getter into or out of the envelope for the purpose of controlling the operation including the regulation of the gas or vapor pressure of the lamp or discharge device.

- (1) Note. The subcombination of the valve for an electric lamp or discharge device is here unless provided for elsewhere.
- (2) Note. The reservoir for the gas or vapor to be admitted to the lamp or discharge device can be also claimed.
- (3) Note. The purpose may be for pressure regulation of the gas or vapor pressure of the lamp or discharge device or for getting an unwanted gas or vapor.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 7, for a lamp or discharge device with an evacuating pump.
- 11+, for a lamp, discharge device or electrode combined with means to modify the temperature of the lamp, discharge device or electrode or some other part thereof.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclass 251.1 for liquid valves, per se.

- 141, Fluent Material Handling, With Receiver or Receiver Coating Means, subclass 8 for processes of exhausting a lamp envelope, and inserting a gas or vapor into the exhausted envelope.
- 222, Dispensing, subclasses 3+ for gas or vapor dispensing into an evacuated envelope by the use of a valve.
- 251, Valves and Valve Actuation, for a valve.
- 315, Electric Lamp and Discharge Devices: Systems, subclass 110 for valve controlled confined gas or vapor load device with pressure regulating means.
- 411, Expanded, Threaded, Driven, Headed, Tool-Deformed, or Locked-Threaded Fastener, subclasses 52+ for expansion and contraction of pump fluid processes.

**546 WITH FRANGIBLE CAPSULE CONTAINING GETTER, GAS OR VAPOR GENERATING MATERIAL:**

This subclass is indented under the class definition. Subject matter which includes a sealed capsule holding a getter or a gas or vapor generating material, capable of being opened within the envelope so that the material can enter the inside of the envelope to perform some function.

- (1) Note. The container can be unsealed by breaking the container, melting at least a portion of the container, penetrating the container, or destroying the sealed container in any way to cause the material to enter the inside of the envelope.
- (2) Note. Here is the subcombination of an envelope of a lamp or discharge device and a frangible container with material within the inside of the envelope.
- (3) Note. Material in the container may be solid, gas or liquid.

**SEE OR SEARCH CLASS:**

- 141, Fluent Material Handling, With Receiver or Receiver Coating Means, subclass 7 for a gas or vapor in a receiver with the evacuation of the receiver for processes.

- 252, Compositions, subclasses 181.1+ for getter compositions or gas or vapor generating material compositions which may be stored in a capsule.
- 417, Pumps, subclasses 48+ for electric or getter type pumps where the claims do not state the gettering action is within a lamp or discharge device (single disclosure appears to control the classification).
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 9+ for a process which includes generating gas or vapor or coating by gas vapor, mist or smoke within an envelope combined with an assembly operation, subclass 16 for a process of gas introduction into an electric lamp or discharge device with generating gas or vapor within the envelope, subclass 19 for a process which includes the generating a gas or vapor, mist or smoke within an envelope which requires induction heating to release the generated material, subclasses 38+ for a process which includes the evacuation of a lamp or discharge device and some other operation, subclasses 53+ for a process which includes evacuation, degasification or gas, vapor or liquid introduction into a lamp or discharge device envelope and the step of gettering within the envelope and subclasses 70 and 73 for apparatus to evacuate, degasify and/or gas, vapor or liquid introduction into a lamp or discharge envelope.

**547 HAVING HEATING MEANS TO CONTROL GAS/VAPOR, GAS OR VAPOR GENERATING MEANS OR GETTER MEANS:**

This subclass is indented under the class definition. Subject matter which includes an envelope for a lamp or discharge device, at least an electrode within the envelope and electric heating means to maintain or control the temperature or the pressure of gas or vapor within certain limits within the envelope, to cause the generation of gas or vapor within the envelope or to control a getter within the envelope to remove a gas or vapor from the gas to vapor within the tube.



SEE OR SEARCH THIS CLASS, SUB-CLASS:

552, for a gas or vapor lamp of discharge device having pressure control of the gas or vapor generally.

553+, for a lamp or discharge device having a getter.

**548 Incandescent lamp gettering:**

This subclass is indented under subclass 547. Subject matter wherein the electric heating means is used for the purpose of heating getter material within the envelope to remove unwanted gas or vapor from the gas or vapor within the envelope of an incandescent lamp.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

315+, for an incandescent lamp generally.

557, for an incandescent lamp and getter including getter material where no additional heating means to heat the getter is claimed.

578+, for a gas or vapor incandescent lamp.

**549 Discharge device gettering:**

This subclass is indented under subclass 547. Subject matter wherein the electric heating means is used for the purpose of heating the getter material within the envelope to remove unwanted gas or vapor from the gas or vapor within the envelope of an electrical discharge device.

(1) Note. Here the getter or the getter support may be part of the heating means.

(2) Note. Included are electrical resistance, induction or any other type of electric heaters for the purpose of heating the getter in the envelope.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

553+, for a discharge device of the gas, vapor or the vacuum type with a getter whether it is a lamp or electronic tube where no additional heating means is claimed.

**550 Vapor generating:**

This subclass is indented under subclass 547. Subject matter wherein the electric heating means is used to create a vapor from material within the envelope.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

564+, for a lamp or discharge device having vapor generating material where no additional heating means is claimed.

**551 Gas generating:**

This subclass is indented under subclass 547. Subject matter wherein the electric heating means is used to create a gas from material within the envelope.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

563, for a lamp or discharge device having gas generating material where no additional heating means is claimed.

**552 HAVING PRESSURE CONTROL OF GAS OR VAPOR:**

This subclass is indented under the class definition. Subject matter which includes a gas or vapor within the envelope, at least an electrode within the envelope and material of structure to release or take up gas vapor within the envelope to control the pressure of the gas or vapor within the envelope.

(1) Note. Here gas or vapor may be added or subtracted from the gas or vapor within the envelope to control the pressure or the temperature of the gas or vapor within the envelope more than one time.

(2) Note. The lamp or discharge device itself in its normal operation creates the energy which controls the material or structure to release or remove gas or vapor from the amount of gas or vapor within the lamp or discharge device.

(3) Note. Pressure control requires the ability to add or subtract gas or vapor from the gas or vapor within the envelope. The temperature of the gas or vapor

determines whether gas or vapor is added to subtracted.

- (4) Note. The vacuum of a vacuum tube is considered to be pressure on the gas or vapor within the envelope.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

11+, for a lamp or discharge device with a temperature modifier.

547+, for pressure control of gas or vapor using heating means rather than the heat evolved during the operation of the tube.

**553 WITH GETTER:**

This subclass is indented under the class definition. Subject matter including a lamp or discharge device having a gas or vapor within an envelope detrimental to the operation of the lamp or discharge device and a material to remove the detrimental gas or vapor or lessen the amount of the detrimental gas or vapor in the atmosphere of the envelope.

- (1) Note. The subcombination of an envelope and a getter within the envelope will be placed in this group of subclasses.
- (2) Note. The getter receives heat from the filament of a lamp, a cathode heater of a tube, or the electrical discharge of a tube.
- (3) Note. Getters may be of the absorption, adsorption, chemical reaction type or by any means solely within the envelope.
- (4) Note. Support structure for a getter or with a getter where the only disclosure is for an electric lamp or discharge device will be placed with the appropriate subclass as a subcombination not elsewhere classified.
- (5) Note. Getter materials for vacuum tubes are classified in this subclass.

**554 Plural:**

This subclass is indented under subclass 553. Subject matter wherein there are at least two getter materials or structures within the envelope of the lamp or discharge device.

**555 Diverse:**

This subclass is indented under subclass 554. Subject matter wherein the plural getters include at least two different elements, or compounds, or an element and a compound within the envelope of the electric lamp or discharge device.

- (1) Note. A getter may change an element or a compound within the sealed envelope into other substances and a second getter may in turn change the resulting products of the first gettering action into other chemical substances.
- (2) Note. Here the plural diverse getters may be in name only and may affect the same unwanted element or compound within the envelope.

**556 And vapor generator:**

This subclass is indented under subclass 553. Subject matter which includes, in addition to the getter, a material to produce a vapor within the envelope.

**557 Incandescent lamp type:**

This subclass is indented under subclass 553. Subject matter wherein there is an incandescent filament within the envelope.

**558 Electrode includes getter, supports getter or is connected to getter:**

This subclass is indented under subclass 553. Subject matter including an electrode which, (1) includes getter material, (2) supports a getter, or (3) is connected to a getter.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

559, for a getter mounted on an electrode support.

**559 Mounted on electrode support:**

This subclass is indented under subclass 553. Subject matter wherein the getter or getter material is mounted on a support for an electrode.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

558, for a getter, forming part of an electrode, supported by an electrode or connected to an electrode.

**560 With structure to direct or shield from getter:**

This subclass is indented under subclass 553. Subject matter which includes structure to direct or cause the gas or vapor of the supported getter to be deposited only in certain areas within the envelope.

(1) Note. The subcombination of a discharge envelope with a support for a getter with a directional type outlet is classified here.

(2) Note. Classified here are getters within a discharge device envelope having an electrode with a shield to prevent the getter material from being deposited in unwanted areas of the tube or with a container with an outlet to have the getter material leave the container in a predetermined direction.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

481, for a cathode-ray tube with a getter.

558, for a getter, part of an electrode, supported by an electrode or connected to an electrode.

565, for a contained getter without means to direct the gas or vapor of the getter.

**561 With contained getter:**

This subclass is indented under subclass 553. Subject matter which includes a getter material supported by a holder.

**562 Gas or vapor device type:**

This subclass is indented under subclass 553. Subject matter wherein the getter is used in a gas or vapor type tube.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

553, for a vacuum tube getter.

**563 HAVING GAS GENERATING MATERIAL:**

This subclass is indented under the class definition. Subject matter which includes an envelope for a lamp or discharge device, at least an electrode or a filament and a material within the envelope capable of emitting a gas.

(1) Note. The subcombination of an envelope of a lamp or discharge device and a gas within the envelope and a material which will generate a gas is here in the absence of another class to take this subcombination. Also an electrode, per se, with gas generating material is here.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

551, for gas generating means within the envelope having heating means other than the heat developed in the operation of the lamp or discharge device.

SEE OR SEARCH CLASS:

206, Special Receptacle or Package, subclasses 0.6+ for a receptacle with a gas therein.

315, Electric Lamp and Discharge Devices: Systems, subclass 108 for gas or vapor type load device with pressure regulating means and subclasses 111.01+ for a discharge device load with fluent material supply to discharge space.

361, Electricity: Electrical Systems and Devices, subclass 120 for gas filled space discharge device in safety and protection of systems and devices to dissipate high voltage arcs.

**564 HAVING VAPOR GENERATING MATERIAL:**

This subclass is indented under the class definition. Subject matter which includes an envelope for an electric lamp or discharge device, at least an electrode and a substance capable of being vaporized within the envelope.

(1) Note. A vapor is the gasified state of a liquid or a solid material.

(2) Note. No electrical heating means is claimed to change the substance from a

solid or a liquid to a vapor. See subclass 550 for heating means to heat vapor generating material. In this subclass the heat evolved in the operation of the tube changes the vaporizable substance to a vapor.

- (3) Note. The subcombination of an envelope of a lamp or discharge device and a material capable of being vaporized is here in the absence of a class to take the subcombination.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 550, for a lamp or discharge device having electrical heating means to vaporize material.  
 554, for temperature or pressure control of a gas or vapor.  
 555, for a lamp or discharge device having a getter which is a vapor generating material.  
 571, for a lamp or discharge device envelope with a gas or vapor fill.

**SEE OR SEARCH CLASS:**

- 361, Electricity: Electrical Systems and Devices, subclasses 2+ particularly 14 for arc blowout for main breaker contact by means of a fluid or gas and subclass 121 for high voltage dissipation by means of a fluid.

**565 Mercury vapor material:**

This subclass is indented under subclass 564. Subject matter wherein the substance to be vaporized is mercury.

**566 Electrode or electrode support includes material:**

This subclass is indented under subclass 564. Subject matter wherein the electrode composition or structure or the support for the electrode includes the substance capable of being vaporized.

**567 WITH GAS OR VAPOR:**

This subclass is indented under the class definition. Subject matter which includes a lamp or discharge device having a gas or vapor within an envelope.

**568 Having a particular total or partial pressure:**

This subclass is indented under subclass 567. Subject matter wherein the gas or vapor pressure within the envelope is stated as being a specific pressure or in a range of pressures.

- (1) Note. The unit of pressure, torr, is the same as a millimeter of pressure.  
 (2) Note. The patents are placed on the basis of the highest pressure of the total or the partial pressure recited in the claim.  
 (3) Note. Here are patents which include a gas or vapor fill of less than one torr, but greater than .1 torr.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 233, for a lamp or discharge device which is defined in terms of the degree of vacuum within the envelope of the lamp or discharge device. However, claims reciting a gas or vapor at less than 0.1 torr are classified in subclass 577.  
 549, for a lamp or discharge device having a heating means to control the gas or vapor pressure within the envelope of the lamp or discharge device.  
 552, for a lamp or discharge device having means to control the gas or vapor pressure within the envelope of the lamp or discharge device, using the heat developed in the operation of the lamp or discharge device.  
 637, for a lamp or discharge device having a particular gas or vapor including mixtures of gases or vapors.

**569 Incandescent lamp:**

This subclass is indented under subclass 568. Subject matter which includes a filament type lamp.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 315+, for incandescent glower or filament type lamps with or without an enclosing envelope.

- 548, for incandescent lamp gettering by heating means.
- 557, for incandescent lamp with getter including gettering and gettering material.
- 578+, for a gas or vapor type incandescent lamp.

**570 Greater than 760 torr:**

This subclass is indented under subclass 568. Subject matter wherein the gas or vapor pressure is in excess of one atmosphere.

- (1) Note. One torr is equal to one millimeter of pressure.

**571 Includes mercury in gas or vapor fill:**

This subclass is indented under subclass 570. Subject matter which includes mercury in the gas or vapor.

**572 One torr thru 760 torr:**

This subclass is indented under subclass 568. Subject matter wherein the gas or vapor pressure within the envelope is from one torr to and including 760 torr.

**573 Having specified envelope detail:**

This subclass is indented under subclass 572. Subject matter wherein the envelope is defined in terms of some envelope feature.

- (1) Note. The feature may be structural, or composition, or some optical feature, but not merely transparent, translucent, sealed or vitreous.
- (2) Note. Included in this subclass are patents to both envelope detail and electrode detail.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 317+, for a lamp or discharge device having a particular envelope.
- 634+, for a gas or vapor discharge device envelope having particular structure including envelopes with a layer or coating or material.
- 636, for a gas or vapor discharge device having a particular envelope composition.

**574 With electrode structure:**

This subclass is indented under subclass 572. Subject matter which includes a structural detail of an electrode.

- (1) Note. For electrode material or composition, see subclasses 568+.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 238+, for a lamp or discharge device with a support and/or spacing structure for electrode and/or shield.
- 326+, for lamp or discharge device electrode or shield structures, per se.
- 615, for a gas or vapor discharge device having a crater electrode and a shield.
- 617, for a gas vapor discharge device having a spur electrode.
- 618, for a gas or vapor discharge device having a hollow cathode.
- 622, for a gas or vapor discharge device having diverse electrodes.
- 630, for a gas or discharge device having an electrode of alkali, alkaline, or rare earth material.
- 631+, for a gas or vapor discharge device having particular electrode structure.
- 633, for a gas or vapor discharge device having cathode or anode of composition.

**575 Composite:**

This subclass is indented under subclass 574. Subject matter including an electrode made of more than one part or material.

- (1) Note. Here are electrodes having a base material with a coated, or layered type electrode.
- (2) Note. The composite electrode is generally a cathode having a low work function material to increase electron emission.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 352+, for composite electrodes.

**576 With rare gas:**

This subclass is indented under subclass 575. Subject matter which also includes noble gas.

- (1) Note. The rare gases are helium, neon, argon, krypton or xenon. These gases are also known as the noble or inert gases.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 641, for a lamp or discharge device having a mercury vapor, rare earth metal and a rare gas atmosphere.  
 642, for a lamp or discharge device including a mercury vapor and a rare gas atmosphere.  
 643, for a lamp or discharge device including one or more rare gases.

**577 Less than .1 torr:**

This subclass is indented under subclass 568. Subject matter wherein the total or partial pressure of the gas or vapor is below one-tenth torr.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 233, for lamp or discharge devices which are defined in terms of the magnitude of the vacuum of the lamp or discharge device.

**578 Incandescent filament lamp:**

This subclass is indented under subclass 567. Subject matter which includes an electrical filament capable of being energized within the envelope so that the filament as a result of the energization is heated to emit electromagnetic radiation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 37, for a lamp or discharge device with a temperature modifier for a filament or heated cathode.  
 110+, for an incandescent lamp having an optical device or a special ray transmissive envelope integral therewith.  
 315+, for incandescent lamp having a glower or filament adapted to be heated to incandescence by passage of current therethrough.  
 317+, for significant envelope or envelope and base structure and a filament or light emitter body in name only or broadly and no relationship to other parts of the lamp.

- 341+, for a lamp only with significant filament or glower structure.

- 557, for a getter integral with an incandescent lamp.

- 563, for a lamp having a gas generating material.

- 564+, for a lamp having vapor generating material.

SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, particularly subclass 46 for a combined load device or load device temperature modifying means wherein there is a filament, electric heater, or resistance in shunt with the discharge electrodes of a discharge device load, subclass 49 for a filament or electric in series with a discharge device load and subclasses 82+ for headlight systems.

**579 Tungsten-halogen cycle lamp:**

This subclass is indented under subclass 578. Subject matter wherein the filament is tungsten and the gas includes, (1) a halogen, or (2) a halogen compound containing gas, or (3) a halogen compound within the envelope.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 548, for a lamp or discharge device having heating means to control an incandescent lamp getter.  
 557, for an incandescent lamp having a getter.

**580 With filter, barrier, screen, shield, electric terminal or fuse:**

This subclass is indented under subclass 578. Subject matter which includes, (1) a physical screen to trap unwanted material as vaporized filament material, (2) a screen or shield for preventing an explosion, or fire within the lamp, (3) a quick make and break electrical connector attached to the filament, (4) a barrier to contain or impede the circulation of gas or vapor within the envelope, or (5) an integral fuse in circuit with the filament.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

579, for tungsten filament-halogen cycle lamps that lessens blackening of the lamp envelope.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, for apparatus for gas separation, per se.

315, Electric Lamp and Discharge Devices: Systems, subclasses 119+ for an electric lamp with an automatic shunt or cut-off.

337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 142+ for fusible element actuated switch.

439, Electrical Connectors, subclasses 611+ for a quick make or break electrical connector with a vitreous envelope secured to contact or coupling part.

**581 Three or more electrode discharge device:**

This subclass is indented under subclass 567. Subject matter wherein the discharge device includes at least three electrodes within the envelope.

(1) Note. See the glossary for the definition of the term "electrode".

SEE OR SEARCH THIS CLASS, SUB-CLASS:

162, for a discharge device or lamp having a movable electrode or shield in an envelope having three or more electrodes.

163+, for a liquid electrode discharge device having three or more electrodes, particularly subclass 168 for plural anodes in separate envelope chambers.

306+, for a discharge device having three or more electrodes.

568+, for a lamp or discharge device having a particular total or partial gas or vapor pressure.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 334+ and the subclasses specified in the

notes for systems for supplying electrical energy to gas or vapor discharge devices which have a plurality of cathodes and/or anodes and subclasses 349+ and the subclasses cited in the notes thereto for systems supplying electrical energy to gas or vapor type discharge devices which have a control electrode.

**582 Multiple gaseous discharge display panel:**

This subclass is indented under subclass 581. Subject matter wherein the envelope has an extended viewing surface, a first set and a second set of electrode, of the second set produce a point of light in the ionized gas to form a visual display.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclass 169.4 for a gas display panel device having diverse type energizing or bias supplies to different electrodes of a plural anode and/or cathode load device.

345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 41+ for selective electrically controlled visual display systems having segmented, fluid, light-emitting display elements, and subclasses 60+ for selective electrically controlled visual display systems having fluid light-emitting display elements arranged in a matrix or array.

**583 Having electric terminal detail:**

This subclass is indented under subclass 582. Subject matter where there is included electrical terminal structure connected to the electrodes to supply power to ionize the gas.

(1) Note. Since the bulk of the patents here do not claim the gas as ionizable and some do not include in the claim more than two electrodes, the patents are placed here on the basis of the disclosure having an envelope with a gas therein and at least one electrode associated with the gas.

**SEE OR SEARCH CLASS:**

- 174, Electricity: Conductors and Insulators, subclasses 17+ for boxes and housings with fluids or vacuum particularly subclass 18 with bushing, terminal or lead in and subclasses 50.5+ for hermetic sealed envelope type boxes and housings.
- 439, Electrical Connectors, subclasses 55+ for an electrical connector with a preformed panel circuit arrangement without specific electronic structure; and subclasses 611+ for an electrical connector or contact having a vitreous-type envelope secured thereto.

**584 Having intersecting electrode sets:**

This subclass is indented under subclass 582. Subject matter wherein the electrodes of the first set are at an angle to the electrodes of the second set so that an electrode of one set can intersect each of the electrodes of the other set to create a plurality of points of light when the sets of electrodes and the gas are appropriately energized.

**585 With three sets of electrodes:**

This subclass is indented under subclass 584. Subject matter which includes a third set of electrodes spaced from the second set of electrodes.

**586 With dielectric member:**

This subclass is indented under subclass 584. Subject matter wherein there is a dielectric medium between the ionizable gas and at least one set of the electrodes.

- (1) Note. One of the sets may have one electrode, but the second set has plural electrodes.
- (2) Note. The dielectric medium may be claimed as a composition with or without the thickness of the medium or in terms of the thickness of the medium.
- (3) Note. The type of display panel here is energized by an alternating current supply supply rather than direct current.

**587 And additional layer on member:**

This subclass is indented under subclass 586. Subject matter wherein the dielectric medium has another layer of material.

- (1) Note. The layers may be a coating or a laminate and one of the layers may be electron emissive.

**588 Amplifier, cathanode or ionic cathode:**

This subclass is indented under subclass 581. Subject matter which includes, (1) a cathode and an anode between which the main electron flow takes place after the gas or vapor ionizes and a control electrode which does not lose control of the electron flow between the cathode and the anode after the gas or vapor ionizes, (2) an auxiliary cathode and an anode with the gas or vapor in between which functions, when the appropriate voltage is placed on the auxiliary cathode and the anode, to ionize the gas or the vapor to create electrons which form the electron current in the envelope, or (3) an auxiliary cathode and an auxiliary anode which causes the gas or vapor to ionize, when the appropriate voltage is placed between them and cause the electrons formed by the ionization to bombard the auxiliary anode which in turn gives off secondary electrons which acts as the main cathode of the device.

- (1) Note. See the glossary for the terms "cathanode" and "ionic cathanode".
- (2) Note. Some the discharge device in this subclass are provided with means, such as a barrier, between two discharge spaces, so that different pressures of gas or different kinds of gas may be maintained in the respective discharge space, the barrier being electron permeable. Other of the discharge spaces have the electron receiving electrode so spaced with respect to the ionizing discharge electrodes that the electrons do not attain sufficient velocity or do not travel through sufficiently long distance to ionize the gas or vapor.



## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 305, for cathanode type discharge device which is provided with two electron emissive electrodes and another electrode, one electron emissive electrode being designed to emit electrons to the second electron emitting electrode to heat the second emitting electrode to its emitting temperature, the second emitting electrode being designed to emit electrons to the third electrode.
- 359.1+, for discharge devices with means to form and accelerate positive ion or megative ions.
- 420, for a cathode-ray tube which is provided with a electron permeable window.
- 598, for a gas or vapor discharge device with three or more electrodes one of which is an apertured grid, the space between two of the electrodes is less than the mean free path spacing of the gas or vapor.

## SEE OR SEARCH CLASS:

- 330, Amplifiers, subclasses 4+ for maser type amplifying devices and subclass 41 for gas or vapor type amplifying device.
- 331, Oscillators, subclass 126 for a gaseous space discharge device.
- 372, Coherent Light Generators, particularly subclasses 55+ for gas or vapor media generators.

**589 Counter, indicator or switching tube:**

This subclass is indented under subclass 581. Subject matter wherein there is a plurality of the same type of anode or cathode and an electrode of the opposite type, conduction of the gas or vapor when ionized between the electrode of the opposite type and one of the plurality of the same type electrodes can be shifted to another electrode of the plurality of the same type electrodes and the same electrode of the opposite type whereby the tube can function as counter, indicator or a switching tube.

- (1) Note. The envelope may or may not be transmissive to the light caused by the ionization of the gas or vapor in the operation of the tube.

## SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclass 84.61 for pulse storing systems of the gaseous discharge tube type having plural cathode or anodes and subclass 169.2 for a plural power supply to a plural cathode and/or anode load device having diverse type energizing or bias supplies to different electrodes including shifting, of register, counter or display.
- 377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 103 for counting or dividing chains using gas filled tubes.

**590 With shield to prevent discharge between electrodes:**

This subclass is indented under subclass 581. Subject matter which includes a physical barrier within the envelope to prevent the passage of an electrical discharge from one electrode to another electrode.

- (1) Note. Classified here are barriers to prevent a discharge between two anodes.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 609+, for baffles, partition or constricting means to control the discharge path within the discharge device.
- 613+, for electron shields to prevent a discharge to the electrode.

**591 Having cathode heater:**

This subclass is indented under subclass 581. Subject matter wherein there is a cathode which is electrically heated by the passage of an electrical current through an electrical resistance element which may be the cathode.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 337+, for indirectly heated cathodes, per se.
- 341+, for filament or resistance heated electrodes, per se.
- 629, for gas or vapor tubes having a resistance heated cathode.

**592 With control electrode:**

This subclass is indented under subclass 591. Subject matter wherein there is a control grid electrode whose function is to ionize the gas or vapor within the envelope.

- (1) Note. Here the grid electrode loses control of the ionized gas when the gas or vapor becomes ionized.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 163+, for liquid electrode device particularly subclasses 170+ for an auxiliary starting or holding electrode.  
588, for a gas or vapor discharge device wherein the grid does not lose control of the discharge.

**593 Plural:**

This subclass is indented under subclass 592. Subject matter wherein there are two or more control electrodes within the envelope.

- (1) Note. If a thyratron is claimed, the cathode may be stated as a "cathode" rather than a thermionic or an electrically heated cathode.  
(2) Note. Classified here are shield grid thyratrons.

**594 Start electrode exterior to envelope:**

This subclass is indented under subclass 581. Subject matter wherein there is a starting electrode on the outside of the envelope, the start electrode when electrically energized along with the electrodes within the envelope of the gas or vapor tube, causes the gas or vapor to ionize to form the discharge current in the envelope.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 166, for a liquid electrode discharge device having a starting band or external electrode.  
595+, for gas or vapor three electrode discharge device with an internal start or control electrode in the discharge path.

601+, for three electrode gas or vapor discharge device where a start electrode is not in main discharge path.

607, for a gas or vapor discharge device having an electrode on the outside of the envelope.

**595 Internal start or control electrode between discharge electrodes:**

This subclass is indented under subclass 581. Subject matter wherein the start or control electrode is between two spaced electrodes which are capable of having an electrical discharge there between in use, the start or control electrode being capable of starting or controlling the discharge of the ionized gas or vapor between the two spaced electrodes.

**596 Strip electrode:**

This subclass is indented under subclass 595. Subject matter wherein the electrode between the two spaced electrodes is an elongated electrical conductor.

- (1) Note. The strip electrode may be electrically connected to either of the two spaced electrodes.  
(2) Note. The discharge devices here are generally double-ended tubes but the subclass is not restricted to such type tubes.  
(3) Note. The two spaced electrodes are heated filaments, but the subclass is not restricted to electrically heated resistance electrodes.

**597 Interposed apertured electrode:**

This subclass is indented under subclass 595. Subject matter wherein the start or control electrode has at least one opening there through or formed to make a conduit to permit the passage of the electrical discharge, between the two electrodes.

- (1) Note. The control or start electrode can be grid like or in the form of an open cylinder.

**598 Mean free-path spacing:**

This subclass is indented under subclass 597. Subject matter wherein the interposed apertured electrode is spaced from another elec-

trode a distance which is less than the mean free path distance of an electron in the gas or vapor within the device.

- (1) Note. The mean free path of an electron is the average distance an electron may travel in the gas or vapor without producing ionization of the gas or vapor. As the mean free path distance depends upon a number of factors, not all of which necessarily involve structure of the discharge device, this subclass includes patents which claim two electrodes as being within the mean free path distance and include as cross references patents which disclose that the electrodes are within the mean free path distance.
- (2) Note. The electrodes between which the apertured electrode is interposed may be spaced from each other a distance less than the mean free path length.

**599 Plural serial apertured electrodes:**  
This subclass is indented under subclass 597. Subject matter wherein there are more than one apertured electrode in series in the electrical discharge path of the discharge device.

**600 Two interposed electrodes:**  
This subclass is indented under subclass 595. Subject matter wherein there are at least two electrodes between the two spaced electrodes.

- (1) Note. Included are auxiliary electrodes which ionize the gas or vapor of the discharge device but are not in the main discharge path.

**601 Start electrode not in main discharge path:**  
This subclass is indented under subclass 581. Subject matter wherein one of the electrodes is a starting, trigger or control electrode and two of the electrodes are the discharge electrodes of the discharge device, the one electrode is placed out of the discharge path between the main discharge electrodes of the discharge device.

**602 Trigger electrode concentric with discharge electrode:**

This subclass is indented under subclass 601. Subject matter wherein the start or the control electrode is placed with respect to one of the two discharge electrodes so that they both have a common axis.

**603 Triggerable vacuum gap device:**

This subclass is indented under subclass 601. Subject matter wherein there is a starting electrode which injects an ionized gas or vapor into the discharge device as a result of an overload so that an electrical discharge can be transferred to the discharge electrodes of the discharge device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

231.01+,for a fluent material supply or flow directing means in a discharge device lamp, radiation source or discharge device.

**604 Plural serial electrodes:**

This subclass is indented under subclass 581. Subject matter wherein two of the electrodes are the main discharge electrodes and there is at least another electrode in between wherein all electrodes are in series with each other so that, when an ionized discharge takes place between successive electrodes, the voltage drop between two successive electrodes is proportional to the distance between the two electrodes with respect to the overall distance between the main discharge electrodes.

- (1) Note. The tubes here can be voltage regulators, voltage dividers or overvoltage protection devices for a circuit or for the tube itself.

**605 Mean free-path spacing of envelope portions or content parts:**

This subclass is indented under subclass 567. Subject matter wherein one envelope portion or a part of the device is spaced from another envelope portion or part of the device a distance which is less than the mean free-path length distance.

- (1) Note. The mean free-path distance of an electron is the average distance an elec-

tron may travel in the gas or vapor without producing ionization of the gas or vapor. As the mean free-path length depends upon a number of factors, not all of which involve structure of the device, this and the indented subclass include patents which claim the parts as being within the mean free-path distance and include as cross references patents that disclose that the parts are within the mean free-path distance.

**606 Electrode spacing related to mean free path length:**

This subclass is indented under subclass 605. Subject matter wherein at least a portion of the electrode is spaced a distance from a portion of another electrode less than the mean free path spacing.

- (1) Note. The spacing may be for the purpose of restricting current flow from one electrode or may be for the purpose of insulating one portion of an electrode from a portion of another electrode even though other portions of the electrodes are spaced a distance which permits ionization between such portions.

SEE OR SEARCH THIS CLASS, SUBCLASS:

598, for a gas or vapor discharge device having a grid like or apertured electrode interposed in the discharge path between two discharge electrodes, the distance between the discharge electrodes being less than the means free path length.

620, for a gas or vapor discharge device having the spacing between electrodes cited as being a specific distance or a range of distances or being based upon the gas or vapor pressure or the operating electrical power.

621, for a gas or vapor discharge device having the electrodes spaced from each other in terms of a geometrical relationship.

**607 Having electrode exterior to envelope:**

This subclass is indented under subclass 567. Subject matter wherein at least one electrode of the discharge device is on the outside of the envelope.

SEE OR SEARCH THIS CLASS, SUBCLASS:

594, for a gas or vapor discharge device having at least three electrodes one of which is on the outside of the envelope.

**608 Single electrode type discharge device, or including particulate material:**

This subclass is indented under subclass 567. Subject matter which include discharge devices having only one electrode; or which have a space between two electrodes which is at least partially filled with particulate material.

- (1) Note. When the discharge device has but one electrode and the voltage to operate the device is applied between the single electrode and some other object, such as ground, the electrostatic field at the discharge device along with the gas pressure and the device structure is capable of causing ionization of the gas or vapor within the device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

325, for a discharge device having an insulating material in the discharge space.

SEE OR SEARCH CLASS:

607, Surgery: Light, Thermal, and Electrical Application, subclasses 154+ for discharge devices which are designed to transmit high frequency electric current into the human body, the devices include an envelope with a confined gas or vapor and an electrode within the envelope, the human body being used as the other electrode to establish a space discharge in the device.

**609 Having baffle, partition, or constricting means affecting discharge:**

This subclass is indented under subclass 567. Subject matter which includes physical structure within the envelope to change the direction of the electrical discharge within the envelope or which can be part of the envelope to change the area of the discharge flowing within the envelope.

- (1) Note. Shields for an electrode which may act as a baffle are classified in subclasses 613+.
- (2) Note. Electrical type of control of the discharge is not classified here.
- (3) Note. In these indented subclasses, there is no structure to stop the electrical discharge from continuing.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 33, for a lamp or discharge device having an envelope with internal temperature modifying baffle.
- 317+, for a lamp or discharge device having a particular envelope structure.
- 325, for a miscellaneous discharge device which has an insulating material in the discharge space.
- 608, for a gas or vapor discharge device including particulate material between discharge electrode.
- 613+, for an electrode with a baffle to prevent an electrical discharge from hitting the electrode except in a specific direction.
- 634, for a gas or vapor discharge device having an envelope with a nonlinear discharge path.

**610 Partition:**

This subclass is indented under subclass 609. Subject matter wherein the physical means within the envelope not only guides the direction of the discharge but also changes the cross-sectional area of the discharge that can flow through the envelope and lengthens the discharge path.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 611+, for a partition that only changes the area of the discharge between electrodes.

**611 Constriction means:**

Subject matter under subclasses 609+ wherein the structure includes, (1) envelope structure which changes the cross-sectional area of the envelope, or (2) physical means within the

envelope to reduce the cross-sectional area of the discharge of the discharge device.

- (1) Note. A constriction reduces the area of the electrical discharge at least in one position of the discharge path within the tube and does not change the length of the discharge path.

**612 Substantially the full length of discharge path:**

This subclass is indented under subclass 611. Subject matter wherein the physical means to reduce the cross-sectional area of the discharge extends substantially the entire length of the discharge between main electrodes of the tube.

**613 Having electrode shield:**

This subclass is indented under subclass 567. Subject matter which includes a protective member, (1) to protect the electrode from the ionized gas or vapor within the envelope, or (2) to restrict the area of the electrode available to receive the ionized discharge of gas or vapor.

- (1) Note. See the to this class for the word "shield".
- (2) Note. The shield may be an conductor or an insulator.
- (3) Note. Here is an electrode surrounded by a conductive or an insulative shield which limits the area of the electrode to receive the ionized gas or vapor discharge in the envelope.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 147, for a lamp or discharge device having a movable shield.
- 239+, for devices having a support and/or spacing structure for electrode and/or shield.
- 326+, for shield structures, defined by structure, for a lamp or discharge device.
- 492, for a lamp or discharge device with luminescent solid or liquid material and gaseous discharge medium having the solid or liquid on the envelope and an electrode shield.
- 590, for a three or more electrode gas or vapor discharge device with a shield

to prevent discharge between electrodes.

592+, for a three or more electrode gas or vapor discharge device with a shield grid electrode.

626, for a gas or vapor discharge device having electrode leading shields.

**614 With anode shield:**

This subclass is indented under subclass 613. Subject matter wherein the electrode is an anode or the electrode acts as an anode during the portion of an alternating voltage supplying power to the electrode and the member prevents bombardment of the anode or electrode by positive ions or restricts the area of the anode or electrode available to the discharge of the device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

168, for liquid electrode discharge device which has a plurality of anodes and an envelope having a plurality of separate anode chambers.

169, for a liquid electrode discharge device which is provided with a plurality of anodes, at least one anode having a shield.

590, for three or more electrode gas or vapor discharge device including a plurality of anodes, at least one anode having a shield.

609+, for a gas or vapor discharge device having physical barrier or partition between the electrodes of a discharge path to cause the discharge to travel along a longer path between the electrodes or a constricting means in the discharge path which reduces the cross-sectional area of the discharge path to a smaller area than the rest of the path.

616, for a gas or vapor discharge device with a positive ion or cathode shield.

**615 Crater electrode with shield:**

This subclass is indented under subclass 613. Subject matter wherein the electrode is a cathode with a hollowed out cavity, and there is also an anode and a dielectric shield touching both the cathode and the anode to prevent an electrical discharge between the cathode and the anode except at predetermined locations.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

618, for a gas or vapor discharge device having a crater electrode.

**616 With positive ion or cathode shield:**

This subclass is indented under subclass 613. Subject matter wherein the gas or vapor within the envelope becomes ionized in the operation of the device and the electrode is a cathode separated from an anode by the ionized gas or vapor and there is a barrier protecting the cathode so that the positive ions will hit the barrier to protect the cathode.

(1) Note. The shield is generally connected electrically to dissipate the electrical charge as a result of the ions hitting shield.

(2) Note. Shields or anode plates about a thermic cathode achieve a reduction of the anode voltage drop and slows down the darkening of a lamp or electronic tube without damage to the cathode.

(3) Note. An electrical cathode shield is an auxiliary electrode electrically acting as an anode in alternate half cycles of a.c. operation of a discharge device.

(4) Note. The positive ion shield need not for the purpose of shielding the cathode.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

614, for a gas or vapor discharge device having an anode shield.

**617 Having spur electrode:**

This subclass is indented under subclass 567. Subject matter wherein the electrode is provided with a starting spur extending from the electrode towards another electrode.

(1) Note. A starting spur is usually a wire or strip of metal which is attached to an electrode and extends close to another electrode, the starting spur serving to initiate the discharge between it and the other electrode when the device is put into operation, the discharge transferred

to the other electrode after the initial discharge has been initiated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 592+, for a gas or vapor discharge device having a cathode heater and a starting electrode.
- 594, for a gas or vapor discharge device having a start electrode exterior to envelope.
- 595+, for a gas or vapor discharge device with a start electrode between discharge electrodes.
- 601+, for a gas or vapor discharge device with a start electrode not in the main discharge path.

**618 Having hollow cathode:**

This subclass is indented under subclass 567. Subject matter wherein the electrode is a cathode which has at least a portion which is a cavity or is a hollow cylinder.

- (1) Note. Crater type glow discharge lamp sources are here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 615, for a gas or vapor device with a shield between the hollow cathode and the anode.
- 631+, for a gas or vapor discharge device having a hollow or tubular electrode.

**619 Negative or cathode glow device:**

This subclass is indented under subclass 567. Subject matter wherein there are two electrodes and the electrodes and the electrode spacing are so designed that during the operation of the device only the negative or cathode glow portion of the discharge will generate visible light.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 615, for a gas or vapor discharge device having a shield between the anode and crater type cathode to control the type and the shape of electrical discharge.
- 618, for a gas or vapor discharge device having a hollow or crater like cathode to confine the luminous electrical discharge to the interior or hollow of the cathode.

**620 Having specified electrode spacing:**

This subclass is indented under subclass 567. Subject matter wherein there are two electrodes spaced from each other in terms of, (1) the distance between the electrodes or a range of distances between them, or (2) the distance between them stated relative to a parameter of the discharge device or an operating parameter of the device.

- (1) Note. The parameter may be an electrical parameter with respect to the spacing of the electrodes or a nonelectrical parameter of the discharge device with respect to the spacing of the electrodes.
- (2) Note. Included in the parameter are the, (1) gas or vapor pressure of the discharge device with respect to the spacing between electrodes or the product of the gas or vapor pressure and the spacing between the electrodes, and (2) the electrical power to operate the discharge device with respect to the electrode spacing or the voltage necessary to operate the discharge device with respect to the electrode spacing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 581+, for a three or more electrode gas or vapor discharge device, particularly subclass 602 for an interposed grid like or apertured electrode in the discharge space between two other electrodes, the spacing between the interposed electrode and another of the electrodes being less than the mean free path distance.
- 605, for a gas or vapor discharge device where the distance between electrodes is less than the mean free path distance.
- 619, for a gas or vapor discharge device where the spacing between the electrodes is such, when operated, to emit visible light only by the negative or cathode glow discharge.

**621 Having electrodes with geometrical relationship:**

This subclass is indented under subclass 567. Subject matter wherein there are two electrodes spaced from each other in terms of a geometrical condition.

- (1) Note. The geometrical relationship involves the spacing between electrodes in terms of being parallel, nonparallel, concentric or other spatial relationship.
- (2) Note. For classification here, the geometrical relationship must be claimed or disclosed.

**622 Discharge device with diverse electrodes:**

This subclass is indented under subclass 567. Subject matter wherein there are two electrodes which differ in their structure or in the material composing the electrodes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 581+, for a gas or vapor discharge device having three or more electrodes at least one is different in structure of material from the others.
- 609, for a gas or vapor discharge device where an electrode is exterior to the device envelope.
- 616, for a gas or vapor discharge device having a cathode which is provided with a positive or other shielding structure.

**623 Having electrode lead-in or electrode support sealed to envelope:**

This subclass is indented under subclass 567. Subject matter wherein the envelope has an open end and means to seal the open end of the envelope which includes and lead-in wire or an electrode support sealed to the means to seal the envelope.

- (1) Note. Here are also the patents dealing with the sealing of the ends of the envelope which are more than a nominal recitation of the seal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 43, for a lamp or discharge device having a temperature modifier for a lead-in seal or stem protection.

SEE OR SEARCH CLASS:

- 65, Glass Manufacturing, subclass 49 for a process of bonding metal to the glass part formed from shapeless mass in a mold cavity, subclasses 59.1+ for a process of fusion bonding of glass to a metal part and subclass 154 for an apparatus for fusion bonding glass to metal.
- 174, Electricity: Conductors and Insulators, subclass 17.07 for a box or housing with a fluid or vacuum of the sealed envelope type and subclasses 50.61+ for a box or housing of the sealed envelope type with a bonded seal for a conductive member.

**624 End cap seal:**

This subclass is indented under subclass 623. Subject matter wherein the open end is closed by a closure which fits over and about the end of the envelope to seal the envelope.

**625 End plug seal:**

This subclass is indented under subclass 623. Subject matter wherein the open end of the envelope is closed by a closure which fits into the open end to seal the envelope.

**626 Having lead-in shield:**

This subclass is indented under subclass 567. Subject matter having means to shield the lead-in wire or a support from an electrode.

- (1) Note. The shielding means can be for the purpose of preventing an electric discharge from being established between the lead-in wire or support and another part of the device or for preventing a deposit of sputtered material upon the lead-in wire or supports, or for any other shielding purpose.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 168, for liquid electrode discharge device which has an anode and an anode



- lead-in wire in separate anode chambers.
- 169, for a liquid electrode discharge device having plural anodes and a shield between the anodes and anode lead-in wires to prevent a discharge there between.
- 239+, for devices which are provided with a supporting and/or spacing structure for a shield.
- 313, for devices provided with means to distribute or prevent static charges or means to prevent deleterious electrical discharges.
- 317+, for devices of this class which include an envelope with lead-in conductors.
- 590, for a three or more electrode gas or vapor discharge device having a shield to prevent a discharge between two of the electrodes.
- 594, for a three or more electrode gas or vapor device wherein there is a grid or other apertured electrode arranged within an anode shield.
- 614, for a discharge device having an anode shield to prevent undesired discharges to the anode or anode lead-in.
- 616, for a discharge device having a shield to protect some part of the device such as the cathode, from the effects of positive ion bombardment.

## SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclass 50.59 for hermetic sealed envelope with lead-in conductors of general utility which has shielding means between the lead-in conductors or the joint between the envelope and a lead-in conductor.

**627 Having electrode heated by space discharge current:**

This subclass is indented under subclass 567. Subject matter wherein the electrode is bombarded by a charged particle of the ionized gas or vapor which constitutes the electrical discharge within the envelope of the tube which is attracted to the electrode by an electrical force.

- (1) Note. The gas or vapor discharge is not restricted to the discharge between the main electrodes of the tube.

- (2) Note. All or part of the electrode is of thermionically active material.
- (3) Note. The discharge may be from electrons or ions.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 39+, for a discharge device with a filament or a heated cathode with means to modify the temperature of the cathode of filament.
- 310, for a discharge device having a thermionic cathode.
- 346+, for thermionic electrode, per se, and the notes to the other subclasses and classes.
- 347, for an electrode which becomes incandescent when subjected to electron bombardment.
- 558, for a lamp or discharge device with an electrode which includes or is coated with a getter.
- 566, for a lamp or discharge device with a filament or a heated cathode electrode which includes or is coated with a vapor generating material.
- 567+, for a gas or vapor discharge device particularly subclasses 591+ for three or more electrode device having a cathode heater.

**628 Coil type:**

This subclass is indented under subclass 627. Subject matter wherein at least part of the electrode is in the form of a wound spiral.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 31, for a lamp or discharge device having a tubular hollow coil electrode with a temperature modifier for the coil.
- 344, for a coiled resistance heated electrode, per se.

**629 Having resistance heated cathode:**

This subclass is indented under subclass 567. Subject matter wherein the electrode is a cathode and the cathode is heated by the passage of electrical current through it or indirectly heated by the passage of an electrical current through a resistive element.

- (1) Note. For a gas or vapor discharge device having an electrode heated by a space discharge current, see subclasses 627+.
- (2) Note. Subclass 616 includes a cathode shield and a heated electrode where the heated electrode when negative is the cathode and the shield is used to prevent positive ion bombardment of the electrode.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 37+, for a lamp or discharge device with a temperature modifier for a heated cathode.
- 310, for other discharge devices which have a directly heated cathode or an indirectly heated cathode.
- 337+, for an indirectly heated cathode, per se.
- 341+, for a resistance heated cathode, per se.
- 591+, for three or more electrode gas or vapor discharge device having a heated cathode.
- 616, for a positive ion or cathode electrode shield.
- 627+, for an electrode heated by space discharge current.

SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclasses 94+ for systems for supplying electrical energy to the cathode or cathode heater of a discharge device.

**630 Having electrode of alkali, alkaline or rare earth material:**

This subclass is indented under subclass 567. Subject matter wherein the electrode includes within the envelope, structure or a material containing an alkali, alkaline or a rare earth as an element or in compound form.

- (1) Note. If composite electrode structure is an electron emissive material coated or laminated electrode, see subclass 631.
- (2) Note. See the "SEARCH THIS CLASS, SUBCLASS" notes in subclass 631.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 326+, for a discharge device electrode, particularly subclasses 337+ for an indirectly heated cathode, subclasses 341+ for a resistance heated cathode and 346 for cathode containing and/or coated with an electron emissive material.
- 591+, for a three or more electrode gas or vapor discharge device having a cathode heater.
- 618, for a gas or vapor discharge device having a hollow cathode.
- 631, for an electron emissive coated or laminated electrode.
- 636+, for a gas or vapor discharge device having an electrode heated by space discharge current.
- 639, for a space discharge device having a resistance heated cathode.

**631 Having particular electrode structure:**

This subclass is indented under subclass 567. Subject matter wherein the structure of an electrode is significantly recited.

- (1) Note. See the general class notes, for an electrode combined with connector structure and for an electrode/or shield.
- (2) Note. An electrode, per se, is not here. See subclasses 326+ for an electrode, per se.
- (3) Note. A gas or vapor lamp containing a coated electrode is here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 5+, for a plural unit lamp or discharge device having at least a discharge device with a control unit.
- 16, for a liquid electrode with an electric heater.
- 30+, for a hollow electrode with temperature modifier.
- 39+, for an electrode with a temperature modifier within an envelope.
- 146+, for a discharge device with movable electrode.

- 155, for a lamp or discharge device with a magnetic device where an electrode generates a magnetic field.
- 163+, for liquid electrode discharge device.
- 238+, for a lamp or discharge device with support and/or spacing structure for an electrode.
- 326+, for an electrode structure for a lamp or discharge device.
- 523+, for photosensitive device having a photosensitive electrode and subclasses 543+ for photocathode, per se.
- 558, for a lamp or discharge device where an electrode includes a getter, supports a getter or is connected to a getter.
- 566, for a lamp or discharge device having a vapor generator having an electrode with vapor generating material.
- 574+, for a gas or vapor discharge device having a particular total or partial gas or vapor pressure.
- 581+, for a gas or vapor, three or more electrode, discharge device, particularly 591+ for a device with a cathode heater with or without a control electrode, subclasses 595+ for a start electrode between discharge electrodes and subclasses 601+ for start electrode not in main discharge path.
- 607, for a gas or vapor discharge device with an electrode exterior on the outside of the envelope.
- 608, for a single electrode type gas or vapor discharge device.
- 621, for a gas or vapor discharge device having a hollow cathode.
- 627+, for a gas or vapor discharge device having an electrode heated by space discharge current.
- 629, for a gas or vapor discharge device having a resistance heated cathode.
- 630, for a gas or vapor discharge device having an electrode of alkali; alkaline or rare earth material in structure or composition form.
- 632 Cathode or anode:**  
This subclass is indented under subclass 631. Subject matter wherein the electrode is a cathode or an anode.
- (1) Note. Included are lamps or discharge devices of the gas or vapor type which
- operate on direct current or pulsating current in one direction, for example, a flash tube.
- 633 Electrode composition:**  
This subclass is indented under subclass 567. Subject matter wherein the composition of an electrode is significantly recited.
- (1) Note. See the class definition for a discussion of patents disclosing electrode compositions or materials for use in gas or vapor lamps or discharge devices.
- 634 Envelope with particular structure:**  
This subclass is indented under subclass 567. Subject matter wherein a structural detail of the envelope is significantly recited.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
633, for an electrode composition used in a discharge device.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
311, for a discharge device having an electrode of particular material. Also, see the subclasses specified in the notes for discharge devices having an electrode defined by composition or material.
- 558, for an electrode which includes a getter or is coated with a getter material.
- 566, for an electrode which includes a vapor generating material or is coated with a vapor generating material.
- 627+, for thermionic cathodes which are formed or coated with a particular composition.
- 629, for resistance heated cathodes which include a particular composition.
- 630, for an electrode which includes alkali, alkaline or rare earth material.
- 634+, for an electrode having particular structure.
- SEE OR SEARCH CLASS:  
252, Compositions, subclasses 500+ for electrically conductive or emissive compositions.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 25+, for means in the space between the envelope walls for modifying the temperature of the lamp or discharge device.
- 33, for an envelope provided with an internal temperature modifying baffle.
- 34, for an envelope provided with a condensing chamber or surface to cool the gas or vapor within the envelope.
- 44, for means to modify the temperature of the device (e.g., heat radiating means, etc.).
- 110+, for optical means (e.g., lens, etc.) to modify the ray energy passing through the envelope wall, see subclass 112 where the optical means is a polarizer, or filter, subclass 113 where the optical means is a reflector, subclass 116 where the envelope wall is light diffusing, and subclass 117 where the optical means is a light valve or light obscuring means.
- 168, for liquid electrode (e.g., mercury) discharge devices having a plurality of anodes, the envelope being provided with separate anode chambers.
- 317, for a lamp or discharge device envelope with an electrode or filament or where there is some significance in the use of the envelope in a lamp or discharge device.
- 515, for a lamp or discharge device with character display having a character shaped envelope.
- 547, for valve means for introducing a gas or vapor into or withdrawing a gas or vapor from the envelope.
- 567, for a lamp of discharge device envelope with a gas or vapor.
- 577, for a lamp or discharge device having particular total or partial gas or vapor pressure having an envelope detail.
- 609+, for a discharge device having a baffle, partition or constricting means affecting discharge.
- 623+, for discharge device having lead-in wire, electrode support or electrode sealed to envelope including envelope end seals.
- 636, for envelope compositions.

## SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 17+ for boxes and housings filled with a fluid and subclasses 50+ for boxes and housings with electrical features not restricted for use in a lamp or discharge device.
- 206, Special Receptacle or Package, subclasses 0.6+ for gas containers.
- 220, Receptacles, subclasses 2.1+ for an envelope of an electric lamp or similar device.

**635 Envelope layer or coating:**

This subclass is indented under subclass 634. Subject matter wherein the envelope has a coating or layer on the internal or external surface of the envelope.

- (1) Note. The covering is considered structure. If the coating is used as an electrode see the electrode subclasses.
- (2) Note. A glaze on the inside or the outside of the envelope is considered structure.

## SEE OR SEARCH CLASS:

- 118, Coating Apparatus, subclass 50 for vacuum or fluid pressure chamber type coating apparatus and subclasses 620+ for coating apparatus using means to apply electrical and/or radiant energy to work and/or coating material.
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 99+ for methods of making an optically transparent sandwich.
- 427, Coating Processes, 106+ for processes for coating a hollow electrical article or the product produced.

**636 Envelope composition:**

This subclass is indented under subclass 567. Subject matter wherein the composition of the envelope is significantly recited.

- (1) Note. Here discharge devices including lamps and electronic devices are classified.

- (2) Note. Envelopes defined only by composition will be found in the appropriate composition class. Also see the class definition.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 110+, for a special ray transmissive envelope formed of a specific composition having optical properties, particularly subclass 112 where the envelope wall includes a polarizing composition or a light filtering material, subclasses 113+ wherein the envelope has material which has light reflecting properties, subclass 116 wherein the envelope has light diffusing material and subclass 117 wherein the envelope has material with light valve properties or light obscuring properties.
- 317, for an envelope of the lamp or discharge device with electrical lamp or discharge device structure or there is some significance in the use of the envelope in a lamp or discharge device.
- 480, for an envelope composition of a cathode-ray tube.

SEE OR SEARCH CLASS:

- 501, Compositions: Ceramic, subclass 54 for a glass composition containing greater than ninety per cent silica.

**637 With particular gas or vapor:**

This subclass is indented under subclass 567. Subject matter wherein the gas or vapor within the envelope is defined in terms of its composition.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 161, for a lamp or discharge device with magnetic device and a gas or vapor within lamp or device.
- 481, for a cathode-ray tube having a gas therein.
- 484+, for a lamp or discharge device having a luminescent solid or liquid and a gaseous discharge medium.

- 515+, for a lamp or discharge device with character display and a gaseous discharge medium.
- 538, for a gas phototube.
- 545, for a lamp or discharge device with a valve and gas or vapor generating material.
- 546, for a lamp or discharge device with a frangible capsule containing gas or vapor generating material.
- 547+, for a lamp or discharge device with heating means to control gas or vapor or gas or vapor generating means.
- 563, for a lamp or discharge device with gas generating material.
- 564+, for a lamp or discharge device with vapor generating material.
- 568+, for a lamp or discharge device having a particular total or partial gas or vapor pressure.
- 580, for incandescent lamp having a tungsten-halogen cycle.
- 595+, for a three or more electrode device having a gas or vapor and a heated cathode.

SEE OR SEARCH CLASS:

- 252, Compositions, subclasses 372+ for gaseous compositions and the processes for making them.
- 423, Chemistry of Inorganic Compounds, subclasses 210+ for modifying or removing component of normally gaseous mixture and subclass 262 for an inert or noble gas or compound thereof, subclasses 351+ for nitrogen or compound thereof, subclasses 414+ for carbon or compound thereof and subclasses 644+ for nitrogen or compound thereof.

**638 With metal vapor:**

This subclass is indented under subclass 637. Subject matter wherein the composition includes a metal vapor.

SEE OR SEARCH CLASS:

- 423, Chemistry of Inorganic Compounds, subclasses 155+ for an alkaline earth metal, subclasses 179+ for an alkali metal, compound, subclasses 99+ for mercury containing compound, and subclass 263 for rare earth compound.

**639 Mercury vapor:** END

This subclass is indented under subclass 638. Subject matter wherein the composition of the vapor includes mercury vapor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

150, for a discharge device having a movable liquid mercury electrode.

163+, for a discharge device having a liquid mercury electrode.

**640 And rare earth metal:**

This subclass is indented under subclass 639. Subject matter wherein a rare earth metal is included in the composition.

(1) Note. The “rare earth” element are metallic in character.

(2) Note. Misch metal is an alloy of iron with mixture of rare earth metals.

(3) Note. The “rare earth” elements include the atomic numbers from 57 to 71.

**641 With rare gas:**

This subclass is indented under subclass 640. Subject matter wherein the composition includes a rare gas.

**642 And rare gas:**

This subclass is indented under subclass 639. Subject matter wherein the composition includes a rare gas.

**643 One or more rare gases:**

This subclass is indented under subclass 637. Subject matter wherein the composition includes at least one noble gas.

(1) Note. Many of the patents includes a mixture of noble gases or gas of the noble type and another type gas.

(2) Note. The noble “gases” are helium, neon, argon, krypton and xenon.

SEE OR SEARCH CLASS:

423, Chemistry of Inorganic Compounds, subclass 262 for an inert or noble gas or compound thereof.