CLASS 359, OPTICAL: SYSTEMS AND ELEMENTS

SECTION I - CLASS DEFINITION

GENERAL STATEMENT OF THE CLASS SUBJECT MATTER

A. This is the generic class for optical elements and optical systems not elsewhere classified.

Among the optical elements included in this class are:

Lenses; Polarizers; Diffraction gratings; Prisms; Reflectors; Filters; Projection screens; Optical Modulators; Optical Demodulators.

B. Among the optical systems included in this class are:

Compound lens systems; Light reflecting signalling systems (e.g., retroreflectors); Stereoscopic systems; Binocular devices; Systems of lenticular elements; Systems involving light interference; Glare reducing systems; Light dividing and combining systems; Light control systems (e.g., light valves); Building illumination with natural light; Systems for protecting or shielding elements; Optical systems whose operation depends upon polarizing, diffracting, dispersing, reflecting, or refracting light; Kaleidoscopes

C. Further included are certain apertures, closures, and viewing devices of a specialized nature which involve no intentional reflection, refraction, or filtering of light rays.

D. This class also includes optical elements combined with another type of structure(s) to constitute an optical element combined with a nonoptical structure or a perfection or improvement in the optical element. This includes filters with supports or frames; reflectors with handles, vehicles, or controlling motors; and prisms with mountings. Also, included are lenses with supports or mountings, lenses with diverse art tools, instruments or machines, lenses with casings and lenses with viewed object supports or viewed object or field illumination. Additionally, included are stereo-viewers with view changers, illumination or supporting, mounting, enclosing or light shielding structure; lenses with spacing structure such as barrels with or without an additional support, handle or illumination; and optical elements with moisture or foreign particle control.

E. Included here also are certain accessories or attachments combined with optical elements such as blinds, shields, shades, and caps or covers for preventing the accumulation of dust, moisture, or other foreign material.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

SUPPORTS OR MOUNTS FOR OPTICAL ELEMENTS AND SYSTEMS

Included here (359) also are supports, mounts, and frames which are particularly adapted for use with optical elements. The nominal recitation of a mirror or filter in combination with such structure is generally not sufficient for classification here, if the mirror or filter is treated as a panel or lamina of general utility. Such panels with associated components, such as frames, edging, backing, etc., mechanically and permanently assembled thereto are provided for elsewhere. Supports for such panel type structures are classified elsewhere. (See References to the Current Class, below.) However, combinations of a detailed mirror with its support are classified in this class. In the case of other optical elements, such as prisms or lenses, the broad recitation of the element in combination with the support or mounting is sufficient for classification in this class. This Class (359) provides for lenses, prisms, and filters respectively with supports. (See Subclass References to the Current Class, below.)

Stereo-viewer supports and mountings are provided for in this class. (See Subclass References to the Current Class, below.)

NONVISIBLE RADIATION

Included in this class are not only those elements which operate in the visible portion of the spectrum, but also those which operate in the near visible portion of the spectrum (i.e., infrared and ultraviolet) in accordance with optical principles. Systems which function in both the visible and near visible portions of the spectrum are classified here unless a specific structure is claimed as a result of the utilization of invisible ray energy. Systems whose operation is restricted to the nonvisible portion of the spectrum are classified elsewhere. (See References to Other Classes, below.)

OPTICAL SYSTEM INCLUDING PHOTOCELL

Generally, where a photocell is claimed as a part of the optical system, the subject matter is excluded from this class. Such subject matter is typically provided for with

the art for radiant energy or measuring and testing. However, where a modulating signal is recovered from a modulated light wave (as in an optical communication receiver or in an optical demodulator), classification is in Class 359. (See References to Other Classes, below.)

OPTICAL WAVEGUIDES

Optical waveguiding elements, per se, are classified in elsewhere. Also, combinations of an optical waveguide with an associated mechanical connecting device or a device coupling light into or out of the optical waveguide are classified elsewhere. (See References to Other Classes, below.)

OPTICAL MODULATION

An optical modulator, in general, is classified in this class (359). However, optical modulation occuring solely within the confines of an optical waveguide is excluded from this class. Such subject matter is provided for in Class 385.

OPTICAL AMPLIFICATION OR FREQUENCY CONVERSION

A detailed optical amplifier/frequency converter, per se, or such subject matter in combination with an additional waveguide structure is classified in this class (359). However, the nominal recitation of any type of optical amplifier/frequency converter together with an additional waveguide structure is classified elsewhere where such combination meets the class requirements.

MEASURING AND TESTING

A claimed image forming optical system plus a reticle is classified in this class. Sighting instruments for determining geometrical relationships where no significant optical system is claimed are classified elsewhere. Measuring and testing systems which determine the optical characteristics of light so as to measure materials and provides for lens or reflective image former testing are classified elsewhere. Eye examining and testing instruments are classified elsewhere. (See References to Other Classes, below.)

LASERS

Lasers and similar devices, per se, are excluded from this class. See References to Other Classes for lasers and similar devices when they function as a generator of coherent electromagnetic waves in the optical range.

OPTICAL TELEMETRY

Optical telemetry includes the combination of an optical data link between multiple locations together with a specific sensor used in a particular environment. Since the overall combination specifies an environment or specific sensor, the environment or sensor will control the classification. The following are examples of proper art areas for optical telemetry:

(1) Wellbore telemetry including any type of radiant energy; (i.e., optical, radio, etc.). (See References to Other Classes, below.)

(2) An optical data link in combination with a specific sensor, unless there is a place for the specific sensor in another class. (See References to Other Classes, below.)

COMPOSITIONS AND STOCK MATERIAL

Where there is no shape or structure peculiar to optical elements as in compositions or stock material, the subject matter is excluded from this class. See References to Other Classes, below, for classes that provide for these compositions and stock material.

OPTICAL ELEMENTS CLASSIFIED ELSEWHERE

For Optical Elements Classified Elsewhere, see References to Other Classes, below.

OPTICAL ELEMENTS COMBINED WITH DIVERSE TYPE ART DEVICES

An optical element combined with a diverse type art device where the element results in an improvement or perfection of the device is generally classified with the device. See Subclass References to the Current Class, below, for a reference to details of this distinction with reference to lenses, and also for references to combinations of a reflector and diverse type art device. The combination of an optical element and an electric discharge device is provided for elsewhere. See Class Definition, section D, above. (See References to Other Classes, below.)

For Classes that are more common external classifications of systems including or combined with optical elements, see References to Other Classes, below.

METHODS OF MAKING OPTICAL ELEMENTS CLASSIFIED ELSEWHERE

For Methods of Making Optical Elements Classified Elsewhere, see References to Other Classes, below.

SECTION III - SUBCLASS REFERENCES TO THE CURRENT CLASS

SEE OR SEARCH THIS CLASS, SUBCLASS:

477, for stereo-viewer supports and mountings.

871+, for combinations of a detailed mirror with its support.

811+, 831, and 892 provide for lenses, prisms, and filters respectively with supports.

809, see (1) Note for details of the following distinction with reference to lenses: an optical element combined with a diverse type art device where the element results in an improvement or perfection of the device is generally classified with the device.

838, under "SEARCH CLASS" for numerous combinations of a reflector and diverse type art device.

SECTION IV - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 227+ for sighting devices for determining geometrical relationships. (See Lines With Other Classes and Within This Class, "Optical Elements Combined With Diverse Type Art Devices.")

33, Geometrical Instruments, for sighting instruments for determining geometrical relationships where no significant optical system is claimed. (Lines With Other Classes and Within This Class "Measuring and Testing")

52, Static Structures (e.g., Buildings), provides for such panels with associated components, such as frames, edging, backing, etc., mechanically and permanently assembled thereto. (See Lines With Other Classes and Within This Class, "Supports or Mounts for Optical Elements and Systems" above.)

65, Glass Manufacturing, subclasses 385+ for processes for forming optical fibers, waveguides, or preforms; subclass 31 for chemical glass etching; subclasses 37+ for glass lens making. (See Lines With Other Classes, "Methods of Making Optical Elements Classified Elsewhere.")

117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, for processes and non-coating apparatus for growing therein-defined single-crystal of all types of materials, including inorganic or organic. (See Lines With Other Classes "Methods of Making Optical Elements Classified Elsewhere.")

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 99+ for optically transparent glass sandwich making. (See Lines With Other Classes, "Methods of Making Optical Elements Classified Elsewhere.")

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclass 71 for the electroforming of a mirror or reflector and subclass 116 for producing a mirror or reflector by electrolytic coating. (See Lines With Other Classes, "Methods of Making Optical Elements Classified Elsewhere.")

248, Supports, subclasses 466+ provides for supports for panel type structures. (See Lines With Other Classes and Within This Class, "Supports or Mounts for Optical Elements and Systems," above.)

250, Radiant Energy, subclasses 200+ for optical systems for controlling or controlled by a photocell and subclasses 336.1 to 395 for methods and apparatus for the detection of invisible, radiation or the testing of material by invisible radiation for the production, transmission, control or general utilization of invisible radiant energy, including cathode rays, ultra-violet rays and the radiations and emanations of radio-active substances and the irradiation of material not limited to particular arts. (See Lines With Other Classes and Within This Class, "Optical Elements Combined With Diverse Type Art Devices.")

250, Radiant Energy, for systems whose operation is restricted to the nonvisible portion of the spectrum. (See Lines With Other Classes and Within This Class "Nonvisible Radiation.")

250, Radiant Energy, subclasses 200+ generally, where a photocell is claimed as a part of the optical system. (See Lines With Other Classes and Within This Class, "Optical System Including Photocell.")

252, Compositions, for compositions generally, subclasses 299.01+ providing for compositions of liquid crystals and subclasses 582+ providing for other light transmission modifying compositions. (See Lines With Other Classes

and Within This Class, "Compositions and Stock Material.")

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 1.1+ for optical article shaping or treating. (See Lines With Other Classes, "Methods of Making Optical Elements Classified Elsewhere.")

313, Electric Lamp and Discharge Devices, subclasses 110+ for an electron lamp or discharge device having an optical device structurally combined therewith. (See Lines With Other Classes and Within This Class, "Optical Elements Combined With Diverse Type Art Devices.")

340, Communications: Electrical, subclass 815.76 for lens type indicator. (See Lines With Other Classes and Within This Class, "Optical Elements Classified Elsewhere.")

340, Communications: Electrical, subclasses 853.1+ for wellbore telemetry including any type of radiant energy; (i.e., optical, radio, etc.). (See Lines With Other Classes and Within This Class, "Optical Telemetry," above.)

340, Communications: Electrical, subclasses 870.28+ for an optical data link in combination with a specific sensor. (See Lines With Other Classes and Within This Class, "Optical Telemetry," above.)

343, Communications: Radio Wave Antennas, subclasses 909+ for radio wave refracting means and filters. (See Lines With Other Classes and Within This Class, "Optical Elements Classified Elsewhere.")

348, Television, subclasses 195+, 335+, 744+, and 832+ for optical systems included in television systems. (See Lines With Other Classes and Within This Class, "Optical Elements Combined With Diverse Type Art Devices.")

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 159.01+ for spectacle lenses. (See Lines With Other Classes and Within This Class, "Optical Elements Classified Elsewhere.")

351, Optics: Eye Examining, Vision Testing and Correcting, for spectacles and instruments for vision testing and eye examining. (See Lines With Other Classes and Within This Class "Optical Elements Combined With Diverse Type Art Devices.")

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 200+ for eye examining and testing instruments. (Lines With Other Classes and Within This Class, "Measuring and Testing")

352, Optics: Motion Pictures, for optical systems used in motion picture apparatus. (See Lines With Other Classes and Within This Class "Optical Elements Combined With Diverse Type Art Devices.")

353, Optics: Image Projectors, for image projectors. (See Lines With Other Classes and Within This Class "Optical Elements Combined With Diverse Type Art Devices.")

356, Optics: Measuring and Testing, subclass 396 for measurements involving moire patterns caused by plural optical grids relatively movable with respect to each other and subclass 242.1 for moire pattern examination of mesh or grid like material including knitted fabrics to determine the number of threads, lines or the spacing between the lines. (See Lines With Other Classes and Within This Class, "Optical Elements Classified Elsewhere.")

356, Optics: Measuring and Testing, for methods and apparatus for analyzing light, determining the optical or nonoptical properties of materials, measuring optically dimensions, determining optically spatial relations and inspecting optically for flaws and imperfections, within the scope of this class and not otherwise classifiable. (See Lines With Other Classes and Within This Class "Optical Elements Combined With Diverse Type Art Device.")

356, Optics: Measuring and Testing, provides generally for measuring and testing systems which determine the optical characteristics of light so as to measure materials and provides in subclasses 124+ for lens or reflective image former testing. (Lines With Other Classes and Within This Class, "Measuring and Testing")

358, Facsimile and Static Presentation Processing, subclasses 400 through 304 for optical systems included in facsimile systems. (See Lines With Other Classes and Within This Class, "Optical Elements Combined With Diverse Type Art Devices.")

362, Illumination, subclasses 341+ and 326+ respectively for reflecting and refracting elements to be used with an artificial source of illumination.

362, Illumination, appropriate subclasses for light sources combined with optical light modifiers, especially subclass 19 for light sources with polarizers; subclasses 166-170 and 293 for light sources with selected wavelength filters; subclass 268 for light sources combined with

plural serial lens elements; subclasses 296.01-296.1 for light sources with reflectors; and subclasses 326-350 for refractors and reflectors, respectively, for use with light sources. (See this class (359), Lines With Other Classes and Within This Class, Optical Elements Combined With Diverse Type Art Devices.)

365, Static Information Storage and Retrieval, subclasses 64, 106+, 120+, 215+, and 234+ for systems and circuits utilizing radiant energy. (See Lines With Other Classes and Within This Class, "Optical Elements Combined With Diverse Type Art Devices.")

372, Coherent Light Generators, appropriate subclasses for oscillators of the quantum electronic type for generating coherent electromagnetic waves in the optical range by stimulated emission of radiation (e.g., lasers, irasers). (See Lines With Other Classes and Within This Class "Optical Elements Combined With Diverse Type Art Devices.")

372, Coherent Light Generators, appropriate subclasses for lasers and similar devices, per se, when they function as a generator of coherent electromagnetic waves in the optical range. (See Lines With Other Classes and Within This Class "Lasers," above.)

378, X-Ray or Gamma Ray Systems or Devices, subclasses 145+ for X-ray beam control devices. (See Lines With Other Classes and Within This Class, "Optical Elements Combined With Diverse Type Art Devices.")

385, Optical Waveguides, appropriate subclasses for light wave transmitting devices. (See Lines With Other Classes and Within This Class "Optical Elements Classified Elsewhere.")

396, Photography, appropriate subclasses for still cameras. (See Lines With Other Classes and Within This Class "Optical Elements Combined With Diverse Type Art Devices.")

399, Electrophotography, subclasses 9+ for diagnostics, subclasses 38+ for controls, subclasses 130+ for image formation, subclasses 168+ for charging, subclasses 177+ for exposure, subclasses 222+ for development, subclasses 297+ for transfer, subclasses 320+ for fixing, subclasses 343+ for cleaning, and subclasses 361+ for document handling. (See Lines With Other Classes and Within This Class, "Optical Elements Combined With Diverse Type Art Devices.")

424, Drug, Bio-Affecting and Body Treating Compositions, subclasses 59+ for a sun or radiation screening or sun tanning composition intended for topical application to a living body. (See Lines With Other Classes and Within This Class, "Compositions and Stock Material.")

427, Coating Processes, subclasses 162+ for coating processes, per se, wherein the product is an optical element. (See Lines With Other Classes, "Methods of Making Optical Elements Classified Elsewhere.")

428, Stock Material or Miscellaneous Articles, subclass 1.1 for miscellaneous liquid crystal articles and appropriate subclasses for a metallic or nonmetallic stock material product in the form of a single or plural layer web or sheet or a structurally defined or coated rod, strand, fiber flake or other element and a nonstructural metallic or nonmetallic composite web or sheet defined by the compositions of the layers. Note subclass 910 (a cross-reference art collection) for a product with molecular orientation. (See Lines With Other Classes and Within This Class, "Compositions and Stock Material.")

451, Abrading, subclasses 42+ for a lens grinding process and subclasses 323 and 325 for a machine for grinding an optical lens. (See Lines With Other Classes, "Methods of Making Optical Elements Classified Elsewhere.")

505, Superconductor Technology: Apparatus, Material, Process, subclasses 100+ for high temperature (T_c 30 K) superconducting material. (See Lines With Other Classes and Within This Class, "Compositions and Stock Materia.")

505, Superconductor Technology: Apparatus, Material, Process, subclasses 150+ for high temperature (T_c 30 K) superconducting device, and particularly subclasses 181+ for photoconductive, light transmissive, light emissive, or light responsive device or component. (See Lines With Other Classes and Within This Class, "Optical Elements Classified Elsewhere.")

505, Superconductor Technology: Apparatus, Material, Process, subclasses 150+ for high temperature (T_c 30 K) superconducting device; and particularly subclasses 181+ for photoconductive, light transmissive, light emissive, or light responsive device or component. (See Lines With Other Classes and Within This Class, "Optical Elements Combined With Diverse Type Art Devices.")

702, Data Processing: Measuring, Calibrating, or Testing, subclass 40, 49, 134+, and 172 for the use of radiant energy (e.g., X-ray, light, etc.) in

a mechanical measurement system, flow metering, temperature measuring system, or system for measuring thickness or width, respectively, and subclass 159 for measuring of linear distance or length by reflected signal (e.g., ultrasonic, light, laser).

708, Electrical Computers: Arithmetic Processing and Calculating, subclass 816 for optical correlation or convolution and subclass 831 for electro-optical analog integrators. This class will accept optical computers where the resultant mathematical operation is in the form of an electrical signal. For mathematical operations performed by optical means, classification is in Class 359.

SECTION V - GLOSSARY

BINOCULAR

Pertaining to the use of both eyes in the act of viewing.

BIREFRINGENT

Certain crystalline materials have their outer electrons bound more strongly in one direction than another resulting in the material having two refractive indices depending on the direction of the oscillation. Such materials are termed birefringent and, if an unpolarized light ray enters such a material obliquely, it will be refracted into two different linearly polarized rays having directions of polarization which are normal to one another.

DICHROIC

As used in one sense, the term dichroic refers to (1) the property of some materials to absorb to a greater degree one or the other of the two orthogonal component vectors which can be considered as constituting ordinary light. This results in producing light polarized to a degree depending upon the relative absorption of the two components. The term dichroic is also used to refer to (2) an optical element which will transmit light of one color and reflect other colors with little light being absorbed. These elements are usually composed of superimposed strata of dielectric materials.

DIFFRACTION

A phenomenon resulting from the wave nature of light, e.g., light passing through a slit of decreasing width, forms a narrower and narrower beam until the slit width approaches the wavelength of light, after which further decreasing of the slit width results in a beam having a larger and larger divergence.

DIFFRACTION PATTERN

The intensity profile of a light beam after having passed by a diffracting aperture or object.

DIFFUSE

Pertaining to the scattering or random deviation of transmitted or reflected light.

HOLOGRAPHY

The optical recording of an object wave formed by the resulting interference pattern of two (or more) mutually coherent, component light beams. Generally, a coherent beam is first split into two component beams, one of which irradiates an object, the second of which irradiates a recording medium. The diffraction or scattering of the first wave by the object forms an object wave which proceeds to and interferes with a second coherent beam (i.e., reference beam) at the medium. The resulting pattern is a two-dimensional (thin) or three-dimensional (thick) hologram of the object wave, depending on the thickness of the recording medium.

IMAGE FORMER

An optical device capable of producing an image from light rays proceeding from an object.

INTERFERENCE

The interaction of two light waves which, as a result of their relative phases, produce a cancellation or reinforcement of wave energy.

LIGHT, VISIBLE LIGHT

Visible light is radiation which stimulates the optical receptors of the eye and has a wavelength from 3850 to 7600 Angstrom units. The term light is used to refer to wavelengths in the above mentioned range and, often, also to refer to the ranges immediately adjacent, i.e., the ultra violet and infrared ranges which are nonvisible.

OPTICAL COMMUNICATION

The conveyance of information from one location to another via at least one optical transmitter and one optical receiver. These are used to transfer the information with an optical beam and this beam can be used in vari-

ous communication schemes to enable the most effective or desired method of moving the information, including optical multiplexing when plural information signals or plural transmitters and receivers are utilized.

OPTICAL ELEMENT

A structure which performs a basic optical function, i.e., the structure, when exposed to or placed in the path of a light beam, will cause refraction, diffraction, attenuation, or blocking of the light or a modification in the character or properties of the light. In lenses, the complete lens is considered an optical element, while the individual masses of a plural element lens are considered as lens elements or lens components.

OPTICAL MODULATION

The change of some characteristic of an optical beam in direct relation to a varying signal applied thereto. The change may be temporal (e.g., amplitude, frequency, or phase) or directional.

OPTICAL SYSTEM

A combination of two or more similar or diverse optical elements which are optically related.

OPTICS, OPTICAL

The science of light and vision and the construction of optical instruments.

POLARIZATION

In a beam of polarized electromagnetic radiation, the polarization direction is the direction of the electric field vector (with no distinction between positive and negative as the field oscillates back and forth). The electric field vector is always in the plane which is normal to the beam propagation direction. At a given stationary point in space, the electric field vector of a beam can vary with time at random (unpolarized beam), can remain constant (plane-polarized beam), or can rotate. In the latter two cases, the beam is said to be "polarized" and can be thought of as the resultant vector of two orthogonal component vectors having equal amplitudes. If the phase difference of the two component vectors is 0 degrees, the light is plane polarized; if 90 degrees, the light is circularly polarized; and if it is between 0 and 90 degrees, the light is elliptically polarized. Elliptical and plane polarized light can be converted into each other by means of birefringent optical systems which retard one of the orthogonal component vectors relative to the other.

REFLECTION

Light striking a surface and returning back into the medium from which it came, at an angle equal but opposite to the angle of incidence.

REFRACTION

The deviation of light which results when a ray of light passes obliquely from a medium of one refractive index to a medium of another refractive index.

RETROREFLECTION

Light striking a surface and returning back into the medium in the reverse direction (i.e., a 180 degree change from its original path).

SPECTRUM

The band of colors produced by separating a beam of white light into its component frequencies.

TERMINAL IMAGE

The last image formed by a compound system.

ULTRAVIOLET/INFRARED

Electromagnetic radiation immediately above and below the optical visible frequency spectrum is termed ultraviolet and infrared, respectively. This entire range of frequencies is encompassed by the term "light."

SUBCLASSES

1 HOLOGRAPHIC SYSTEM OR ELEMENT:

This subclass is indented under the class definition. Subject matter wherein apparatus for forming a record of the phase and amplitude information of a wavefront where the information can be used to reconstruct the original wavefront; apparatus to reconstruct the original wavefront from a record containing the phase and amplitude information of this wavefront; or the record itself is recited.

(1) Note. This subclass is the generic locus for subject matter relating to holography. However, where particular use or appli-

cation is claimed, classification is in the appropriate use or application class.

(2) Note. Nominally claimed subject matter external to this class in combination with holography is classified here. Significantly claimed subject matter external to this class in combination with holography is classified in the class appropriate to the external subject matter.

(3) Note. Interferometers are excluded from this subclass and are classified in Class 356, subclasses 345+.

(4) Note. Holographic memories including those having a nominal recitation of a photodetector or photocell are included in this or the indented subclasses. Static holographic storage and retrieval systems having electrical circuitry are classified in Class 365.

(5) Note. Dynamic holographic storage and retrieval systems having electrical circuitry are classified in Class 369.

(6) Note. Mere nominal recitation of developing, fixing, bleaching, or etching a photographic recording medium does not exclude the subject matter from this class. Holographic systems including significant chemical processing steps are classified in Class 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof.

(7) Note. Systems for making holographic matched filters are included in this and the indented subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

558+, for correlation systems using holographic matched filters.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 603+ and 656 for acoustic holographic testing and for holographic interferometry in which an object is acted upon during the test, as for example, stressed or vibrated.

235, Registers, subclass 457 for holographic coded record sensors with particular circuitry to process electrical signals.

250, Radiant Energy, appropriate subclasses, for holographic systems that use radiation entirely outside of the optical or microwave ranges and which is not acoustic, and subclass 550 for photocell circuits and apparatus for interference pattern analysis (e.g., holography).

283, Printed Matter, appropriate subclasses for holograms in combination with credit or identification cards.

340, Communications: Electrical, subclass 980 for nonalarm flight indicator visible in pilot's line-of-sight through windscreen.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 176+ for head up display combined with radar.

345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 7+ for heads-up displays with selective electrical control.

348, Television, subclasses 40+ for television systems which use holography.

355, Photocopying, subclass 2 for photographic copying of holograms by non-holographic means.

356, Optics: Measuring and Testing, subclass 457 for holographic interferometry in general.

365, Static Information Storage and Retrieval, subclass 125, 216, and 235 for holographic storage and retrieval of information systems including significant and particular electrical circuitry.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 8+ for acoustic holography in general.

369, Dynamic Information Storage or Retrieval, subclass 103 for dynamic storage or retrieval using a holographic storage medium.

378, X-Ray or Gamma Ray Systems or Devices, subclass 36 for X-ray holography or interferometry.

380, Cryptography, subclass 54 for this subject matter used in a device for revealing concealed information.

382, Image Analysis, subclasses 210+ for spatial filtering (e.g., holography) in a pattern recognition system.

396, Photography, for photography in general.

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 1+ for holographic systems involving significant chemical processing steps, composition, or product.

600, Surgery, subclasses 101+ for endoscopes.

708, Electrical Computers: Arithmetic Processing and Calculating, appropriate subclasses for electrical computers or data processing arithmetic systems which may use holography.

2 Authentication:
This subclass is indented under subclass 1. Subject matter wherein a hologram is used to provide proof that a document is not counterfeit or to make a document copy-proof.

SEE OR SEARCH CLASS:

283, Printed Matter, for document authentification with nominally recited holograms.

380, Cryptography, subclass 54 for modifying an optical image in order to conceal or reveal a hidden message.

3 Having particular recording medium:
This subclass is indented under subclass 1. Subject matter in which details of the internal structure of a holographic recording medium is defined either physically or chemically.

(1) Note. An example of such a physical definition: "a multilayer emulsion, each layer being sensitive to a different color". A chemical definition: "thermoplastic tape".

SEE OR SEARCH CLASS:

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclass 1 for holographic processes involving significant chemical processing steps composition or product; and appropriate subclasses for radiation chemical recording media, per se.

4 Recyclable:
This subclass is indented under subclass 3. Subject matter in which the recording medium is of such a nature that the recorded information can be erased to permit further record-erase cycles.

(1) Note. Included here are photochromics, thermochromics, dye cells, magnetic films, etc.

5 Magnetic material:
This subclass is indented under subclass 4. Subject matter wherein the recording medium is a material which is alterable by application of magnetic force.

6 Sandwich having photoconductor:
This subclass is indented under subclass 4. Subject matter in which the recording medium is integral with a layer of material which, when illuminated, undergoes a decrease in resistance.

SEE OR SEARCH CLASS:

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclasses 10, 11, 21, 53-56, 72, 113-118, 184-189, 225-234, 257, 258, 290-294, 414, 431-466, and 910 for light responsive active semiconductor devices.

7 Cyrstalline material:
This subclass is indented under subclass 4. Subject matter in which the recording material is either a single crystal or in polycrystalline form.

8 Having nonplanar recording medium surface:
This subclass is indented under subclass 3. Subject matter in which an illuminated portion of the recording medium surface is curved, as into a cylinder, or bent or folded during recording or readout.

9 For synthetically generating a hologram:
This subclass is indented under subclass 1. Subject matter including means for providing a hologram of a single object by other than a sin-

gle exposure to the interference pattern of light from the object as a whole and a reference beam.

(1) Note. Holographic stereograms are considered recordings of different images and are excluded from this subclass.

(2) Note. Holographic memories are excluded in which an object beam is scanned so as to act as a page composer when each bit is intended to be separately detected.

SEE OR SEARCH THIS CLASS, SUBCLASS:
23, for holographic stereograms.

10 Using modulated or plural reference beams:
This subclass is indented under subclass 1. Subject matter in which a hologram is formed by interfering an object-modulated beam with another beam which is spatially or temporally modulated or with a plurality of other beams.

(1) Note. Phase modulation systems to compensate for object motion and systems for extending the depth of fluid are included here.

11 Spatial, phase or amplitude modulation:
This subclass is indented under subclass 10. Subject matter in which the reference beam is modulated by changing its phase, path length, or amplitude so as to have a nonuniform wavefront.

SEE OR SEARCH THIS CLASS, SUBCLASS:
22+, for spatial multiplexed holograms.

SEE OR SEARCH CLASS:
365, Static Information Storage and Retrieval, subclass 49.1 for associative holographic memories.

12 Copying by holographic means:
This subclass is indented under subclass 1. Subject matter in which an image reconstructed from one hologram is used as the object in making a second hologram.

(1) Note. Systems in which a holographic analog to an ordinary optical element is used to shape or form a beam used to make a second hologram, but which does not by itself provide the object information for the second hologram are excluded. Such systems are classified based on the other claimed features in subclass 1 and its indented subclasses.

SEE OR SEARCH CLASS:
355, Photocopying, appropriate subclasses for photographic copying, in general.
399, Electrophotography, subclass 118 for optics with particular modular or displaceable structure, subclass 137 optical intermediate storage of original image, subclasses 196+ for variable magnification during exposure, subclass 216 for slit exposure by pivoting mirror, subclass 218 for lens used in exposure, and subclass 219 for fiber optics used in exposure.

13 Head up display:
This subclass is indented under subclass 1. Subject matter wherein a first image is optically superimposed upon a second image within a field of view.

SEE OR SEARCH CLASS:
345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 7+ for heads-up displays with selective electrical control.

14 Holograph on curved substrate:
This subclass is indented under subclass 13. Subject matter wherein a holograph is formed on a medium which is not flat.

15 Using a hologram as an optical element:
This subclass is indented under subclass 1. Subject matter wherein a holographic equivalent to an ordinary optical element is formed or used and wherein the holographic equivalent does not itself contain any intelligence or image information more significant than a point image.

(1) Note. The optical elements for which the hologram may be substituted include lenses, reflectors, diffusers, gratings, polarizers, beam splitters or combiners, filters, and phase plates or beam couplers.

16 With aberration correction:
This subclass is indented under subclass 15. Subject matter which compensates for the inability of an optical system to provide a point to point correspondence between an object and its image.

17 Scanner:
This subclass is indented under subclass 15. Subject matter in which a hologram is used to direct a beam of light successively over the elements of a given region.

(1) Note. Systems using a holographic element to convert one scan pattern to another are included here.

18 Flat rotating disk:
This subclass is indented under subclass 17. Subject matter where the scanning element is a planar surface, containing holographic segments, which is rotated about an axis normal to the surface.

19 Lens:
This subclass is indented under subclass 15. Subject matter in which the holographic equivalent is an optical device which focuses light.

(1) Note. Holograms which are used to form a single image of an extended two- or three-dimensional object are included here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
362+, for compound lens systems.
642+, for lenses.

20 Multiple point hologram (e.g., fly-eye lens, etc.):
This subclass is indented under subclass 19. Subject matter wherein a hologram, which simulates one produced by the interference of two beams with one of the beams consisting of a plurality of separate subbeams, is produced which is the analog of a plurality of lenses in a plane such as lenticular or fly eye lens array.

21 Having defined page composer:
This subclass is indented under subclass 1. Subject matter including the details of the internal structure of a changeable modulator, which serves as the principle object in a system for making a plurality of holograms, where the internal conditions of the modulator represent the intelligence to be recorded in the holograms.

(1) Note. Systems in which a page composer is merely nominally recited are excluded from this subclass and are classified on the basis of the other claimed features in subclass 1 and its indented subclasses.

22 For producing or reconstructing images from multiple holograms (e.g., color, etc.):
This subclass is indented under subclass 1. Subject matter comprising systems specifically adapted for making a plurality of holograms, simultaneously or sequentially, of different intelligence or for reading out images from a plurality of holograms.

(1) Note. Holographic stereograms are classified in subclass 23.

SEE OR SEARCH THIS CLASS, SUBCLASS:
9, for synthetically generating holograms.
23, for holographic stereograms.

23 Holographic stereogram:
This subclass is indented under subclass 22. Subject matter including a series of holograms made from a series of two-dimensional pictures of a three-dimensional object, each picture representing a different parallactic view of the object, and upon readout the hologram series represents a three-dimensional view to an observer.

SEE OR SEARCH THIS CLASS, SUBCLASS:
9, for synthetically generating a hologram.
462+, for nonholographic stereoscopic devices.

24 Superimposed holograms only:
This subclass is indented under subclass 22. Subject matter in which the plurality of holograms are fully overlapped on the same recording medium only.

(1) Note. Typical subject matter of this subclass include (a) holograms made with multicolor illumination and (b) systems using spatial frequency multiplexing or pupil separation.

25 Discrete hologram only:
This subclass is indented under subclass 22. Subject matter in which the plurality of holograms are arranged in a side-by-side relationship on only one integral recording medium or have an equivalent fixed side-by-side spatial relationship to each other such as in a frame having windows containing the holo-grams.

(1) Note. Space division multiplexing systems wherein holograms are discretely recorded and interlaced are included here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
23, for holographic stereograms.

26 Sequential frames on moving film:
This subclass is indented under subclass 25. Subject matter in which the plurality of holograms will, upon readout, produce images whose spatial location will move as a function of the movement of the holograms and in which movement of the holograms is used to provide for sequential readout of the individual images at a fixed location in space.

(1) Note. Holographic movies or books and holograms of time varying electrical signals are typical of the subject matter included here.

27 Having particular laser source:
This subclass is indented under subclass 1. Subject matter including a laser as a light source wherein the physical or chemical internal structure of the laser is explicity defined.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, appropriate subclasses for lasers, per se.

28 Having multiple object beam or diffuse object illumination:
This subclass is indented under subclass 1. Subject matter in which a plurality of light beams are used to illuminate an object whose image is to be recorded or in which the light illuminating the object has been modulated by a diffuser or the equivalent.

29 Fourier transform holography:
This subclass is indented under subclass 1. Subject matter where the transmission factor of a hologram closely approximates a Fourier integral.

(1) Note. The Fourier Transform, F(w), of a function, f(t), is given by

30 Having optical element between object and recording medium:
This subclass is indented under subclass 1. Subject matter comprising systems for producing holograms in which an optical element, such as a lens, grating, mask, or mirror is located in the path of the light between the object whose image is to be recorded and the holographic recording medium and systems for reconstructing an image from such holograms in which an equivalent optical element having an equivalent spatial location relative to the holo-gram must be used during readout.

31 Focused image holography:
This subclass is indented under subclass 30. Subject matter in which an image of the intelligence to be recorded is formed on, in, or very close to the recording medium when producing a hologram or in which an image is formed on, in, or very close to the hologram during readout.

32 For reconstructing image:
This subclass is indented under subclass 1. Subject matter used for reading out the intelligence recorded in a hologram.

33 Real image:
This subclass is indented under subclass 32. Subject matter for reconstructing a hologram made of an image formed by light collected at a single point as opposed to a virtual image.

34 With optical waveguide:

This subclass is indented under subclass 1. Subject matter including one or more optically transparent elongated structures (e.g., rods, fibers, or waveguides) are used to transmit light rays from one point to another through modal transmission or within the confines of their outer surfaces through internal reflection.

SEE OR SEARCH CLASS:

385, Optical Waveguides, appropriate subclasses for optical waveguides, per se.

35 Hardware for producing a hologram:

This subclass is indented under subclass 1. Subject matter including physical components (e.g., fittings, tools, or metal equipment of a system, etc.) used in creating a holographic image.

107 OPTICAL COMPUTING WITHOUT DIFFRACTION:

This subclass is indented under the class definition. Subject matter wherein basic and more involved mathematical processes of comparing, adding, substracting, multiplying, dividing, integrating, etc., are performed by optical elements on an optical beam prior to any conversion to another form of energy.

(1) Note. The optical beam itself performs the computing.

(2) Note. The computing of this and the indented subclass optically works on a single input optical beam to produce a desired output optical beam, but this optical computing is not intended to encompass convolution (crosscorrelation) or correlation functions performed by a diffration grating.

(3) Note. Electrical computing for optical purposes without any computation using an optical beam is classified elsewhere.

SEE OR SEARCH THIS CLASS, SUBCLASS:

560, for convolution or cross-correlation using a diffraction grating.

561, for correlation using a diffraction grating.

SEE OR SEARCH CLASS:

235, Registers, subclasses 200+ for fluid logic.

700, Data Processing: Generic Control Systems or Specific Applications, appropriate subclasses.

701, Data Processing: Vehicles, Navigation, and Relative Location, appropriate subclasses.

702, Data Processing: Measuring, Calibrating, or Testing, appropriate subclasses.

703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, appropriate subclasses.

704, Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/Decompression, appropriate subclasses.

705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, appropriate subclasses.

706, Data Processing: Artificial Intelligence, appropriate subclasses.

708, Electrical Computers: Arithmetic Processing and Calculating, appropriate subclasses.

709, Electrical Computers and Digital Processing Systems: Multiple Computer or Process Coordinating, appropriate subclasses.

710, Electrical Computers and Digital Data Processing Systems: Input/Output, appropriate subclasses.

711, Electrical Computers and Digital Processing Systems: Memory, appropriate subclasses.

712, Electrical Computers and Digital Processing Systems: Processing Architectures and Instruction Processing (e.g., Processors), appropriate subclasses.

713, Electrical Computers and Digital Processing Systems: Support, appropriate subclasses.

714, Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses.

716, Computer-Aided Design and Analysis of Circuits and Semiconductor Masks, appropriate subclasses.

717, Data Processing: Software Development, Installation, and Management, appropriate subclasses.

108 Logic gate:

This subclass is indented under subclass 107. Subject matter wherein the optical beam performs the operation known to be performed by an AND, OR, NOR, NOT, etc., gate and the optical beam output is the resultant of the relationship of all the input optical beams as designed prior to the application of the optical beams.

SEE OR SEARCH CLASS:

235, Registers, subclasses 200+ for fluid gates.

326, Electronic Digital Logic Circuitry, for electrical digital logic circuits.

700, Data Processing: Generic Control Systems or Specific Applications, subclass 89 for data processing control system with specific algorithm.

196.1 DEFLECTION USING A MOVING ELEMENT:

This subclass is indented under the class definition. Subject matter related to offsetting or altering the direction of at least a portion of a light incident onto a light reflecting or transmitting element (i.e., optical element) such as lens, mirror, prism, etc., by translating, rotating, oscillating, or otherwise repositioning the element with respect to the light path.

(1) Note. A prism may be employed for refracting or reflecting light. Prism reflections are considered to be internal reflections; that is, the light is inside the prism body before and immediately after reflection. Light beam deflection by a movable prism is included in this subclass.

(2) Note. Lenses or curved surface mirrors movable for focusing are classified elsewhere in this class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

227, through 236, for light control by an opaque element or medium movable in or through light path.

298, through 320, for light wave directional modulation.

577, through 590, for light control by light interference.

642, through 830, for lenses, per se.

831, through 837, for prisms, per se.

838, through 884, for mirrors, per se.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 503.1 through 504+ for an invisible radiation source with a radiation modifying member, in general, and subclasses 505.1-519.1, for radiation controlling elements per se, exclusive of infrared, visible and ultraviolet types.

348, Television, subclasses 195 through 205 for mechanical-optical scanning by moving a lens or refractor.

197.1 Using a periodically moving element:

This subclass is indented under subclass 196.1. Subject matter wherein the moving of the light reflecting or transmitting element occurs at regular intervals.

(1) Note. The motion of the light reflective or transmitting element or medium as a result of vehicle vibration, vehicle wheel motion, wind action, etc., is considered to be of an irregular nature and not periodic within the meaning of this definition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

227, through 236, for light control by an opaque element or medium movable in or through a light path.

SEE OR SEARCH CLASS:

348, Television, subclasses 195 through 205 for mechanical-optical scanning.

352, Optics: Motion Pictures, subclass 84 for high speed cameras which use rotating optical elements and subclasses 105-120 for motion picture optical rectifiers using rotating or scanning optical elements.

358, Facsimile and Static Presentation Processing, subclasses 474 through 498 for a facsimile scanning signal generator.

198.1 With particular mount or driver for element:

This subclass is indented under subclass 197.1. Subject matter includes details of structure to support or move the element periodically.

SEE OR SEARCH THIS CLASS, SUBCLASS:

221.2, for deflection of light wherein the deflection element or medium further comprises detail structure for supporting or moving the non-periodically moving element.

199.1 Oscillating driver:

This subclass is indented under subclass 198.1. Subject matter includes means to move the element back and forth repetitively.

SEE OR SEARCH THIS CLASS, SUBCLASS:

213.1, for light deflection wherein the reflective moving element is an oscillating reflective element.

199.2 Electrostatically driven:

This subclass is indented under subclass 199.1. Subject matter wherein the oscillating driver is powered via an electrical device having an energy source pertaining to an electric charge or field alone, without interaction with magnetic influence.

SEE OR SEARCH THIS CLASS, SUBCLASS:

200.6, for light deflection wherein the deflection element is moved by a non-oscillating electrostatic driver.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclasses 309 and 310 for an electrical generator or motor structure wherein the electrical charge or potential is of static electricity.

199.3 Electromagnetically driven:

This subclass is indented under subclass 199.1. Subject matter wherein the oscillating driver is powered via an electromotive force in a conductor when there is a change in magnetic flux through the conductor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

200.7, for light deflection wherein the deflection element is moved by a non-oscillating electromagnetic driver.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 90.5 for an electrical generator or motor further comprising bearings having an induction field.

199.4 Electromechanically driven:

This subclass is indented under subclass 199.1. Subject matter wherein the oscillating driver is powered via an electrical to mechanical conversion device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

200.8, for light deflection wherein the deflection element is driven by a non-oscillating electromechanical driver.

200.1 Bearing or shaft for rotary driver:

This subclass is indented under subclass 199.1. Subject matter wherein the oscillating driver is powered via an electrical to mechanical conversion device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

221.3, for bearings or a shaft for a non-periodic rotary driver.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 90.5 for an electrical generator or motor further comprising bearings having an induction field.

384, Bearings, subclasses 91 through 623 for bearings, per se.

200.2 Specific shaft material or structure (e.g. ceramic ring):

This subclass is indented under subclass 200.1. Subject matter wherein the shaft has a defined shape or configuration or having a particular compositional make up.

SEE OR SEARCH THIS CLASS, SUBCLASS:

221.4, for light deflection wherein the deflecting element further comprises a specific shaft material or structure for a non-periodic rotary driver.

200.3 Grooved shaft:

This subclass is indented under subclass 200.2. Subject matter wherein the defined structure includes a narrow furrow.

200.4 Fluid pressure bearing:

This subclass is indented under subclass 200.1. Subject matter including structural details of fluid under pressure provided between the bearing and the rotating shaft to reduce the friction between them during the rotation.

(1) Note. Fluid bearings are also called hydrostatic or gas bearings, and are bearings which support load on a thin layer of liquid or gas.

SEE OR SEARCH CLASS:

384, Bearings, subclasses 100 through 124 for fluid bearings, per se.

200.5 Dynamic fluid bearing:

This subclass is indented under subclass 200.4. Subject matter wherein the pressure in the fluid bearing is adjustable.

200.6 Electrostatic driver:

This subclass is indented under subclass 198.1. Subject matter wherein the driver is powered via an electrical device having an energy source pertaining to an electric charge or field alone, without interaction with magnetic influence.

SEE OR SEARCH THIS CLASS, SUBCLASS:

199.2, for light deflection wherein the element is moved by an electrostatic oscillating driver.

200.7 Electromagnetic driver:

This subclass is indented under subclass 198.1. Subject matter wherein the driver is powered via an electromotive force in a conductor when there is a change in magnetic flux through the conductor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

199.3, for light deflection wherein a periodically moving element further comprises an electromagnetic oscillating driver.

200.8 Electromechanical driver:

This subclass is indented under subclass 198.1. Subject matter wherein the driver is powered via an electrical to mechanical conversion device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

199.4, for light deflection wherein a periodically moving element further comprises an electromechanical oscillating driver.

201.1 With multiple scanning elements (e.g. plural lenses, lens and prism, etc.):

This subclass is indented under subclass 197.1. Subject matter wherein the deflection of the incident light achieved by periodically changing the position of more than one optical element in the light beam path.

SEE OR SEARCH THIS CLASS, SUBCLASS:

201.2, for light deflection using a moving mirror array.

211.3, for light deflection using plural non-periodically moving prisms.

216.1, for light deflection using a mutiple faceted mirrors.

201.2 Reflective element (e.g. a mirror, a reflector, etc.):

This subclass is indented under subclass 201.1. Subject matter wherein at least one scanning element has a surface which returns the incident light back to its original medium without changing its wavelength.

SEE OR SEARCH THIS CLASS, SUBCLASS:

838, through 884, for mirrors, per se.

202.1 X-Y scanners:

This subclass is indented under subclass 201.1. Subject matter wherein the multiple scanning

elements cause a deflection of light in two mutually perpendicular directions.

203.1 Having a common axis of rotation:
This subclass is indented under subclass 201.1. Subject matter wherein the plural moving scanning elements revolve about one physical or imaginary line.

204.1 Utilizing multiple light beams:
This subclass is indented under subclass 197.1. Subject matter wherein two or more light beams are used as input for the moving element.

204.2 Including modulated light beam:
This subclass is indented under subclass 204.1. Subject matter wherein at least one of the light beams has its amplitude, frequency or phase modified in proportion to an applied time varying signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
217.2, for light deflection wherein the deflection element is a multifaceted rotating element that deflects modulated light.
224.2, for light deflection wherein the deflection element is a reflective element moved by a deformable support that deflects modulated light.
237, through 236, for modulation, per se.

204.3 Including polarized light beam:
This subclass is indented under subclass 204.1. Subject matter wherein at least one of the light beams is modified such that all electric field vectors are within the same plane (plane polarized) or having vectors within two orthogonal planes (elliptically polarized).

SEE OR SEARCH THIS CLASS, SUBCLASS:
483.01, through 494.01, for polarization without modulation.

204.4 Having multiple light beams with visible wavelengths:
This subclass is indented under subclass 204.1. Subject matter including two or more light beams that have wavelengths in the visible region of the electromagnetic spectrum.

204.5 With diffraction grating:
This subclass is indented under subclass 204.1. Subject matter wherein the multiple light beams are bent or deflected via a barrier or a series of narrow slits.

SEE OR SEARCH THIS CLASS, SUBCLASS:
207.7, for light deflection wherein the deflection element is a post scanning element comprising a diffraction grating.
211.6, for light deflection wherein the deflection element further comprises non-periodically rotional diffracting grating.
217.4, for light deflection wherein the deflection element further comprises a non-periodically multifacted rotating reflective element having a diffraction grating.
558, through 576, for diffraction, per se.

205.1 Post scanning optical element:
This subclass is indented under subclass 197.1. Subject matter wherein an optical element is provided after the deflecting element to gather light.

206.1 High distortion lens (e.g., f-Theta lens):
This subclass is indented under subclass 205.1. Subject matter wherein the post scanning optical element includes a lens producing an image such that the image height is proportional to the scan angle (Theta).

SEE OR SEARCH THIS CLASS, SUBCLASS:
662, for an f-Theta lens, per se.

207.1 Anamorphic elements:
This subclass is indented under subclass 205.1. Subject matter including an optical element that produces unequal image magnifications in two orthogonal planes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
668, for anamorphic lenses, per se.

207.2 Having an aspheric surface:
This subclass is indented under subclass 207.1. Subject matter wherein the anamorphic optical element has a non-spherical surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:
708, through 718, for lenses having aspherical surfaces.

207.3 Multiple aspheric surfaces:
This subclass is indented under subclass 207.2. Subject matter wherein the anamorphic optical element has more than one non-spherical surface.

207.4 Multiple symmetrical aspheric surfaces:
This subclass is indented under subclass 207.3. Subject matter wherein two or more aspheric surfaces have symmetry about an optical axis.

207.5 Multiple nonsymmetrical aspheric surfaces:
This subclass is indented under subclass 207.3. Subject matter wherein two or more aspheric surfaces are asymmetrical about the optical axis.

207.6 Cylindrical or toric lens:
This subclass is indented under subclass 205.1. Subject matter wherein the post scanning optical element consists of a lens with at least one surface that is formed like a portion of a cylinder i.e., cylindrical lens, or a lens having a main power in one meridian and a minimum power in a perpendicular meridian, i.e., toric lens.

207.7 With diffraction portion or element:
This subclass is indented under subclass 205.1. Subject matter wherein the post scanning optical element includes an edge, narrow slit or groove for bending or deflecting light incident thereon.

SEE OR SEARCH THIS CLASS, SUBCLASS:
204.5, for light deflection wherein the deflecting element further comprises a diffraction grating acting upon multibeam polarized light.
211.6, for light deflection wherein the deflection element further comprises non-periodically rotational diffracting grating.
217.4, for light deflection wherein the deflection element further comprises a non-periodically multifacted rotating reflective element having a diffraction grating.
558, through 576, for diffraction, per se.

207.8 With reflecting prism:
This subclass is indented under subclass 205.1. Subject matter wherein the post scanning optical element is a wedge-shaped transparent body consisting of plane surfaces set at specified angles, some of these surfaces transmit light and some reflect light, which causes the incident light to traverse in succession.

SEE OR SEARCH THIS CLASS, SUBCLASS:
831, through 837, for prisms, per se.

207.9 Polarized beam:
This subclass is indented under subclass 205.1. Subject matter wherein the light incident on the post scanning optical element is modified such that all electric field vectors are within the same plane (plane polarized) or having vectors within two orthogonal planes (elliptically polarized).

SEE OR SEARCH THIS CLASS, SUBCLASS:
204.3, for light deflection wherein the deflected light beams are plural multiple polarized beams.

207.11 Thermal compensation:
This subclass is indented under subclass 205.1. Subject matter wherein the post scanning optical element includes means to counteract operational effects due to changes in temperature.

208.1 Concave reflector:
This subclass is indented under subclass 205.1. Subject matter wherein the post scanning optical element has an inwardly curved reflective surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:
867, through 869, for a concave cylindrical mirror providing a line focus.

208.2 Aspheric reflector:
This subclass is indented under subclass 208.1. Subject matter wherein the concave reflective optical element has a non-spherical surface.

209.1 Transmissive type moving element:
This subclass is indented under subclass 197.1. Subject matter wherein the periodically moving element is made of a transparent material that allows light to pass through.

210.1 Moving lens:
This subclass is indented under subclass 209.1. Subject matter wherein the transmissive element is a transparent optical component with surfaces so curved such that transmitted light is converged, diverged, or collimated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
211.1, for deflection of a light beam using a periodically moving prism.
642, through 830, for lenses, per se.

210.2 Rotational lens:
This subclass is indented under subclass 210.1. Subject matter wherein the moving lens moves about an axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
226.1, for light deflection wherein the deflecting element is a non-periodic rotating reflective element.
226.2, for light deflection wherein the deflecting element is a non-periodic rotating element.

211.1 Moving prism:
This subclass is indented under subclass 209.1. Subject matter wherein the transmissive element is a transparent optical element having at least two (2) flat surfaces angled relative to each other to refract the light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
210.1, for light deflection wherein the deflecting element is a moving lens.
592, through 595, for refracting elements employed in natural light directing systems.
606, for prismoidal antiglare mirrors.
618, for plural path optical systems which divide or combine light paths.
831, through 837, for a prism, per se.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclass 51 for optical test devices having prisms used in infrared or UV range alone and subclasses 300 – 334 for prism-type spectroscopic instruments.

211.2 Rotating prism:
This subclass is indented under subclass 211.1. Subject matter wherein the prism moves about an axis.

211.3 Multiple prisms:
This subclass is indented under subclass 211.2. Subject matter wherein there are two or more rotating prisms.

211.4 With angled axis of rotation:
This subclass is indented under subclass 211.1. Subject matter wherein the prism is oriented at an incline with respect to movement about an axis.

211.5 Rotating element:
This subclass is indented under subclass 209.1. Subject matter wherein the transmissive element moves about an axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
210.2, for light deflection wherein the deflecting element is a rotational lens.
211.2, for light deflection wherein the deflecting element is a rotational prism.

211.6 With diffraction grating:
This subclass is indented under subclass 211.5. Subject matter wherein the rotating element includes an edge, narrow slit or groove for bending or deflecting light incident thereon.

SEE OR SEARCH THIS CLASS, SUBCLASS:
204.5, for light deflection wherein the deflecting element further comprises a diffraction grating acting upon multibeam polarized light.

207.7, for light deflection wherein the deflection element is a post scanning element comprising a diffraction grating.
217.4, for light deflection wherein the deflecting element further comprises a nonperiodically multifacated rotating reflective element having a diffraction grating.
558, through 576, for diffraction, per se.

212.1 Reflective type moving element:
This subclass is indented under subclass 197.1. Subject matter wherein the periodically moving element has a surface that returns the incident light back to its original medium without changing its wavelength.

SEE OR SEARCH THIS CLASS, SUBCLASS:
207.8, for light deflection wherein the deflecting element further comprises post scanning reflecting prisms.
838, through 884, for reflective optical elements, per se.

212.2 Rotating reflective element:
This subclass is indented under subclass 212.1. Subject matter wherein the element moves about an axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
210.2, for light deflection wherein the deflecting element is a rotating lens.
211.2, for light deflection wherein the deflecting element is a rotational prism.
211.5, for light deflection wherein the deflecting element is a rotating transmissive element.

213.1 Oscillating reflective element:
This subclass is indented under subclass 212.1. Subject matter wherein the reflective element moves back and forth repetitively.

SEE OR SEARCH THIS CLASS, SUBCLASS:
520, through 526, for rotating, oscillating and vibrating signal reflectors.

214.1 Single plane mirror:
This subclass is indented under subclass 213.1. Subject matter wherein the reflective element has a unitary flat reflective surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:
838, through 884, for mirrors, per se.

215.1 With imaging lens:
This subclass is indented under subclass 214.1. Subject matter further comprising an optical element for the purpose of focusing the reflected light.

216.1 Multifaceted rotating element:
This subclass is indented under subclass 212.1. Subject matter wherein the reflective element has two or more reflecting surfaces and moves about an axis.

217.1 With facet plane substantially parallel to rotating axis plane:
This subclass is indented under subclass 216.1. Subject matter wherein the reflecting surfaces of the reflective element are in the same plane as the axis of rotation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
219.2, for a multifaceted reflective element wherein the facets are tilted at an angle with respect to the axis of rotation.

217.2 With beam modulation:
This subclass is indented under subclass 216.1. Subject matter wherein the light's amplitude, frequency or phase has been modified in proportion to an applied time varying signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
204.2, for scanners using multiple modulated light beams.
224.2, for light deflection wherein the deflection element is a reflective element moved by a deformable support that deflects modulated light.
237, through 324, for modulation, per se.

217.3 Having vibration absorbing means:
This subclass is indented under subclass 216.1. Subject matter including means to attenuate or eliminate unwanted trembling motion of the moving element.

SEE OR SEARCH THIS CLASS, SUBCLASS:
207.11, for light deflection wherein the deflecting element having thermal compensation.

217.4 With diffractive element:
This subclass is indented under subclass 216.1. Subject matter wherein the multifaceted rotating element includes an edge, narrow slit or groove for bending or deflecting the incident light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
204.5, for light deflection wherein the deflecting element further comprises a diffraction grating acting upon multibeam polarized light.
207.7, for light deflection wherein the deflection element is a post scanning element comprising a diffraction grating.
211.6, for light deflection wherein the deflecting element further comprises a non-periodically rotational diffraction grating.

218.1 Having six, seven, or eight facets:
This subclass is indented under subclass 216.1. Subject matter wherein the number of reflecting surfaces is greater than five and less than nine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
219.1, for light deflection wherein the deflecting element is a multifaceted rotating element having five or fewer reflecting surfaces.

219.1 Having five or fewer facets:
This subclass is indented under subclass 216.1. Subject matter wherein the number of reflecting surfaces is less than six.

SEE OR SEARCH THIS CLASS, SUBCLASS:
218.1, for light deflection wherein the deflecting element is a multifaceted rotating element having more than five, but less than nine, reflecting surfaces.

219.2 Inclined reflective elements:
This subclass is indented under subclass 216.1. Subject matter wherein the reflective elements are disposed at an angle relative to the rotational axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
217.1, for a multifaceted reflective element wherein the facets are parallel to the axis of rotation.

220.1 Rotation axis traversely oriented relative to reflective element:
This subclass is indented under subclass 212.1. Subject matter wherein the element is tilted with respect to the rotational axis.

221.1 Having planar rotating reflector with coplanar axis of rotation:
This subclass is indented under subclass 212.1. Subject matter wherein the reflective surface of the moving element is non-curved and the axis of rotation lies in its plane.

SEE OR SEARCH THIS CLASS, SUBCLASS:
214.1, for light deflection wherein the deflecting element is an oscillating planar mirror.

221.2 With particular mount or drive for element:
This subclass is indented under subclass 196.1. Subject matter includes details of structure to support or move the element to deflect the light beam.

SEE OR SEARCH THIS CLASS, SUBCLASS:
198.1, for light deflection comprising detailed structure for supporting or moving a periodically moving element or medium.

221.3 Bearing or shaft for rotary driver:
This subclass is indented under subclass 221.2. Subject matter includes structural details of the load support or the axle member to which torque is applied to cause rotation of the driver.

SEE OR SEARCH THIS CLASS, SUBCLASS:
200.1, for light deflection wherein the deflecting element further comprising bearings or shaft for a periodic rotary driver.

SEE OR SEARCH CLASS:
384, Bearings, subclasses 91 through 623 for bearings, per se.

221.4 Specific shaft material or structure (e.g. ceramic ring):
This subclass is indented under subclass 221.3. Subject matter wherein the shaft has a defined shape or configuration or having a particular compositional make- up.

SEE OR SEARCH THIS CLASS, SUBCLASS:
200.2, for specific shaft material or structure for a periodic rotary driver.

222.1 By frustrated total internal reflection:
This subclass is indented under subclass 196.1. Subject matter wherein light is deflected via light leakage at a total reflecting interface of a first reflective surface when a second reflective surface is placed in proximity of the first.

(1) Note. When light is incident on a reflective surface and undergoes total internal reflection, by bringing a second element or medium into proximity with the first surface, total internal reflection becomes frustrated and the light beam is no longer total internal reflection, but instead, is passed into the second element or medium.

223.1 By moving a reflective element:
This subclass is indented under subclass 196.1. Subject matter wherein the direction of at least a portion of an incident light beam is offset or changed by repositioning an optical element which returns incident light without changing its wavelength.

SEE OR SEARCH THIS CLASS, SUBCLASS:
207.8, for light beam deflection having a reflective prism after the moving element (i.e. post scanning).
291, through 295, for light control by deforming or flexing a reflector.
838, through 884, for a reflector or mirror, per se.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclass 230 for reflection-type light valves used in photocell systems.
324, Electricity: Measuring and Testing, subclass 97 for galvanometers of the light beam type.
348, Television, subclasses 203 through 205 for mechanical-optical scanning by a moving reflector.

224.1 Reflective element moved by deformable support:
This subclass is indented under subclass 223.1. Subject matter wherein structure holding the element is extended, flexed or contracted to modify the position of the reflecting element.

SEE OR SEARCH THIS CLASS, SUBCLASS:
199.3, for light beam deflection wherein the reflecting element itself is extended, flexed or contracted.

224.2 Modulated light beam:
This subclass is indented under subclass 224.1. Subject matter wherein the light's amplitude, frequency or phase is modified in proportion to an applied time varying signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
204.2, for scanners using multiple modulated light beams.
217.2, for modulated light reflected by a multifaceted rotating element.
291, through 295, for optical modulation by altering the shape or contour of the light control surface.

225.1 Pivotally or moving in circular arc:
This subclass is indented under subclass 223.1. Subject matter wherein the reflective element

rotates about an axis which passes through the element.

226.1 Rotating:
This subclass is indented under subclass 223.1. Subject matter wherein the reflective element rotates about an axis which does not pass through the element.

226.2 Pivotal or rotational element:
This subclass is indented under subclass 196.1. Subject matter wherein the element revolves or pivots about an axis.

226.3 Fluid filled medium:
This subclass is indented under subclass 196.1. Subject matter wherein the element comprises a liquid or gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:
228, for light control by a movable opaque element or medium including a gas or liquid.
665, for a fluid lens, per se.
886, for a fluid filter, per se.

227 LIGHT CONTROL BY OPAQUE ELEMENT OR MEDIUM MOVABLE IN OR THROUGH LIGHT PATH:
This subclass is indented under the class definition. Subject matter comprising the control of the amount of light transmitted through an area defined by an optical beam via an element or material, which is either completely opaque or opaque only in certain portions whereas the other portions are transparent, by (1) selectively intercepting the light path by the element or (2) changing the orientation of the element within the light path.

(1) Note. Where the element is not substantially opaque, but is used to reduce the light intensity, the subject matter is not classified here but in subclass 889.

(2) Note. Class 359 provides for optical diaphragms and shutters, per se, in subclasses 227+ for lenses combined with shutters generally in subclasses 738+, and for lenses combined with diaphragms generally in subclasses 739+. However, a camera shutter and diaphragm, per se, are classifiable in Class 396, Photography, subclasses 452+ and subclasses 505+ respectively, the indicated use in cameras or camera background being sufficient for classification in Class 396 as opposed to Class 359. Class 396 also provides for lenses broadly or specifically combined with camera shutter or diaphragm details, it being emphasized that such combinations involving noncamera shutters or diaphragms or plural disclosures of utility are classified in subclasses 738+ and 739+ of Class 359 as indicated above. The combination of a lens broadly or specifically claimed and a camera shutter or diaphragm broadly claimed are classifiable in subclasses 738+ and 739+ of this class (359).

SEE OR SEARCH THIS CLASS, SUBCLASS:
196.1 through 226.3, for light deflection by a moving element.
738+, for light controlling means combined with a lens.

SEE OR SEARCH CLASS:
396, Photography, particularly subclasses 452+ and 505+ for shutters and diaphragms used in cameras and see (2) Note above.

228 Fluid:
This subclass is indented under subclass 227. Subject matter including a liquid or gas.

(1) Note. The fluid itself or an element in the fluid may constitute the light controlling element.

SEE OR SEARCH THIS CLASS, SUBCLASS:
296, for realignment or repositioning of particles (possibly opaque) suspended in a fluid in response to an applied field.
665+, for a fluid lens.
886, for a fluid filter.

229 With glare or flicker elimination:
This subclass is indented under subclass 227. Subject matter comprising structure for equalizing light intensity reaching the eye or for reducing glare or flicker.

SEE OR SEARCH THIS CLASS, SUBCLASS:
601+, for generic glare reduction.

230 Electro-mechanical:
This subclass is indented under subclass 227. Subject matter wherein electrical energy is used to control the movement of the light controlling element.

(1) Note. This includes solenoid and tuning fork structures and electrostatic type effects.

SEE OR SEARCH THIS CLASS, SUBCLASS:
228, for electro-mechanically controlled light control systems using a liquid.

231 String or ribbon type:
This subclass is indented under subclass 230. Subject matter wherein electric current is applied across a resilient, electrically conducting opaque element which as a result of its location in the field of an electromagnet vibrates, thus interrupting a light path or a portion thereof in accordance with variations in the current or in the strength of the field of the electromagnet.

232 Slit type:
This subclass is indented under subclass 227. Subject matter wherein the light controlling structure comprises a pair of jaws having opposed parallel edges which can be moved toward or away from each other and which can be fixed in a variety of intermediate positions between fully open and fully closed.

(1) Note. Typically the location of the center of the slit remains fixed.

233 With relative motion of two apertured elements:
This subclass is indented under subclass 227. Subject matter where the light control results from the relative movement of two opaque elements, each containing openings which allow light to pass.

234 With rotating or pivoting element (e.g., scanning discs):
This subclass is indented under subclass 227. Subject matter comprising means wherein the light control results from revolving, completely or partially, an opaque element or an element containing opaque and transparent portions.

(1) Note. Included here are generic optical shutters or diaphragms, per se, which have rotating vanes or blades.

SEE OR SEARCH THIS CLASS, SUBCLASS:
229, for similar subject matter used in reducing glare.
233, for two relative moving apertured elements which may rotate.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 201.1+ for scanning elements of this type used in photo-cell controlled optical systems and subclass 232 for the combination of a light chopper and photocell.

235 Continuously rotating apertured element:
This subclass is indented under subclass 234. Subject matter wherein the light controlling element revolves nonstop during the operation of the device.

(1) Note. Apertures as used here encompass slots removed around the periphery of an otherwise opaque element.

SEE OR SEARCH THIS CLASS, SUBCLASS:
233, for relative motion of two apertured elements where one may be continuously rotating.

236 Element rotates about axis perpendicular to light path:
This subclass is indented under subclass 234. Subject matter wherein the light controlling element is revolved about an axis substantially at right angles to the direction of the light rays.

237 OPTICAL MODULATOR:

This subclass is indented under the class definition. Subject matter wherein an optical element varies a characteristic of a traversing optical light beam in direct proportion to an applied time-varying signal which may be in any energy form.

(1) Note. Characteristics of a traversing light beam that may be varied include its direction or characteristics such as amplitude, frequency, phase, or polarization.

SEE OR SEARCH THIS CLASS, SUBCLASS:

109+, for optical communication systems or devices which may include an optical modulator.

325, for an optical demodulator, per se.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 200+ for photocell circuit and subclasses 503.1+ for an invisible radiation source with a radiation modifying member, generally.

332, Modulators, appropriate subclasses for modulators of an electrical wave.

348, Television, subclasses 195+ for mechanical-optical scanning.

352, Optics: Motion Pictures, subclass 84 for high speed cameras which use rotating optical elements and subclasses 105+ for motion picture optical rectifiers using roatating or scanning optical elements.

372, Coherent Light Generators, appropriate subclasses for lasers including internal light control apparatus.

385, Optical Waveguides, subclasses 1+ and 4+ for light wave modulation within an optical waveguide.

396, Photography, particularly subclasses 452+ and 505+ for shutters and diaphragms used in cameras and see (2) Note in subclass 227 above.

238 Light wave temporal modulation (e.g., frequency, amplitude, etc.):

This subclass is indented under subclass 237. Subject matter wherein a device varies a property of light which is a function of time only as it traverses the device where such variation is in accordance with the applied varying signal which can be of any energy form.

(1) Note. Such properties of the traversing light include amplitude, frequency, or phase.

(2) Note. Optical modulation occuring exclusively within a waveguide is classified in Class 385.

SEE OR SEARCH THIS CLASS, SUBCLASS:

298+, for directional modulation.

SEE OR SEARCH CLASS:

385, Optical Waveguides, subclasses 1+ for light temporal modulation inside of a waveguide.

239 Modulator output feedback to modulator:

This subclass is indented under subclass 238. Subject matter wherein the light beam output from the modulator is fed back into the modulator input.

240 Changing bulk optical parameter:

This subclass is indented under subclass 238. Subject matter comprising structure for controlling a light parameter by changing a bulk optical parameter of an optically transmitting medium.

(1) Note. “Bulk optical parameter” refers to those inherent internal characteristics of an optical element which can be defined by mathematical expressions describing their effect on light radiation (e.g., index of refraction, transmissivity, etc.) and which can be changed without producing a significant change in the shape, size, or contours of the optical element itself.

(2) Note. Included here are devices in which an optical parameter of the light control element is changed as a result of an applied electrical or magnetic field, an applied acoustic wave, a change in chemical structure, or by any other mechanism which primarily alters the bulk optical parameters rather than the physical shape, size, or contours of an optical medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

577+, for light control by light interference.

738+, for light controlling structure combined with a lens.

SEE OR SEARCH CLASS:

345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 48+ and 84+ for selective electrical control of displays having light-controlling display elements.

372, Coherent Light Generators, appropriate subclasses for lasers including light control means.

241 By actinic radiation (e.g., photochromic):
This subclass is indented under subclass 240. Subject matter wherein an optical parameter of the light control element is changed by or in response to either the light to be controlled or a separate external source of optical radiation.

242 Display device:
This subclass is indented under subclass 241. Subject matter wherein the temporal modulation is in an information conveying element.

SEE OR SEARCH CLASS:

345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 1.1 through 3.4 for visual display systems with selective electrical control.

243 Bistable device:
This subclass is indented under subclass 241. Subject matter wherein an optical device has two distinct, stable output states which toggle between one another by a single application of actinic radiation.

244 Opto-optical device:
This subclass is indented under subclass 241. Subject matter wherein the temporal modulation is achieved by an externally applied modulating light wave.

245 Electro-optic:
This subclass is indented under subclass 240. Subject matter wherein the optical properties (e.g., index of refraction) of an optical element are changed in response to an applied electrical signal.

246 Modulation of polarized light via modulating input signal:
This subclass is indented under subclass 245. Subject matter wherein a property of a polarized optical beam, such as amplitude, phase, polarization, frequency, or color are varied in a controlled manner by the applied electrical signal.

247 Using reflective or cavity structure:
This subclass is indented under subclass 246. Subject matter wherein the modulation is effected by structure which redirects the entire beam or a part of the beam at an angle equal to that of incidence, or wherein the medium through which the beam passes is confined in a cavity.

SEE OR SEARCH THIS CLASS, SUBCLASS:

302, for reflecting structures used in beam deflection.

248 Semiconductor:
This subclass is indented under subclass 247. Subject matter wherein barrier layer (i.e., semiconducting) material is used in the modulating structure, generally, as a variable reflector.

249 Compensation technique:
This subclass is indented under subclass 246. Subject matter wherein unwanted effects due to the action of the medium or the field on the beam such as those due to temperature, birefringences, or color are eliminated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

250, for plural mediums in the beam path where the plural mediums are not for the purpose of compensation.

250 Using plural mediums:
This subclass is indented under subclass 246. Subject matter wherein more than one medium or structure, each of which modulates the beam, are provided.

(1) Note. The mediums or structures in the beam path, layered mediums transverse to the beam path or parallel paths, each

containing a medium where the output beam is the result of the combined action of the medium or structure. Not all of the mediums need to be field responsive.

(2) Note. Initial polarizers and final analyzers are not considered part of the plural mediums where the only affect is to select a polarization. Plural areas formed by a matrix of electrodes whose sole function is to act on a portion of the beam are not considered plural mediums. Nonbirefringent lenses are also not considered a medium in the sense of the definition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

249, for plural mediums where the purpose of the mediums is compensation.

301+, for plural mediums used to deflect the beam or a portion of the beam.

489.01, through 489.15, for polarization achieved by plural birefringent elements.

251 With particular direction of the field in relation to the medium, beam direction or polarization:

This subclass is indented under subclass 246. Subject matter wherein details of the medium are given, especially crystal cut or orientation, and the direction of the applied field is specified in relation to the medium or in relation to the incident beam direction or polarization.

SEE OR SEARCH THIS CLASS, SUBCLASS:

252, for a particular medium where no field directional particulars, in relation to the medium, are specified.

252 With particular medium or state of the medium:

This subclass is indented under subclass 246. Subject matter wherein the details of the medium structure, state of the medium, shape of the medium, or treatment of the medium are recited.

(1) Note. For classification herein, there should be more than just the recitation of the name or abbreviation of the name of the material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

251, where details of the medium are combined with a particular field direction.

485.01, through 489.15, for a particular medium used for reflectively or refractively polarizing light.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, for preparation or treatment of nonmetallic elements involving only physical treatments.

252, Compositions, for compositions, per se.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, for melt shaping or treatment of nonmetallic materials.

423, Chemistry of Inorganic Compounds, for nonmetallic elements and for processes for producing nonmetallic elements involving a chemical reaction.

253 Liquid medium:

This subclass is indented under subclass 252. Subject matter wherein the medium is in a nongaseous fluid state.

SEE OR SEARCH THIS CLASS, SUBCLASS:

36+, for similar structures using liquid crystals for the medium.

254 With particular electrode structure or arrangement, or medium mounting structure or arrangement:

This subclass is indented under subclass 246. Subject matter wherein the physical structure, geometry or arrangement of the electrodes is detailed or there is detailed mounting structure for the medium (e.g., to prevent physical distortion).

(1) Note. Included here are structures which perform auxiliary functions such as protection or index matching.

SEE OR SEARCH THIS CLASS, SUBCLASS:

251, for the arrangement of the electrodes as related to the medium for a particu-

lar direction of the field in combination with details of the medium.

253, for those structures used with a liquid medium where the structure is peculiar to the medium.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclasses 365+ for electrode arrangements with respect to a piezoelectric element.

255 With particular field:

This subclass is indented under subclass 246. Subject matter wherein the field which modulates the medium is of a specific magnitude, phase, or frequency or is of a specific type (e.g., pulse).

SEE OR SEARCH THIS CLASS, SUBCLASS:

251, for a field direction or polarization specified in relation to the medium (e.g., crystal cut).

484.01, through 484.1, for polarization by an applied magnetic field.

256 With birefringent element:

This subclass is indented under subclass 246. Subject matter including an element having the property of dividing a ray or beam of energy into two polarized rays or beams (known as the ordinary and extraordinary rays), the directions of polarization being at right angles to each other.

(1) Note. A birefringent material which has been treated with a dichroic dye to absorb the ordinary or extraordinary ray is no longer considered to be birefringent within the meaning of this definition. A birefringent element in the form of a Nicol prism, where the unwanted ray is deflected, is classified here.

257 Pockel's cell:

This subclass is indented under subclass 246. Subject matter wherein the variation of a polarized light characteristic is achieved by an element which advances or retards the phase of an induced ordinary wave relative to the extraordinary wave when the electrical signal is applied.

258 Kerr cell:

Subject matter under 246 wherein the variation of a polarized light characteristic is achieved by an element including a material (usually liquid) whose refractive index change is proportional to the square of the field of the applied electrical signal.

259 Plural modulation cells:

This subclass is indented under subclass 245. Subject matter wherein the temporal light modulator utilizes multiple elemental units each of which is electro-optically controlled.

260 Etalon structure:

This subclass is indented under subclass 245. Subject matter wherein the modulating structure consists of two parallel dielectric mirrors separated by an active electro-optic material.

261 Multiple reflections within cell:

This subclass is indented under subclass 245. Subject matter wherein the electro-optic temporal modulator includes plural internal redirections of the light passing therethrough.

262 Excitation by electron beam:

This subclass is indented under subclass 245. Subject matter wherein a collimated ray of electrons applied to the modulator is used to vary a temporal characteristic of the light passing therethrough.

263 By reflection:

This subclass is indented under subclass 245. Subject matter wherein the electro-optic temporal modulator includes a single internal redirection of the light passing therethrough.

264 Pulse Modulation:

This subclass is indented under subclass 245. Subject matter wherein a parameter of a train of optical pulses is varied in accordance with the amplitude of the applied signal.

(1) Note. Pulse modulation may involve changes in pulse amplitude (pam), pulse position (ppm), or pulse duration (pdm).

(2) Note. Pulse modulation includes pulse-code modulation wherein the light beam is transmitted as a digital binary code.

(3) Note. This subclass will include a combination of pulse modulation with amplitude, frequency, or phase modulation.

265 Electrochromic:
This subclass is indented under subclass 245. Subject matter wherein the electrical signal applied to the optical control element produces a color change in the element resulting in a change in the absorption characteristics of the element at a given wavelength of light.

SEE OR SEARCH CLASS:
345, Computer Graphics Processing and Selective Visual Display Systems, subclass 49 and 105 for selective electrical control of displays having electrochromic display elements.
349, Liquid Crystal Cells, Elements and Systems, appropriate subclasses for liquid crystal light modulators.

266 Particular nonplanar electrode arrangement:
This subclass is indented under subclass 265. Subject matter wherein solid electrically conductive elements within the electrochromic device are not located on a single flat surface.

267 Reflection-type (e.g., display device):
This subclass is indented under subclass 265. Subject matter wherein the modulator utilizes a surface upon which light strikes and which is coated with a material that simultaneously changes color with the applied electrical signal and reflects a significant portion of incident light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
275, for transmission-type (e.g., windows).

268 Complementary device:
This subclass is indented under subclass 267. Subject matter wherein an oxidizing material operates in conjunction with a reducing material.

269 Particular counter electrode:
This subclass is indented under subclass 267. Subject matter wherein details are recited of an electrode (the counter-electrode) which actually takes part in the electrochromic reaction.

270 Particular electrolyte layer:
This subclass is indented under subclass 267. Subject matter which recites details of an electrically conductive liquid layer which transports ions between the electrochromic material and the counter electrode.

271 Particular planar electrode pattern:
This subclass is indented under subclass 267. Subject matter including an electrically conductive solid element having a configuration which is uniformly flat.

272 Liquid cell:
This subclass is indented under subclass 267. Subject matter wherein the device comprises a cell containing a substance which is in a state intermediate that of a solid and a gas.

273 Particular electrochromic layer structure:
This subclass is indented under subclass 267. Subject matter which specifies details of the form of the electrochromic substance.

274 Diverse layer:
This subclass is indented under subclass 267. Subject matter including a specified miscellaneous layer within the reflection-type electrochromic device.

(1) Note. This might include, for example, an insulating layer.

275 Transmission-type (e.g., windows):
This subclass is indented under subclass 265. Subject matter wherein the modulator utilizes a surface upon which light strikes which is coated with a material that simultaneously changes color with the applied electrical signal and transmits a significant portion of incident light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
267, for reflection-type (e.g., display device).

276 Amplitude modulation:
This subclass is indented under subclass 245. Subject matter wherein the amplitude of a constant frequency optical wave varies in synchronization with the amplitude of the applied signal (i.e., modulating signal).

SEE OR SEARCH THIS CLASS, SUBCLASS:

284, for magneto-optic amplitude modulation.

286, for acousto-optic amplitude modulation.

289, for thermal-optic amplitude modulation.

SEE OR SEARCH CLASS:

345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 48+ and 84+ for selective electrical control of displays having light-controlling display elements.

277 Within display element:

This subclass is indented under subclass 276. Subject matter wherein the amplitude modulator is in an information conveying element.

SEE OR SEARCH CLASS:

345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 1.1 through 3.4 for visual display systems with selective electrical control.

278 Frequency modulation:

This subclass is indented under subclass 245. Subject matter wherein the frequency of a constant amplitude optical wave (i.e., carrier wave) varies in synchronization with the amplitude of the applied signal (i.e., modulating signal).

SEE OR SEARCH THIS CLASS, SUBCLASS:

287, for acousto-optic frequency modulation.

279 Phase modulation:

This subclass is indented under subclass 245. Subject matter wherein the normal zero phase of a constant amplitude optical wave (i.e., carrier wave) is shifted by an angle proportional to the amplitude of the applied signal (i.e., modulating signal).

(1) Note. A sinusoidal signal of zero phase will have a zero amplitude at the intersection of the x-y axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

278, for electro-optic frequency modulation.

287, for acousto-optic frequency modulation.

280 Magneto-optic:

This subclass is indented under subclass 240. Subject matter wherein a bulk optical parameter of an optical element is controlled by a magnetic signal applied to the element.

281 Modulation of polarized light via modulating input signal:

This subclass is indented under subclass 280. Subject matter wherein a property of a polarized optical beam, such as amplitude, phase, polarization, frequency, or color are varied in a controlled manner by the applied varying magnetic signal.

282 Using layered structure or plural mediums:

This subclass is indented under subclass 281. Subject matter wherein the structure through which the beam passes or is acted upon consists of more than one contiguous film or layer which forms a composite structure which modulates the beam or wherein there are plural mediums or structures in the beam path, each of which modulates the beam.

(1) Note. The composite structure can be dielectric or reflective films or layers for the purposes such as compensation, increased Kerr rotation or index (e.g., impedance) matching.

SEE OR SEARCH THIS CLASS, SUBCLASS:

250, for plural mediums where at least one medium is electric field responsive.

254, and 489.2, for layered structures where the purpose of the layers is for such things as protection or index matching.

485.03, for layered structure or plural mediums formed for polarization without modulation.

487.01, through 487.06, for layered structures formed with at least one layer of dichroic material where additional layers may be provided for purposes such as

protection or particular bonding and for layered structures formed for interference effects.

489.15, through 489.19, for plural mediums including a birefringent medium which is not field responsive.

283 With particular direction of the field in relation to the medium, beam direction or polarization:

This subclass is indented under subclass 281. Subject matter wherein details of the medium are given, especially crystal cut or orientation, and the direction of the applied field is specified in relation to the medium or in relation to the incident beam direction or polarization.

SEE OR SEARCH THIS CLASS, SUBCLASS:

281, for magnetic modulating structures using a particular medium, state of the medium, particular electrode structure or arrangement, medium mounting structure or arrangement or with a particular field.

284 Amplitude modulation:

This subclass is indented under subclass 280. Subject matter wherein the amplitude of a constant frequency optical wave varies in synchronization with the amplitude of the applied signal (i.e., modulating signal).

SEE OR SEARCH THIS CLASS, SUBCLASS:

276, for electro-optic amplitude modulation.

286, for acousto-optic amplitude modulation.

289, for thermal-optic amplitude modulation.

285 Acousto-optic:

This subclass is indented under subclass 240. Subject matter wherein an ultrasonic wave generated at the surface or within the confines of the light control element sets up conditions in the element which produce a change in the optical parameters (e.g., refractive index) directly controlling the light.

286 Amplitude modulation:

This subclass is indented under subclass 285. Subject matter wherein the amplitude of a constant frequency optical wave varies in synchronization with the amplitude of the applied signal (i.e., modulating signal).

SEE OR SEARCH THIS CLASS, SUBCLASS:

276+, for electro-optic amplitude modulation.

284, for magneto-optic amplitude modulation.

289, for thermal-optic amplitude modulation.

287 Frequency modulation:

This subclass is indented under subclass 285. Subject matter wherein the frequency of a constant amplitude optical wave (i.e., carrier wave) varies in synchronization with the amplitude of the applied signal (i.e., modulating signal).

SEE OR SEARCH THIS CLASS, SUBCLASS:

278, for electro-optic frequency modulation.

288 Thermo-optic:

This subclass is indented under subclass 240. Subject matter wherein optical properties (e.g., index of refraction) of an optical element are changed by or in response to applied heat.

289 Amplitude modulation:

This subclass is indented under subclass 288. Subject matter wherein the amplitude of a constant frequency optical wave varies in synchronization with the amplitude of the applied signal (i.e., modulating signal).

SEE OR SEARCH THIS CLASS, SUBCLASS:

276+, for electro-optic amplitude modulation.

284, for magneto-optic amplitude modulation.

286, for acousto-optic amplitude modulation.

290 By changing physical characteristics (e.g., shape, size or contours) of an optical element:
This subclass is indented under subclass 238. Subject matter wherein the light property is controlled by a substantial alteration in the optical characteristics of a light control surface or interface or by changing the physical shape, position, or orientation of a light control surface or interface in response to the modulating signal.

(1) Note. Any change in or to the light control surface or interface occur wholly within the region of the light path in which control is effected. The control surface or interface is neither totally nor partially inserted into nor removed from the light path.

291 Shape or contour of light control surface altered:
This subclass is indented under subclass 290. Subject matter wherein the light property is controlled by means of a light control surface which is temporarily altered or modified in some way so as to produce distortions in the surface contours which differ significantly from the normal or unmodified surface contours.

292 Light control surface forms image on projected light beam:
This subclass is indented under subclass 291. Subject matter wherein the contours of a light control surface are modified in accordance with a control signal so as to impart image or picture information to the contour of the control surface which is then transferred to a light beam projected on or through the control surface.

293 Electron beam causes surface alteration:
This subclass is indented under subclass 292. Subject matter wherein the light control surface is changed by a ray of electrons.

294 Using photoconductive layer:
This subclass is indented under subclass 291. Subject matter which utilizes a layer whose electrical conductivity varies as a function of light incident thereon.

295 Having multiple electrodes:
This subclass is indented under subclass 291. Subject matter which includes a plurality of solid electrically conducting elements.

296 Changing position or orientation of suspended particles:
This subclass is indented under subclass 290. Subject matter wherein the light control surface consists of a group of elongated light absorbing or reflecting particles suspended in a fluid media, which collectively change their orientation within the light path in response to an applied signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
228, for fluid light control elements.

297 Light control surface formed or destroyed:
This subclass is indented under subclass 290. Subject matter wherein a light property is controlled by creating or destroying a light absorbing or reflecting surface or interface in response to a modulating signal.

298 Light wave directional modulation (e.g., deflection or scanning is representative of the modulating signal):
This subclass is indented under subclass 237. Subject matter wherein the relative spatial orientation of a light wave exiting a device is changed in accordance with a varying signal of any energy form (i.e., modulating signal) applied to the device.

(1) Note. Optical directional modulation occuring exclusively inside of a waveguide is classified in Class 385.

SEE OR SEARCH THIS CLASS, SUBCLASS:
238+, for light wave temporal modulation outside of a waveguide.

SEE OR SEARCH CLASS:
385, Optical Waveguides, subclasses 4+ for optical directional modulation within an optical waveguide.

299 Opto-optical device:
This subclass is indented under subclass 298. Subject matter wherein the directional modulation is achieved by an externally applied modulating light wave.

300 Phase conjugate:
This subclass is indented under subclass 298. Subject matter including the return of a light beam through the media at precisely the same angles, distances, and intensities as prior to a reflection.

301 Acting on polarized light:
This subclass is indented under subclass 298. Subject matter wherein the direction of a polarized light beam is varied in accordance with a varying input signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
489.08, through 489.13, for birefringent element beam deflection or splitting for polarization without modulation or external input.

302 Using reflecting or cavity structure:
This subclass is indented under subclass 301. Subject matter wherein the deflection is effected by structures which redirect the entire beam or a part of the beam at an angle equal to that of incidence or where the medium through which the beam passes is confined in a cavity.

SEE OR SEARCH THIS CLASS, SUBCLASS:
247, for reflecting structures used in beam temporal modulation.

303 Using more than one polarization (e.g., digital):
This subclass is indented under subclass 301. Subject matter wherein at least two distinct beams, corresponding to two different polarizations, are obtained.

(1) Note. The systems use a polarization modulation element to switch the polarization of the incoming beam followed by a birefringent polarization discriminator whereby two distinct beams are obtained corresponding to the ordinary and extraordinary rays.

SEE OR SEARCH THIS CLASS, SUBCLASS:
302, for reflecting structures where different polarizations are used.

304 Using single polarization:
This subclass is indented under subclass 301. Subject matter wherein the beam is given an initial polarization and then deflected or where only one polarization is allowed to be deflected by blocking or removing any other polarization component.

305 Acousto-optic:
This subclass is indented under subclass 298. Subject matter wherein directional modulation is achieved by applying a modulating sound wave to a device through which a light beam is traversing.

306 Correlation or convolution:
This subclass is indented under subclass 305. Subject matter wherein the correlation or convolution integral of two optical waves is formed by an acousto-optical directional modulator.

307 Utilizing optical feedback:
This subclass is indented under subclass 305. Subject matter wherein an acousto-optic modulator has a portion of the optical output therefrom returned to the input therefor.

308 Filter:
This subclass is indented under subclass 305. Subject matter wherein one frequency band present in an incident light beam is suppressed by an acousto-optic deflection technique.

309 Acting on polychromatic light:
This subclass is indented under subclass 305. Subject matter wherein directional modulation of a light wave which is a composite of many frequencies is achieved.

310 Plural cell array:
This subclass is indented under subclass 305. Subject matter wherein directional modulation is achieved by multiple acousto-optic devices.

311 Plural transducers on single cell:
This subclass is indented under subclass 305. Subject matter wherein the directional modulator consists of a single element having multiple input devices each capable of imposing a separate sound wave on the modulator.

312 Single transducer generating composite plural frequency acoustic wave:
This subclass is indented under subclass 305. Subject matter wherein a composite sound wave of diverse frequencies is generated and applied to the acousto-optic modulator.

313 Particular cell shape:
This subclass is indented under subclass 305. Subject matter wherein detailed structure of the overall configuration of the directional modulator is recited.

314 Particular cell orientation:
This subclass is indented under subclass 305. Subject matter wherein a specific location of the modulator relative to an incident light beam is recited.

315 Electro-optic:
This subclass is indented under subclass 298. Subject matter wherein directional modulation is achieved by applying a varying electrical signal to an element through which a light beam is traversing.

316 Plural modulation cells:
This subclass is indented under subclass 315. Subject matter wherein the directional light modulator utilizes multiple elemental units each of which is electro-optically controlled.

317 Multiple reflections within cell:
This subclass is indented under subclass 315. Subject matter wherein the electro-optic directional modulator includes plural internal redirections of the light passing therethrough.

318 By reflection:
This subclass is indented under subclass 315. Subject matter wherein the electro-optic directional modulator includes a single internal redirection of the light passing therethrough.

319 Focusing:
This subclass is indented under subclass 315. Subject matter wherein light beam focusing is achieved by the application of the electrical signal to a device through which the beam transits.

320 Switching:
This subclass is indented under subclass 315. Subject matter wherein a discrete change in the path of a light beam is achieved by the application of the electrical signal to a device through which the beam transits

321 Having particular chemical composition or structure:
This subclass is indented under subclass 237. Subject matter wherein chemical details of an optical modulator are recited.

322 Electro-optic crystal material:
This subclass is indented under subclass 321. Subject matter wherein the material of the modulator is particularly responsive to an applied electrical signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
245, electro-optic light wave temporal modulation for changing bulk optical parameter.

323 PLZT material:
This subclass is indented under subclass 322. Subject matter wherein the material is a transparent lead-lanthanum zir- conate titanate ceramic with optical qualities that can be controlled by applying voltages to thin plates of the material.

324 Magneto-optic crystal material:
This subclass is indented under subclass 321. Subject matter wherein the material of the modulator is particularly responsive to an applied magnetic signal.

325 OPTICAL DEMODULATOR:
This subclass is indented under the class definition. Subject matter wherein an original modulating wave is recovered from a previously modulated light wave.

(1) Note. These devices may include a photodetector as long as a modulating wave is isolated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
189+, for optical communication receivers which include an optical demodulator.
237+, for an optical modulator, per se.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 200+ for photocell circuits and systems which convert light wave energy into electricity.
329, Demodulators, for electrical demodulators in general.

326 OPTICAL FREQUENCY CONVERTER:
This subclass is indented under the class definition. Subject matter wherein a nonlinear device alters the frequency of an applied traversing optical electromagnetic wave.

(1) Note. The frequencies here are quasi-optical (i.e., infrared through ultraviolet).

(2) Note. Such optical frequency devices include second harmonic generators and other types of frequency conversion devices such as downshifters, oscillators, mixers, etc.

(3) Note. A detailed optical frequency converter, per se, or such subject matter in combination with additional waveguide structure is classified in this class (359). However, the nominal recitation of any type of optical frequency converter together with additional waveguide structure is classified in Class 385, where such combination meets the class requirements.

SEE OR SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 424 for a nonoptical parametric frequency converter.
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 113+ for miscellaneous frequency control.

327 Raman type:
This subclass is indented under subclass 326. Subject matter wherein the nonlinear optical device involves radiation-active materials in which many lines of frequency-shifted radiation can be obtained in response to incident radiation.

(1) Note. Raman radiation is a radiation produced in response to incident radiation by a change in the rotational or vibrational energy of scattering molecules. The resultant optical radiation is often referred to as Stokes or antiStokes radiation dependent upon its frequency relative to that of the incident light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
334, for a Raman optical amplifier.

328 Harmonic generator:
This subclass is indented under subclass 326. Subject matter wherein a nonlinear optical device generates a wave having a frequency which is an integral multiple of a fundamental input wave frequency.

(1) Note. A wave with twice the frequency of the fundamental is called the second harmonic.

SEE OR SEARCH THIS CLASS, SUBCLASS:
240, for light wave temporal modulation via a nonlinear device.
255, for electro-optic polarization modulation by a nonlinear device.

SEE OR SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 424 for a nonoptical parametric frequency converter.
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 113+ for miscellaneous frequency control such as electrical wave harmonic generation.

385, Optical Waveguides, subclass 122 for optical fiber waveguide with cladding having significant nonlinear property.

329 Third harmonic:
This subclass is indented under subclass 328. Subject matter wherein the generated optical wave has a frequency that is three times that of the fundamental input optical wave.

330 Parametric oscillator:
This subclass is indented under subclass 326. Subject matter wherein the frequency conversion of electromagnetic radiation, in the near and the visible spectrum, is based on the nonlinear dependence of polarizability on wave amplitude.

(1) Note. A parametric oscillation is an oscillation in which substantial power is applied at a frequency called the pump frequency. Signal and idler waves, the sum of whose frequencies equals the pump frequency, are generated in an interaction resulting from some nonlinear effect in the optical crystal.

331 Optical laser acoustic delay line type:
This subclass is indented under subclass 326. Subject matter wherein the output from a laser is mode-locked and passed through an acoustic cell in which a radio frequency acoustic wave has been generated; the laser beam is diffracted, and one of the frequency shifted diffracted modes is heterodyned at a detector with an unshifted mode to produce a time delayed radio frequency output signal lower in frequency than the input signal.

332 Dielectric optical waveguide type:
This subclass is indented under subclass 326. Subject matter wherein the depletion layer of a semiconductor whose dielectric material exhibits nonlinear susceptibility is used as an optical waveguide to achieve frequency translation.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclass 177 for an electrical thermometer having a ferroelectric sensor.
385, Optical Waveguides, subclasses 129+ for a planar optical waveguide.

333 OPTICAL AMPLIFIER:
This subclass is indented under the class definition. Subject matter wherein the amplifying device produces an output light beam which is only changed to increase the magnitude of a light beam applied as input.

(1) Note. This amplification can be produced by applying electrical energy to the device to first cause excitation to a higher energy level via certain molecular, atomic, or nuclear particles of a substance and later causing the high energy state to be relaxed to a lower state to produce the emission of the particles.

(2) Note. This amplifcation is the optical or quasi-optical wavelength range, which is generally in the range from ultra-violet (100 Angstroms) to far infrared (10 million Angstroms) of the optical spectrum. See (1) Note of subclass 350 for specific IR and UV wavelength units.

(3) Note. This subclass necessitates light input into a medium prior to amplification. Production of a light beam output without an input light beam is classified in Class 372.

(4) Note. This subclass includes details of an optical amplifier wherein amplification is produced within the optical fiber by the interaction of externally applied energy and a unique property of the fiber (e.g., lazing material). The mere nominal recitation of an optical amplifier in combination with an optical waveguide structure is classified in Class 385.

(5) Note. Infrared to Ultraviolet light emitting junction is classified in Class 357, subclass 17, unless a cavity is set forth for Class 372 or amplification is set forth for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
109+, for optical communication.
237+, for optical modulators external to an optical fiber.
326+, for optical frequency translators.

341.1, for details of an optical amplifier wherein amplification is produced within the fiber optics, wherein the optical fiber has some unique property (i.e., lasing material), to produce the amplification when external energy is applied.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 121.6+ for metal heating by arc using a laser.

250, Radiant Energy, subclasses 200+ for photocells, circuits and apparatus, and subclasses 552+ for solid state light emitting source which is detected by a photocell.

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclasses 80 through 85 for incoherent light emitting devices combined with, or also constituting a light responsive device.

313, Electric Lamp and Discharge Devices, subclass 371 for a cathode-ray tube with optics and subclass 372 for a cathode-ray tube with light conducting fiber or rod.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclass 53 for the combination with an infrared device, and subclass 54 for the combination with a laser.

348, Television, subclass 217 and 300 for camera with image intensifier or amplifier, subclass 707 for television amplifier circuit and subclass 777 for cathode-ray tube image source with intensifier.

351, Optics: Eye Examinating, Vision Testing, and Correcting, subclass 213 including light filter or absorber, subclass 214 including diaphragm or slit, and subclass 215 including light polarizing.

356, Optics: Measuring and Testing, subclasses 300+ for dispersed light spectroscopy.

362, Illumination, subclass 32 for light fibers, rods or pipes, subclass 259 for laser type light source (or support therefor) and modifier, and subclasses 317+ for light modifier.

365, Static Information Storage and Retrieval, subclass 108 for liquid crystal memory and subclasses 120+ for information masking using polarization, Bragg cells, diffraction, holograms electron beams, etc.

369, Dynamic Information Storage or Retrieval, subclasses 110.01 through 110.04 where the information is stored or retrieved from the medium by polarized radiant energy; subclass 116 where the infor is stored or retrieved from the medium by light intensity adjustment or maintenance; and subclass 117 where the information is stored or retrieved from the medium by a movable shutter or light gate.

372, Coherent Light Generators, for lasers and optical oscillators wherein a light output beam is generated without the application of a light input beam.

376, Induced Nuclear Reactions: Processes, Systems, and Elements, subclass 103 for photon beam (e.g., laser) irradiation nuclear fusion, subclass 104 for optics nuclear fusion, and subclass 105 for particle beam irradiation (excluding photons) nuclear fusion.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 102 for bistable electro - optical devices.

385, Optical Waveguides, subclasses 1+ for temporal optical modulation produced within the fiber, and subclasses 4+ for directional modulation produced within the fiber. Class 385 contains patents claiming optical modulation within the fiber but optical amplification (333+) or frequency translation (326+) within the fiber are specifically excluded from Class 385, unless the amplifier or frequency translator are only nominally set forth.

427, Coating Processes, subclasses 163.1+ for processes of coating an optical polarizer, windshield, fiber, waveguide, rod, projection screen, or retroreflector.

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclass 363 for laser or radiation color imaging exposure

other than visible light and subclass 945 for laser beam cross-reference art collection.

334 Raman or Brillouin process:
This subclass is indented under subclass 333. Subject matter wherein the scattered light beam output from a medium, resulting from either the Raman or Brillouin effects, is amplified relative to the input to the medium.

(1) Note. The Raman effect claimed specifically for the optical amplification properties is classified in this subclass, whereas the Raman effect claimed for the frequency translation by itself or together with optical amplification is classified in subclass 327.

(2) Note. Stimulated Raman effect is the amplification exhibiting the characteristic of stimulated emission of the small portion of light that is scattered in random directions when a monochromatic light beam of high intensity is transmitted through matter. The characteristic of the small portion of light is related to the frequencies of the matter.

(3) Note. The Raman effect results in the reradiation of light from a bombarded molecule, having a longer wavelength than the original bombaring beam of coherent light. Part of the energy of the coherent beam is distributed throughout the molecule whereas the remaining energy is reradiated. This effect may be described as being feeble, instantaneous, independent of absorption, independent of the wavelength of the exciting radiation; and it results in the re-emission of light generally having a wavelength longer than the existing one. Although there is a difference in wavelengths or frequency between the wavelengths of each reemitted spectral line, or Raman line, and the wavelength of the incident or exciting radiation; the intensity of Raman increases as the fourth power of the incident frequency except in the neighborhood of an absorption band, where the scattering intensity increases still more markedly.

(4) Note. Brillouin scattering is the nonlinear optical phenomenon of the spontaneous scattering of light in a medium by its interaction with sound waves passing through the medium

SEE OR SEARCH THIS CLASS, SUBCLASS:
327, for Raman type frequency translators.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclass 3 for Raman lasers without a light input beam.

335 Free electron:
This subclass is indented under subclass 333. Subject matter wherein a beam of “free” and unbound electrons of an atom or molecule are passed through an undulator (i.e., “wiggler”), which creates a magnetic field of alternating polarity, to cause the electrons to move along a helical path (i.e., “wiggle”) for the release of a high power light radiation (i.e., amplification of the light input beam).

(1) Note. The use of a free-electron laser for light amplificatoin belongs in this subclass.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclass 2 for free electron lasers and subclass 74 for electron beam pumping without a light input beam.

336 Bistable:
This subclass is indented under subclass 333. Subject matter wherein a two level output is produced (i.e., an amplified output or no output at all) dependent upon the specific characteristic (e.g., amplitude or frequency) of the input light beam that the amplifier is designed to amplify.

(1) Note. The specific type of amplifier (i.e., material type, cavity structure, resonant cavity length, leachable material, etc.) determines which input signal characteristic will produce an amplified output. All other inputs will result in a zero output.

SEE OR SEARCH CLASS:
377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 102 using bistable electro-optical devices.

337 Correction of deleterious effects:
This subclass is indented under subclass 333. Subject matter wherein an amplifier is corrected to overcome actions that prohibit its proper operation.

(1) Note. In order to overcome laser overheating, extraneous gasses that prohibit population inversion, laser medium losing energy that would deplete energy, an excess of power density, etc., the correction is applied to the optical amplifier itself.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclass 33 for particular operating compensation.

337.1 Spectral gain flattening or equalization:
This subclass is indented under subclass 337. Subject matter wherein the correction includes attenuating the signal by nonsaturable absorption of at least part of the amplification uniform over a range of the electromagnetic spectrum.

(1) Note: Also referred to as gain tilt correction and gain flattening.

337.11 Feedback:
This subclass is indented under subclass 337.1. Subject matter including a path that returns some output back to the input of a circuit, wherein systems using this path, optical or electrical, to effect increased spectral uniformity, reduce or increase gain, etc.

(1) Note. Controlling the frequency in a direction for canceling an exciting voltage would be an example of a feedback circuit.

337.12 Using number of signals:
This subclass is indented under subclass 337.11. Subject matter wherein at least two paths of a spectral frequency band is used in the feedback system to control amplifier gain.

337.13 Adjusting input signal power:
This subclass is indented under subclass 337.11. Subject matter wherein the feedback circuit, for the optical energies associated with amplified stimulated emission light, compares a first and second wavelength, then regulates the attenuation so that the optical energies are substantially equal.

337.2 Filtering (e.g., noise):
This subclass is indented under subclass 337. Subject matter wherein the frequency band of the amplifier is restricted to the frequency band of the pulses being transmitted.

337.21 Grating:
This subclass is indented under subclass 337.2. Subject matter wherein the filter has a spatial intensity pattern or photorefractive lattice.

337.22 Interferometer or interference:
This subclass is indented under subclass 337.2. Subject matter wherein the filters contain a directional coupler characterized by a particular thickness and number of layers having high and low refractive indices.

337.3 Additional dopant or host composition:
This subclass is indented under subclass 337. Subject matter wherein the amplifier impurity or chemical element (or compound) improves characteristics in other wavelengths.

337.4 Complementary, adjusting stages:
This subclass is indented under subclass 337. Subject matter wherein successive elements or components within the amplifier system correct for adverse effects caused by earlier elements or components.

337.5 Dispersion compensation:
This subclass is indented under subclass 333. Subject matter wherein the amplifier corrects for spectral splitting.

338 Using phase conjugation:
This subclass is indented under subclass 337. Subject matter wherein the light beam returns through the medium at precisely the same angles, distances, and intensities it was directed prior to the reflection.

(1) Note. The medium causes the light to return to its origin after reflection in precisely the same identical path it took to reach the reflector.

(2) Note. See the January 1986 Scientific American article on this subject matter.

(3) Note. This is often used to clear up poor images.

SEE OR SEARCH THIS CLASS, SUBCLASS:

300, for phase conjugate light wave directional modulation (e.g., deflection or scanning).

339 Using saturable or spatial filter:

This subclass is indented under subclass 337. Subject matter wherein the correction is accomplished by allowing light transmission through the filter of an input light beam only after a particular amount of energy is either applied (saturable filter) or a specific portion of the light beam is passed (spatial filter).

(1) Note. A saturable filber is opaque to a light beam input until one of the atoms of its material is excited to a second energy level as a result of striking photons. Upon reaching this second energy level, the filter becomes "saturated" and thus transparent to the input beam due to the equalization between the original and second energy levels causing no net absorption of additional photons as they strike the filter.

(2) Note. A spatial filter generally consists of either (a) an emulsion mask having a clean annular region in an otherwise opaque region or (b) a pinhole, placed at a focal plane in a laser expander; to remove unwanted radiation generally referred to as amplified spontaneous emission.

SEE OR SEARCH CLASS:

372, Coherent Light Generators, subclass 11 for absorption filter Q-Switch and subclass 14 for mechanical spatial filter Q-Switch.

340 Mode locked:

This subclass is indented under subclass 333. Subject matter wherein the energy content of each state (i.e., mode) of an oscillating system (e.g., laser) is internally modulated in a particular field pattern and is one of the possible resonant frequencies of the system to selectively give rise to energy bursts of high peak power and short duration which can be in the picosecond domain.

(1) Note. This laser, referred to as a mode-locked laser could also be in a continuous wave mode or a pulsed mode.

SEE OR SEARCH CLASS:

372, Coherent Light Generators, subclass 18 for mode locking particular beam control without a light input beam.

341.1 Optical fiber:

This subclass is indented under subclass 333. Subject matter wherein amplification is produced within a glass or plastic filament by the interaction of externally applied energy and a unique property of the filament (e.g., lasing material).

(1) Note. The details of an optical amplifier within an optical waveguide or combination with additional external waveguide structure are classified in this subclass.

(2) Note. Optical waveguides or fibers having the amplification performed within the waveguide of the fiber are classified in this subclass.

(3) Note. This class excludes patents claiming nominal recitation of an amplifier or a frequency translator combined with optical modulation within the fiber.

SEE OR SEARCH THIS CLASS, SUBCLASS:

332, for optical waveguides which produce frequency translation.

SEE OR SEARCH CLASS:

385, Optical Waveguides, subclasses 1 through 3 for temporal modulation performed within the optical waveguides and subclasses 4-10 for

directional modulation performed within the optical waveguide.

341.2 Bi-directional:
This subclass is indented under subclass 341.1. Subject matter in which the amplifier allows two-way signal transmission.

341.3 Pumping:
This subclass is indented under subclass 341.1. Subject matter including an energy elevating device.

341.31 Operating frequency:
This subclass is indented under subclass 341.31. Subject matter including the managing of a useful range of the pump cycles per unit time.

341.32 Radiation routing:
This subclass is indented under subclass 341.3. Subject matter including directing the path of photons.

341.33 With multiple systems:
This subclass is indented under subclass 341.3. Subject matter including at least two energy elevating devices.

341.4 Feedback:
This subclass is indented under subclass 341.1. Subject matter including a path that returns some output back to the input of a circuit, wherein systems using this path, optical or electrical, to effect increased spectral uniformity, reduce or increase gain, etc.

341.41 Automatic Gain Control (AGC):
This subclass is indented under subclass 341.4. Subject matter wherein the feedback provides an adjustment based on a quantitative statement (e.g., wavelength) of the amplification.

341.42 Automatic Level Control (ALC):
This subclass is indented under subclass 341.4. Subject matter wherein the feedback provides an adjustment based on a relative intensity or brightness strength.

341.43 Surge protection:
This subclass is indented under subclass 341.4. Subject matter wherein a sudden rise in power or signal strength is prevented.

341.44 Fault detection:
This subclass is indented under subclass 341.4. Subject matter wherein a discrepancy is sensed.

341.5 Composition (e.g., Tm, Tb, Eu, Ho, Dy, Nd):
This subclass is indented under subclass 341.1. Subject matter and includes the physical or chemical makeup of the amplifier.

342 Particular active medium (e.g., crystal, plasma, fluid, etc.):
This subclass is indented under subclass 333. Subject matter wherein a specified type of active medium, which uniquely causes the amplification of the light input, is used to change the number of atoms or atomic system in a set of energy levels as a result of the absorption of light incident on the material of the medium.

(1) Note. The examples of crystal, plasma, and fluid define the physical state of the active medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
343, for a glass (amorphous) medium.
344, for a semiconductor medium.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclasses 39+ for a particular active medium which is not used for amplification of a light beam input.

343 Glass (amorphous):
This subclass is indented under subclass 342. Subject matter wherein the solid active medium does not have a definite crystalline structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
342, for crystal, plasma, fluid, etc., active medium.
344, for a semiconductor medium.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclass 40 for an amorphous (e.g., glass) active medium which is not used to amplify a light beam input.

344 Semiconductor:
This subclass is indented under subclass 342. Subject matter wherein the active medium is a solid or liquid having a resistivity midway between that of an insulator and a metal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
342, for crystal, plasma, fluid, etc., active medium.
343, for a glass (amorphous) medium.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclasses 43.01+ for a semiconductor active medium which is not used for amplification of a light beam input.

345 Particular pumping type (e.g., electrical, optical, nuclear, magnetic, etc.):
This subclass is indented under subclass 333. Subject matter wherein a specified type of pumping is used to change the number of atoms or atomic system in a set of energy levels as a result of the absorption of light incident on the material.

(1) Note. This pumping causes the atoms of a medium to be raised from certain lower to certain higher energy levels, and it may cause a population inversion between certain intermediate levels in order to ultimately produce photons when the energy level moves from higher to lower.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclasses 69+ for particular pumping type which is not used for amplification of a light beam input.

346 Particular resonator cavity (e.g., scanning, confocal or folded mirrors, etc.):
This subclass is indented under subclass 333. Subject matter wherein the optical beam goes back and forth within an optical cavity without any standing waves, similar to an oscillating cavity, but resulting in the amplification of the light input beam.

(1) Note. This can be a mode-selecting high gain optical structure in which the laser action takes place by the build-up of electromagnetic field intensity upon multiple reflections.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclasses 92+ for laser particular resonant cavities which are not used for amplification of a light beam input.

347 Multiple pass:
This subclass is indented under subclass 333. Subject matter wherein the laser material does not have to be continually pumped since the laser stays in a lasing state for multiple traverses of light throughout the lasing medium to produce amplified light beams that last longer than the period for the pumping itself.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclass 350 for ring lasers with interfering different frequency beams.
372, Coherent Light Generators, subclass 94 for ring configuration folded resonant cavity.

348 Regenerative:
This subclass is indented under subclass 347. Subject matter wherein the lasing medium is pumped more than once to amplify a single input pulse.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclasses 69+ for particular pumping.

349 Beam combination or separation:
This subclass is indented under subclass 333. Subject matter wherein a light beam is either combined with another light beam or many light beams are created from a single light beam in order to produce the desired amplification.

350 HAVING SIGNIFICANT INFRARED OR ULTRAVIOLET PROPERTY:
This subclass is indented under the class definition. Subject matter including structure which is specifically adapted, as by structure or composition, to function as an optical element in the infrared (IR) or ultraviolet (UV) portion of the spectrum, or wherein an optical element is constructed or composed to extend its opera-

tion into the infrared or ultraviolet from the visible portion of the spectrum.

(1) Note. IR (0.7 micrometers to 1000 micrometers wavelength) according to Van Nostrand's Encyclopedia, 7th Edition

Meters: 7×10^{-7} m to .001 m
Centimeters: 7×10^{-5} cm to .1 cm
Millimeters: 7×10^{-4} mm to 1 mm
Micrometers: .7 micrometers to 1000 micrometers
Nanometers: 700 nm to 10^{6} nm
Angstroms: 7000 A to 10^{7} A

UV (100 Angstroms to 4000 Angstroms wavelength) according to Van Nostrand's Encyclopedia, 7th Edition

Meters: 10^{-8} m to 4×10^{-7} m
Centimeters: 10^{-6} cm to 4×10^{-5} cm
Millimeters: 10^{-5} mm to 4×10^{-4} mm
Micrometers: .01 micrometers to .4 micrometers
Nanometers: 10 nm to 400 nm
Angstroms: 100 A to 4000 A
Metric Conversion Units:
Centimeters = 10^{-2} meters
Millimeters = 10^{-3} meters
Micrometers = 10^{-6} meters
Nanometers = 10^{-9} meters
Angstroms = 10^{-10} meters

(2) Note. Holographic systems and modulators of Class 359 and fibers or waveguides of Class 385 that operate in the IR or UV portion of the spectrum are excluded from this and the indented subclasses.

(3) Note. This subclass and those indented thereunder are limited to elements which operate as optical elements in the infrared and ultraviolet portion of the spectrum but a detector to convert IR/UV energy to visible light is classified in Class 250.

(4) Note. "Heat Filters" are considered infrared filters.

SEE OR SEARCH THIS CLASS, SUBCLASS:

358, for IR or UV fluid filter or fluid mirror.
634, for wavelength selective beam splitting or combining surface (e.g., dichroic mirror).
859, for concave and convex mirrors in series for successive reflections in mirrors.
885+, for absorption filters.

SEE OR SEARCH CLASS:

89, Ordnance, subclass 41.06 for light reception traning mechanism.
165, Heat Exchange, subclasses 279+ for temperature or pressure automatic control (Thermal-IR).
219, Electric Heating, subclass 203 for combined vehicle or vehicle component windshield or window heating device.
250, Radiant Energy, subclass 216 for optical or pre-optical photocell system, subclass 226 for color filter or spectroscope optical or pre-photocell system, subclasses 330+ for infrared-to-visible imaging, subclass 333 image tube type imaging wherein the output screen is used to visualize an intensified image or the IR image is converted to electrical signals to control the display device, subclass 336.1 for IR energy responsive electric signalling, subclasses 338.1+ for infrared responsive invisible radiant energy responsive electric signalling, subclass 351 for periodic scanning of an IR beam, subclass 365 for UV light source, subclass 372 for UV light responsive means, subclass 493.1 for radiant energy generation and sources, subclass 504 for ultraviolet or infrared source radiation modifying member, and subclasses 505.1+ for radiation controlling elements exclusive of infrared, visible and ultraviolet optical elements.
252, Compositions, subclass 587 for infrared light transmission modifying com-

positions, and subclasses 588+ for ultraviolet transmission modifying compositions.

283, Printed Matter, subclass 88 for IR filter with electromagnetic radiation having revealable concealed information, fraud preventer or detector, use preventer or detector, or identifier, subclass 89 for UV filter with electromagnetic radiation having revealable concealed information, fraud preventer or detector, use preventer or detector, or identifier, and subclass 90 for polarized IR filter with electromagnetic radiation having revealable concealed information, fraud preventer or detector, use preventer or detector, or identifier.

313, Electric Lamp and Discharge Devices, subclass 112 for polarizer or special ray transmission with optical device or special ray transmission envelope.

348, Television, subclasses 164+ for IR television.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 44+ for antiglare or shading spectacles and eyeglasses, and subclasses 159.6 for through 159.65 light filtering opthalmic lens or blanks.

352, Optics: Motion Pictures, subclass 202 for projection light sources with cooling means.

353, Optics: Image Projectors, subclass 55 for an image projector having a heat filter.

356, Optics: Measuring and Testing, subclass 51 for IR and UV.

374, Thermal Measuring and Testing, subclass 124 for thermally emitted radiation with scanning or temperature distribution display.

424, Drug, Bio-Affecting and Body Treating Compositions, subclasses 59+ for a sun or radiation screening or suntanning composition intended for topical application to a living body.

427, Coating Processes, subclass 160 for a coating with X-ray, Ultrasonic, or Infrared properties, subclasses 162+ for coating processes, per se, wherein the product is an optical element.

607, Surgery: Light, Thermal, and Electrical Application, subclass 1 for light, thermal, and electrically applied surgery.

351 Having folded optical path:

This subclass is indented under subclass 350. Subject matter including an element which modifies the path of incident light so as to cause the light to repeatedly traverse the same or overlapping volumes of space.

(1) Note. The system generally includes plural reflectors to sequentially reverse the direction of the optical axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

489.08, through 489.13, for birefringent element beam deflection or splitting for polarization without modulation or external input.

352 Having polarizing element:

This subclass is indented under subclass 350. Subject matter having an element which restricts the direction of vibration of radiant energy.

(1) Note. The restriction may have a time variation.

(2) Note. The polarized radiant energy may be visible light accompanying the infrared or ultraviolet radiation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

359, for an IR/UV multilayer filter or multilayer reflector.

360, for an IR/UV multilayer filter or multilayer reflector having a metal layer.

372+, for plural optical axis microscope.

419+, for plural optical axis telescope.

483, for a visible light polarizer absent any infrared or ultraviolet characteristic.

486, for light polarization without modulation or external energy by grid or dipoles.

487, for polarization without modulation by reflection or refraction.

490+, for polarization without modulation by dichroic medium, which transmits light of one color and reflects light of

the complementary color with little light absorbed.

494+, for polarization without modulation by a birefringent element, which divides a ray or beam of energy into two polarized rays or beams separated by 90 degrees (known as ordinary and extraordinary).

SEE OR SEARCH CLASS:

283, Printed Matter, subclass 88 for IR filter with electromagnetic radiation having revealable concealed information, fraud preventer or detector, use preventer or detector, or identifier.

313, Electric Lamp and Discharge Devices, subclass 112 for polarizer or special ray transmission (e.g., filter) with an electric discharge device.

353 Including alternative optical path or optical element (e.g., day-night, hi-low magnification):

This subclass is indented under subclass 350. Subject matter which has an element allowing a variable radiation path or which alternatively places an optical element into or out of a fixed optical path, thereby producing plural distinct radiation processing configurations.

(1) Note. One or more configurations may be limited to visible light.

SEE OR SEARCH THIS CLASS, SUBCLASS:

421, for telescope compound lens selectable magnification.

672+, for lens with selective magnification by exchanging or adding lens components.

708, for aspherical lens.

744, for afocal Galilean telescope lens.

354 Including continuously variable magnification or focal length (zoom lens, adjustable lens):

This subclass is indented under subclass 350. Subject matter wherein the focal point or image magnification of an imaging device or element is continuously or intermittantly changed as desired.

(1) Note. This includes various selected positions of different optical elements to fit the user selected application.

(2) Note. This incudes IR/UV variable elements adjacent to or part of the zoom lens.

(3) Note. This also includes FLIR (Forward Looking Infrared systems).

SEE OR SEARCH THIS CLASS, SUBCLASS:

421, for telescope selectable magnification in a compound lens for the visible portion of the spectrum.

422, for telescope variable magnification in a compound lens for the visible portion of the spectrum.

676+, for zoom lens in the visible portion of the spectrum.

744, for an afocal lens (e.g., Galilean Telescope).

355 Lens, lens system or component:

This subclass is indented under subclass 350. Subject matter including a refractive imaging element or a serially arranged group thereof having a significant property in the infrared or ultraviolet area of the electromagnetic spectrum.

(1) Note. Compound lens systems are a plurality of lenses or lens groups arranged in series coaxially along an optical axis, such lenses or lens groups being so spaced along the axis that the second focal plane of the entrant lens of the series lies at or near the first focal plane of the next succeeding lens or lens group of the series whereby the light entrant lens is capable of producing from light rays passing therethrough from an object external to the plurality of lenses an image of that object, which image is viewed or relayed by the said succeeding lens or lens group.

(2) Note. Lens systems designate either a single transparent mass of refractive material having opposed refracting surfaces or a plurality of such masses arranged in series along an optical axis

with their opposed refracting surfaces disposed transversely of such axis, the said opposed surfaces being so shaped and spaced that the mass or plurality of masses are capable of producing from light rays passing therethrough from an object external to the mass or masses a single image of that object, which image is also external to the mass or masses of material.

(3) Note. The term "component" as applied to a lens designates either a single transparent mass of refractive material having two opposed refracting surfaces or a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full over-all contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations, the two refracting surfaces of the single mass and the two axially extreme refracting surfaces of the plurality of masses having at least a portion thereof axially air spaced from all other adjacent refracting surfaces that may be present in the lens. The axial dimension of the air spacing between either the opposed surfaces of the single mass or the axially extreme surfaces of the grouped plurality of masses and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

356, for an infrared lens.
357, for an infrared lens having four or more components.
642+, for lenses in the visible portion of the spectrum.
722+, for lenses which are selective in the visible spectrum by transmitting or blocking certain wavelengths.

SEE OR SEARCH CLASS:

427, Coating Processes, subclass 160 for a coating having X-ray, ultraviolet, or infrared properties.

356 Infrared lens:

This subclass is indented under subclass 355. Subject matter having significant properties in the infrared area of the electromagnetic spectrum.

357 Having four or more components:

This subclass is indented under subclass 356. Subject matter which includes four or more components which have significant properties in the infrared area of the electromagnetic spectrum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

754+, for multiple component lenses, in general.

358 Fluid filter or fluid mirror:

This subclass is indented under subclass 350. Subject matter including filters or mirrors having a liquid or gas which is specially adapted as by composition to transmit or absorb infrared or ultraviolet radiation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

665+, for fluid lenses.
832, for fluid filled prisms.
845, for fluid cooled mirrors.
886, for fluid absorption filters which operate in the visible portion of the spectrum.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 226 for color filter or spectroscope optical or pre-photocell system.
252, Compositions, subclasses 582+ for light transmission modifying compositions and subclass 588 for those compositions used for ultraviolet light transmission modifying.

359 Multilayer filter or multilayer reflector:

This subclass is indented under subclass 350. Subject matter having a substrate and one or more superimposed coatings or laminae and which as a whole is designed to have significant absorbent or redirective properties in the infrared or ultraviolet portion of the spectrum.

(1) Note. Interference filters wherein the multiple reflected beams of various different frequencies will automatically interfere with one another upon reflection are classified in this subclass if significant IR/UV is specified.

(2) Note. Multi-layer absorption would not be interference since waves are not produced which interfere with one another.

(3) Note. Multi-layer absorbing elements are classified in this subclass if significant IR/UV is specified.

(4) Note. Semiconductor elements are classified in this subclass since they are not considered metals for subclass 360.

SEE OR SEARCH THIS CLASS, SUBCLASS:
580, for light interference produced by coating or lamina.
581, for transmissive coating on interference lens.
589, for selective wavelength interference.
590, for selective wavelength interference with another filter.
839, for mirrors with a transmissive property.
884, for mirrors with a selective absorption or transparent overcoating.
885+, for absorptive filters.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 192.26+ for optical or photoactive specified deposition material glow discharge sputter deposited coating.

360 Having metal layer:
This subclass is indented under subclass 359. Subject matter wherein at least one coating or lamina or the substrate is composed of a metal.

(1) Note. Semiconductor elements are not considered as metal and are included under subclass 359.

(2) Note. Only an elemental metal layer is classified in this subclass. Metal alloys or compositions in a multilayer structure are classified in subclass 359.

SEE OR SEARCH THIS CLASS, SUBCLASS:
722+, for lenses with selective wavelength transmitting or blocking.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclass 226 for color filter or spectroscope optical or pre-photocell system.
351, Optics: Eye Examining, Vision Testing and Correcting, subclass 44 for sunglasses with antiglare or shading.
607, Surgery: Light, Thermal, and Electrical Application, subclass 95 for solar cabinets.

361 Having ultraviolet absorbing or shielding property:
This subclass is indented under subclass 350. Subject matter wherein light in the ultraviolet portion of the spectrum is blocked or otherwise filtered.

SEE OR SEARCH THIS CLASS, SUBCLASS:
359+, for a multilayer ultraviolet filter.

362 COMPOUND LENS SYSTEM:
This subclass is indented under the class definition. Subject matter including a plurality of image formers arranged for forming a series of real images along the optical axis, at least one of the real images being formed between two of the image formers.

(1) Note. The terminal image former may be an “eyepiece” designed to form a real image only in combination with the human eye.

SEE OR SEARCH THIS CLASS, SUBCLASS:
642+, for lenses suitable for use in compound lens systems of this subclass type.

SEE OR SEARCH CLASS:
42, Firearms, subclass 119 for compound lens systems.

356, Optics: Measuring and Testing, subclasses 245+ for optical test instruments containing compound lens systems.

363 With image recorder:
This subclass is indented under subclass 362. Subject matter including a device to record an image of the object being directly viewed, the compound lens system being primarily designed for direct viewing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
372+, for a microscope with plural optical axes, one axis of which may be directed to an image recorder.
403+, for a periscope with plural optical axes, one axis of which may be directed to an image recorder.
419+, for a telescope with plural optical axes, one axis of which may be directed to an image recorder.

SEE OR SEARCH CLASS:
396, Photography, subclass 432 for significant camera structure combined with a diverse compound lens system.

364 With curved reflective imaging element:
This subclass is indented under subclass 362. Subject matter including a curved reflector which contributes to the formation of at least one of the real images.

SEE OR SEARCH THIS CLASS, SUBCLASS:
727+, for lenses that employ both refraction and reflection in forming an image (catadioptric lenses).

SEE OR SEARCH CLASS:
362, Illumination, subclasses 296.01 through 296.1 for reflectors in illumination systems.

365 Two or more in a series:
This subclass is indented under subclass 364. Subject matter including a plurality of curved reflectors contributing to the formation of one or more of the real images.

SEE OR SEARCH THIS CLASS, SUBCLASS:
858+, for image forming reflectors having plural curved surfaces in series.

366 Concave, convex combination:
This subclass is indented under subclass 365. Subject matter wherein the plurality of curved reflectors include at least one concave and at least one convex reflector.

367 Right angle inspector:
This subclass is indented under subclass 362. Subject matter including a compound lens system with an objective deflector to provide viewing at a right angle to the main optical axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
434+, for a relay system which may be used in a compound lens system of the structure classified in this subclass (367).

368 Microscope:
This subclass is indented under subclass 362. Subject matter wherein the objective of the compound lens system is designed to focus highly divergent light from an object very close to the objective.

(1) Note. Also illuminators, stages, slide carriers, and transparent slides designed specifically for use with that type of compound lens system are classified in subclasses indented under this subclass (368).

369 With viewed screen:
This subclass is indented under subclass 368. Subject matter including structure for displaying a real image on a viewed screen.

(1) Note. The screen may be at an intermediate or terminal image plane and may, for example, comprise a ground glass screen, a front projection screen, a fiber optic output face, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
400, for a telescope with a viewed screen.

443+, for a viewing screen.
505, for an extended spacing structure for optical elements including a screen.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 370.08+ for invisible radiant energy responsive signalling, including imaging.
313, Electric Lamp and Discharge Devices, subclasses 364+ for cathode-ray tubes and subclasses 523+ for image intensifier tubes, etc.
315, Electric Lamp and Discharge Devices: Systems, subclasses 1+ for cathode-ray tube circuits, including image intensifiers.
353, Optics: Image Projectors, subclasses 18, 47, 67, 72+, 74+, and 79+ for an image projection and viewing screen in combination.

370 Interference:
This subclass is indented under subclass 368. Subject matter wherein light from the object is combined with light of different phase or diffraction characteristics either from the object or bypassing the object.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1+, for interference microscopes having holographic features or for making holograms.

371 Using polarized light:
This subclass is indented under subclass 370. Subject matter wherein light with a particular polarization characteristic is present.

SEE OR SEARCH THIS CLASS, SUBCLASS:
386, for illuminators for microscopes other than interference microscopes using polarized light.
483.01, through 494.01, for optics, systems, and elements for polarization of light or using polarized light.

372 With plural optical axes:
This subclass is indented under subclass 368. Subject matter wherein light from an object may follow any of a plurality of substantially different optical axes through the microscope.

(1) Note. The different optical axes may be partly colinear and may be used either simultaneously or alternately.

SEE OR SEARCH THIS CLASS, SUBCLASS:
363, for a compound lens system with an image recorder.
403+, for a periscope with plural optical axes.
419+, for a telescope with plural optical axes.

373 Side-by-side fields:
This subclass is indented under subclass 372. Subject matter wherein at least two of the separate paths provide different images which are adjacent in a common field of view.

374 Plural oculars:
This subclass is indented under subclass 372. Subject matter wherein at least two of the separate paths terminate in separate eyepieces.

375 Binocular:
This subclass is indented under subclass 374. Subject matter wherein at least two of the plural oculars are separated at approximately the interocular distance to provide simultaneous viewing by both eyes of one observer.

SEE OR SEARCH THIS CLASS, SUBCLASS:
404, for a binocular periscope.
407, for a binocular telescope.
480+, for a binocular viewing device in general.

376 Stereoscopic:
This subclass is indented under subclass 375. Subject matter wherein at least two of the binocular eyepieces provide stereoscopic viewing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
462+, for steroscopic viewing systems.

377 With single or parallel objectives:
This subclass is indented under subclass 376. Subject matter including one objective for two stereoscopic views or two objectives with parallel optical axes for two stereoscopic views.

378 For viewing stereo pairs:
This subclass is indented under subclass 377. Subject matter wherein separate objective channels view different object fields, each field being filled by a separate parallax object view for viewing.

(1) Note. The devices of this subclass provide for two separate fields. The stereoscopic property is related to the objects being viewed taken from two slightly different directions of a three-dimensional object. The views usually comprise a pair of transparencies, each transparency being a separate object view.

SEE OR SEARCH THIS CLASS, SUBCLASS:
466+, for stereo-viewing devices.

379 Spacing of optical elements axially adjustable:
This subclass is indented under subclass 368. Subject matter including means for varying the axial separation of the optical elements, for example, for focusing or varying magnification.

(1) Note. Other subclasses in this class indented under subclass 399, Telescope, and titled "Separation of optical elements axially adjustable" or including the word "focusing" may include subject matter related to subject matter in this subclass (379).

SEE OR SEARCH THIS CLASS, SUBCLASS:
506, for an adjustable extended spacing structure for optical elements.

380 Variable magnification:
This subclass is indented under subclass 379. Subject matter wherein varying the axial separation varies the size of an in focus terminal image while the object distance remains constant.

(1) Note. Other subclasses in this class indented under subclass 407, Binocular, and titled "Spacing of optical elements axially adjustable" may include subject matter related to variable magnification.

SEE OR SEARCH THIS CLASS, SUBCLASS:
422, for a telescope with variable magnification.
432, for variable magnification in nonmagnifying compound lens systems.
506, for adjustable extended spacing structure for optical elements.
676+, for a lens having its equivalent focal length variable continuously between limits.

381 Imaging elements movable in and out of optical axis:
This subclass is indented under subclass 368. Subject matter wherein an imaging element is selectively positionable in or out of the optical axis to change the image distance or image size.

SEE OR SEARCH THIS CLASS, SUBCLASS:
421, for a telescope with selective magnification.

382 Entire microscope adjustable along optical axis:
This subclass is indented under subclass 368. Subject matter wherein the microscope translates along the optical axis to vary the distance to an object plane.

SEE OR SEARCH THIS CLASS, SUBCLASS:
392, for devices wherein the stage or slide carrier translates along the optical axis.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 25+ for a mechanism converting rotary motion to or from reciprocating or oscillatory motion.

383 Focus adjustment:
This subclass is indented under subclass 382. Subject matter wherein the adjustment along the optical axis effects the focus of the compound optical system.

SEE OR SEARCH THIS CLASS, SUBCLASS:
410, for binocular telesopes with adjustable focus.
425+, for telescopes with focusing.

384 With rotatable adjustment:
This subclass is indented under subclass 368. Subject matter including means for swinging the microscope about an axis.

385 Illuminator:
This subclass is indented under subclass 368. Subject matter including (a) structure for illuminating an object being viewed in combination with a microscope or (b) object illuminating structure designed specifically for use with a microscope.

SEE OR SEARCH THIS CLASS, SUBCLASS:
798+, for lenses with viewed object or viewed field illumination.

SEE OR SEARCH CLASS:
362, Illumination, subclasses 257+ and 317+ for an illuminator with a modifier or a light modifier.

386 Using polarized light:
This subclass is indented under subclass 385. Subject matter wherein the illuminating structure provides polarized light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
371, for an interference microscope using polarized light.
483.01, through 494.01, for systems and elements for the polarization of light without modulation.

SEE OR SEARCH CLASS:
362, Illumination, subclass 19 for an illuminator with a polarizer.

387 With annular lighting structure:
This subclass is indented under subclass 385. Subject matter including means for providing an annulus of light surrounding a dark central portion for illuminating the object.

388 With optical switching means:
This subclass is indented under subclass 385. Subject matter including means for changing optical elements in the illuminating beam path to change the type of illumination.

(1) Note. The optical elements may be movable in and out of the illuminating beam path or the illuminating beam may be deflected to pass through different optical elements.

389 With illuminating and viewing paths coaxial at the image field:
This subclass is indented under subclass 385. Subject matter wherein the illuminating light is transmitted through a space occupied by the image field.

(1) Note. A partially transmitting beam splitter is commonly used in devices in this subclass (389).

SEE OR SEARCH THIS CLASS, SUBCLASS:
799, for a lens with a coaxial illuminating beam.

390 With illuminator support:
This subclass is indented under subclass 385. Subject matter including (a) means for maintaining the illuminator in a fixed position or (b) means for limiting the movement of the illuminator.

SEE OR SEARCH CLASS:
362, Illumination, subclasses 382+ for an illuminator with a support.

391 Stage or slide carrier:
This subclass is indented under subclass 368. Subject matter including (a) structure for supporting an object to be viewed or tools to be placed in the field of view in combination with a microscope or (b) structure for supporting an object or tools designed specifically for use with a microscope.

SEE OR SEARCH THIS CLASS, SUBCLASS:
801, and 804+, for lenses with a viewed object support.

SEE OR SEARCH CLASS:
248, Supports, for supports generally.

392 Adjustable along optical axis:
This subclass is indented under subclass 391. Subject matter wherein the stage or slide carrier translates along the optical axis to vary its distance from the microscope.

SEE OR SEARCH THIS CLASS, SUBCLASS:
382+, for devices wherein the microscope translates along the optical axis.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 25+ for a mechanism converting rotary motion to or from reciprocating or oscillatory motion.
108, Horizontally Supported Planar Surfaces, subclasses 144.11+ for a vertically adjustable platform.

393 With plural transverse movements:
This subclass is indented under subclass 391. Subject matter wherein the stage or slide carrier is movable in a plurality of directions perpendicular to the optical axis of the microscope.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclass 471 for X-Y control devices.
108, Horizontally Supported Planar Surfaces, subclasses 137+ for a horizontally adjustable platform.

394 With turntable:
This subclass is indented under subclass 391. Subject matter wherein the stage or slide carrier is rotatable about the optical axis or an axis parallel to the optical axis of the microscope.

395 With temperature control:
This subclass is indented under subclass 391. Subject matter including means to vary or keep constant the temperature at the location of the stage or slide carrier.

SEE OR SEARCH THIS CLASS, SUBCLASS:
396, for devices including a transparent slide which may include temperature control means.

396 Transparent slide:
This subclass is indented under subclass 368. Subject matter including (a) a transparent mass, usually a glass plate, for supporting an object to be viewed in combination with a microscope or (b) a transparent mass, usually a glass plate, designed specifically for supporting an object to be viewed by a microscope.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclasses 244+ for sample or specimen holders.

397 Reference lines or grids:
This subclass is indented under subclass 396. Subject matter including indicia on the transparent slide.

398 Specimen cavity or chamber:
This subclass is indented under subclass 396. Subject matter including a container for holding, isolating, or limiting the flow of an object.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclass 246 for fluid sample containers.

399 Telescope:
This subclass is indented under subclass 362. Subject matter wherein the compound lens system is designed for viewing distant objects.

400 With viewed screen:
This subclass is indented under subclass 399. Subject matter including a semi-transparent or opaque structure for displaying one of the series of real images.

(1) Note. The screen may be at an interminate or terminal image plane and may, for example, comprise a ground glass screen, a front projection screen, a fiber optic output face, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

369, for a microscope with a viewed screen.

443+, for a viewing screen.

505, for an extended spacing structure for optical elements including a screen.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 213 for circuits having image intensifier or non-visible to visible imaging vacuum tubes.

313, Electric Lamp and Discharge Devices, subclass 524 for a telescope (or any optical system) combined with an image intensifier.

353, Optics: Image Projectors, subclasses 18, 47, 67, 72+, 74+, and 79+ for an image projector and viewing screen in combination.

401 With image anti-rotation:

This subclass is indented under subclass 399. Subject matter wherein the telescope maintains an erect terminal image as at least part of the telescope is turned to rotate an intermediate image.

SEE OR SEARCH THIS CLASS, SUBCLASS:

554+, for an image stabilization system including image anti-rotation.

402 Periscope:

This subclass is indented under subclass 399. Subject matter wherein the entrance optical axis and the exit optical axis of the telescope are parallel and offset and perpendicular to the main axis of the telescope.

SEE OR SEARCH THIS CLASS, SUBCLASS:

401, for a periscope with image anti-rotation.

403 With plural optical axes:

This subclass is indented under subclass 402. Subject matter wherein light from an object may follow any of a plurality of substantially different optical axes through the periscope.

(1) Note. The different optical axes may be partly colinear and may be used either simultaneously or alternately.

SEE OR SEARCH THIS CLASS, SUBCLASS:

372+, for a microscope with plural optical axes.

419+, for a telescope with plural optical axes.

404 Binocular:

This subclass is indented under subclass 403. Subject matter wherein at least two of the substantially different axes provide separate views to separate eyepieces for binocular viewing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

375+, for a binocular microscope.

407+, for a binocular telescope.

480+, for a binocular viewing device in general that does not use a compound lens system.

405 With mechanical adjustment:

This subclass is indented under subclass 402. Subject matter wherein all or a portion of the periscope relative to another structure is moved.

SEE OR SEARCH THIS CLASS, SUBCLASS:

429+, for a telescope with line of sight adjustment.

406 Extensible structure:

This subclass is indented under subclass 405. Subject matter wherein the extension or elevation of the periscope is changed, usually by the use of telescoping structures.

407 Binocular:

This subclass is indented under subclass 399. Subject matter wherein at least two exit optical axes are spaced at approximately the interocular distance to provide simultaneous viewing by both eyes of one observer.

(1) Note. This is the type of device used by fans at a ball game to see distant players.

SEE OR SEARCH THIS CLASS, SUBCLASS:

375+, for a binocular microscope.
404, for a binocular periscope.
480+, for a binocular viewing device in general that does not use a compound lens system.

408 Foldable or collapsible:

This subclass is indented under subclass 407. Subject matter wherein the binocular telescope is hinged or provided with telescoping or bellows sections to provide a more compact unit when not in use or prior to assembly.

SEE OR SEARCH THIS CLASS, SUBCLASS:

474, for a collapsible stereoscope.
817, for a lens with a foldable or collapsible support.

409 Body supported or with handle:

This subclass is indented under subclass 407. Subject matter wherein the binocular telescopes are combined with (a) an elongated structure for providing a handhold or (b) a structure for engaging a portion of the body or apparel for support.

410 With focusing means:

This subclass is indented under subclass 409. Subject matter wherein the supported binocular telescope includes means for bringing an object at varying distances into focus.

(1) Note. Other subclasses in this class indented under subclass 412 with adjustable interocular distance and titled "Spacing of optical elements axially adjustable" may include subject matter related to focusing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

379+, for a microscope with the spacing of optical elements axially adjustable.
425+, for a telescope with focusing or relatively sliding barrels.
506, for an adjustable extended spacing structure for optical elements.

411 With adjustable interocular distance:

This subclass is indented under subclass 409. Subject matter wherein the supported binocular telescopes are connected by means which vary and maintain lateral spacing of the two binocular optical axes.

412 With adjustable interocular distance:

This subclass is indented under subclass 407. Subject matter wherein the binocular telescopes are connected by means which vary and maintain lateral spacing of the two binocular optical axes.

413 Oculars swing about central axis:

This subclass is indented under subclass 412. Subject matter wherein the lateral spacing is changed by swinging the binocular telescopes about a common axis.

414 Spacing of optical elements axially adjustable:

This subclass is indented under subclass 413. Subject matter wherein the axial separation of optical elements, usually lenses, prisms, or mirrors, may be varied, usually for focusing or varying magnification.

(1) Note. Other subclasses in this class indented under subclass 362, Compound lens system, and titled "Separation of elements axially adjustable", "Variable magnification" or including the word "focusing" may include subject matter related to subject matter in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

506, for an adjustable extended spacing structure for optical elements.

415 Oculars rotate about separate axes:

This subclass is indented under subclass 412. Subject matter wherein the lateral spacing is varied by rotating the binocular telescopes about different axes displaced from their optical axes.

416 Spacing of optical elements axially adjustable:

This subclass is indented under subclass 415. Subject matter wherein the axial separation of optical elements, usually lenses, prisms, or

mirrors, may be varied, usually for focusing or varying magnification.

(1) Note. Other subclasses in this class indented under subclass 362, Compound lens system, and titled "Separation of optical elements axially adjustable", "Variable magnification" or including the word "focusing" may include subject matter related to subject matter in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
506, for an adjustable extended spacing structure for optical elements.

417 Spacing of optical elements axially adjustable:
This subclass is indented under subclass 412. Subject matter wherein the axial separation of optical elements, usually lenses, prisms, or mirrors, may be varied, usually for focusing or varying magnification.

(1) Note. Other subclasses in this class indented under subclass 362, Compound lens system, and titled "Separation of optical elements axially adjustable", "Variable magnification", or including the word "focusing" may include subject matter related to subject matter in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
506, for an adjustable extended spacing structure for optical elements.

418 Spacing of optical elements axially adjustable:
This subclass is indented under subclass 407. Subject matter wherein the axial separation of optical elements, usually lenses, prisms, or mirrors, may be varied, usually for focusing or varying magnification.

(1) Note. Other subclasses in this class indented under subclass 362, Compound lens system, and titled "Separation of optical elements axially adjustable", "Variable magnification" or including the word "focusing" may include subject matter related to subject matter in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
506, for an adjustable extended spacing structure for optical elements.

419 With plural optical axes:
This subclass is indented under subclass 399. Subject matter wherein light from an object may follow any of a plurality of substantially different paths through the telescope.

(1) Note. The different optical axes may be partly colinear and may be used either simultaneously or alternately.

SEE OR SEARCH THIS CLASS, SUBCLASS:
372, for a microscope with plural optical axes.
403, for a periscope with plural optical axes.

420 Plural magnification in same viewing field:
This subclass is indented under subclass 419. Subject matter wherein telescope images of different magnification are simultaneously viewable in a common field of view.

421 Selectable magnification:
This subclass is indented under subclass 399. Subject matter wherein the telescope includes means for step variations of the image size while the object distance remains constant.

SEE OR SEARCH THIS CLASS, SUBCLASS:
381, for a microscope with an imaging element movable in and out of the optical axis.

422 Variable magnification:
This subclass is indented under subclass 399. Subject matter wherein the telescope continuously varies the size of the image while the object distance remains constant.

(1) Note. Other subclasses in this class indented under subclass 407, Binocular, and titled "Separation of optical elements axially adjustable" may include

subject matter related to variable magnification.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 380, for a microscope with variable magnification.
- 432, for a compound lens system with variable magnification.
- 506, for adjustable extended spacing structure for optical elements.
- 676+, for a lens having its equivalent focal length variable continously between limits.

423 With relay:
This subclass is indented under subclass 399. Subject matter wherein the telescope includes at least one lens system which forms a real image of a real image.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 402+, for a periscope including a relay.
- 422, for a variable magnification telescope including a relay.
- 434, for a compound lens system with a relay.

424 With reticle:
This subclass is indented under subclass 423. Subject matter wherein a cross-hair or emblem is present at a real image plane of the telescope.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 422, for a variable magnification telescope including a relay and a reticle.
- 427, for focusing or relatively sliding barrels with a reticle.
- 428, for a telescope with a reticle.
- 505, for an extended spacing structure for optical elements with a reticle.

425 Focusing or relatively sliding barrels:
This subclass is indented under subclass 399. Subject matter wherein the telescope includes (a) a device for forming an in focus image of an object of varying distances or (b) tubes supporting optical elements movable axially into and out of one another.

(1) Note. Other subclasses in this class indented under subclass 362, Compound lens system, and titled "Separation of optical elements axially adjustable" may include subject matter related to subject matter in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 410, for a binocular telescope that is body supported or with a handle and includes focusing means.
- 506, for an adjustable extended spacing structure for optical elements.

426 Internal focusing:
This subclass is indented under subclass 425. Subject matter wherein the entrance and exit lenses remain a fixed distance apart while the telescope is focused.

427 With reticle:
This subclass is indented under subclass 425. Subject matter wherein a cross-hair or emblem is present at a real image plane of the telescope.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 422, for a variable magnification telescope including a relay and a reticle.
- 424, for a telescope with a relay and a reticle.
- 428, for a telescope with a reticle.
- 505, for an extended spacing structure for optical elements with a reticle.

428 With reticle:
This subclass is indented under subclass 399. Subject matter wherein a cross-hair or emblem is present at a real image plane of the telescope.

SEE OR SEARCH THIS CLASS, SUBCLASS:
- 422, for a variable magnification telescope including a relay and a reticle.
- 424, for a telescope with a relay and a reticle.
- 427, for a telescope with focusing or relatively sliding barrels and with a reticle.
- 505, for an extended spacing structure for optical elements with a reticle.

429 With line of sight adjustment:
This subclass is indented under subclass 399. Subject matter wherein the telescope includes adjusting the direction of view and maintaining the adjustment.

SEE OR SEARCH THIS CLASS, SUBCLASS:
401, for a telescope with image anti-rotation.
405, for a periscope with mechanical adjustment.

SEE OR SEARCH CLASS:
248, Supports, subclasses 127+ for stands in general.

430 Equatorial mount:
This subclass is indented under subclass 429. Subject matter wherein the telescope includes structure to establish an axis (polar axis) parallel to the earth's rotational axis about which the telescope viewing axis rotates (right ascension) at a selected angle (declination) between the polar axis and the viewing axis.

431 With prism or U-shaped optical path:
This subclass is indented under subclass 399. Subject matter wherein the telescope includes two right angle deflections in series to reverse the optical path.

SEE OR SEARCH THIS CLASS, SUBCLASS:
413, for adjustable binoculars including a prism or a U-shaped optical path.

432 Variable magnification:
This subclass is indented under subclass 362. Subject matter wherein the compound lens system continuously varies the size of a terminal image while the object distance remains constant.

(1) Note. Other subclasses in this class indented under subclass 407, Binocular, and titled "Spacing of optical elements axially adjustable" may include subject matter related to variable magnification.

SEE OR SEARCH THIS CLASS, SUBCLASS:
380, for variable magnification in microscopes.
422, for variable magnification in telescopes.

433 With tilted lens or tilted image plane:
This subclass is indented under subclass 362. Subject matter wherein the compound lens system includes (a) at least one lens whose optical axis is oblique to the optical axis of the system or (b) is designed to produce at least one image plane tilted with respect to the optical axis of the system.

434 With relay:
This subclass is indented under subclass 362. Subject matter wherein the compound lens system includes at least one lens system that forms a real image of a real image.

SEE OR SEARCH THIS CLASS, SUBCLASS:
423+, for a telescope with a relay.

435 Repetitious lens structure:
This subclass is indented under subclass 434. Subject matter wherein the compound lens system includes (a) a plurality of identical relays in series or side by side or (b) at least one relay comprised of identical elements or elements symmetrically reversed about a center point.

436 SCALE OR INDICIA READING:
This subclass is indented under the class definition. Subject matter including optical structure for facilitating the reading of a scale, with or without a pointer or indicator, having spaced lines or other indicia thereon; or for facilitating reading a vernier type indicator where lines from two different scales are matched.

(1) Note. The scale may be on a weighing instrument, slide rule, compass or speed indicator, etc.; and classification is here unless sufficient scale supporting structure is recited to classify with the particular art such as Class 33, Geometrical Instruments; Class 73, Measuring and Testing; Class 177, Weighing Scales; and Class 235, Registers.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 327+ for signal pointers and indicating arms.

177, Weighing Scales, subclass 234 for self-positioning scales with magnified indication of spring deformation.

356, Optics: Measuring and Testing, subclass 242.1 for thread counters and similar subject matter where a relationship between the counter and the fabric is recited such as a viewing aperture or support for the counter on the fabric or a fabric support, subclasses 247+ for optical reticles and crosshairs and subclasses 373 and 397 for distance measuring devices which have a scale or optical grid displaced relative to a remote fiducial mark.

362, Illumination, subclasses 23.01 through 23.22 for dial illuminators.

437 Polarizer:

This subclass is indented under subclass 436. Subject matter including a polarizing element.

(1) Note. A polarizing element causes incident light polarization as defined in the class definition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

483.01, through 494.01, for specific polarizing elements in polarization without modulation.

438 Prism:

This subclass is indented under subclass 436. Subject matter including a prism which may reflect or refract light for better viewing the scale or indicia.

(1) Note. See subclass 831 for the definition of a prism.

SEE OR SEARCH THIS CLASS, SUBCLASS:

831+, for specific prism elements.

439 Mirror:

This subclass is indented under subclass 436. Subject matter including a mirror to reflect light from the scale or indicia to the viewer.

(1) Note. See subclass 838 for the definition of a mirror.

SEE OR SEARCH THIS CLASS, SUBCLASS:

838+, for mirrors, per se.

440 Lens:

This subclass is indented under subclass 436. Subject matter including a lens.

(1) Note. See subclass 642 for the definition of a lens.

(2) Note. The lens is usually employed to magnify the image of the scale markings or indicia.

SEE OR SEARCH THIS CLASS, SUBCLASS:

806, for optical reading devices including line markers.

809+, for lenses combined with diverse type art devices in general.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 327 for a reflector or magnifier used for sighting in a liquid level or depth gauge.

441 Movable or adjustable:

This subclass is indented under subclass 440. Subject matter including means for adjusting or moving the lens with respect to the scale or indicia as for positioning or focusing the lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:

642+, for lenses, per se.

442 Along scale or indicia:

This subclass is indented under subclass 441. Subject matter including means to guide a lens along the reading direction of a linear scale or indicia.

(1) Note. The lens may be movable along a nonlinear (e.g., circular) scale as well as a linear scale and the structure must be included which constricts or guides the movement of the lens along the scale or indicia.

(2) Note. An actuator, per se, is not classified in this subclass.

443 PROJECTION SCREEN:

This subclass is indented under the class definition. Subject matter including a sheet or other extending surface or area which is especially adapted to render an image of an object which is projected thereon visible to an observer, usually by diffusing the projected light.

(1) Note. This subclass and those indented thereunder in this class (359) include screens where the size, shape, or refractive index of embedded particles is claimed or screens with elements having geometric curves, with relative refractive indices or parts with claimed patterns, with wave plates, acoustical characteristics or other optical criterion. Such criterion must be more than mere "light diffusing particles" or a "light diffusing surface" to classify a patent in Class 359 as opposed to Class 139 or Class 428. See Class 427, appropriate subclasses for methods of making screens by coating.

(2) Note. The screen may be merely tracing paper or a canvas as in indented subclass 447.

SEE OR SEARCH THIS CLASS, SUBCLASS:

350+, for a viewing screen having infrared or ultraviolet characteristics.

900, for miscellaneous methods of making screens not classified in Class 427, Coating Processes, or Class 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, etc.

SEE OR SEARCH CLASS:

139, Textiles: Weaving, subclasses 383+ for light diffusing woven screens.

160, Flexible or Portable Closure, Partition, or Panel, especially subclasses 19+ and 371+ for framed screens without optical details other than merely "translucent" or something similar.

248, Supports, especially subclasses 158+ for screen supports.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 1.1+ for processes directed to forming optical articles capable of producing an optical effect other than mere transparency or planar reflection.

312, Supports: Cabinet Structure, subclasses 21+ for screens supported in a cabinet.

352, Optics: Motion Pictures, subclass 61 for a motion picture projector combined with a screen.

353, Optics: Image Projectors, subclasses 18, 47, 67, 72+, 74+, and 79+ for cabinet which encloses projector and one side of screen or structurally related projector and screen.

427, Coating Processes, subclasses 162+ for coating processes, per se, wherein the product is an optical element.

428, Stock Material or Miscellaneous Articles, especially subclasses 143+ for embedded light diffusing particles or for light diffusing stock material in the form of a single or plural layer web or stock material which may be useful for projection purposes.

444 With sound producer:

This subclass is indented under subclass 443. Subject matter including a loudspeaker or other sound producing means combined with the screen.

SEE OR SEARCH CLASS:

352, Optics: Motion Pictures, subclass 36 for motion picture devices combined with screens and sound producers.

353, Optics: Image Projectors, subclass 18 for an image projector in combination with a sound producer.

381, Electrical Audio Signal Processing Systems and Devices, subclasses 150+ for electrical loudspeakers, per se.

445 Acoustical:

This subclass is indented under subclass 443. Subject matter wherein the screen is especially adapted to transmit or damp sound waves.

SEE OR SEARCH THIS CLASS, SUBCLASS:

444, for acoustical screens combined with means to produce sound.

SEE OR SEARCH CLASS:

181, Acoustics, subclasses 175+ for mufflers and sound filters.

446 Moving during projection:

This subclass is indented under subclass 443. Subject matter including means to rotate or oscillate the screen, usually for the purpose of improving the image seen by viewers or for imparting a three dimensional effect.

SEE OR SEARCH THIS CLASS, SUBCLASS:

520+, for vibrating, oscillating, or rotating signal reflectors.

447 Tracing (e.g., camera lucida, etc.):

This subclass is indented under subclass 443. Subject matter wherein the screen upon which an image is formed is adapted to have an outline of the image traced or sketched thereon.

(1) Note. The instrument, commonly referred to as a camera lucida, usually includes a prism or mirrors and sometimes a lens to cause a virtual image of an object to appear as if projected upon a plane surface so that an outline may be traced.

SEE OR SEARCH THIS CLASS, SUBCLASS:

369, and 400, for a compound lens system combined with a viewing screen.

448, for a lens combined with a viewing screen.

449, for a reflector combined with a viewing screen.

SEE OR SEARCH CLASS:

353, Optics: Image Projectors, subclass 44 and 45 for an image projector having a concentrated source of light to project an image for the purpose of tracing it.

448 With lens (e.g., camera obscura, etc.):

This subclass is indented under subclass 443. Subject matter including a lens combined with the screen, the screen usually being positioned in the second principle focal plane of the lens.

(1) Note. The device, commonly known as a camera obscura, usually has a darkened chamber with a lens at the entrance thereof to permit light from external objects to enter and to form an image of the objects on a screen in the chamber.

(2) Note. The combinations classified here are often constructed to function normally only when the light rays approaching the entrant lens from the object are substantially parallel, under which conditions the image produced by the device is always greatly reduced relative to the size of the object. The lens and screen combinations classified in Class 353, Optics: Image Projectors, differ from those classified here in that they are constructed to operate normally only when the light rays approaching the entrant lens from the object are of the widely diverging type, that is, when the object is near the first principal focal plane of the entrant lens, under which conditions the image produced by the device is enlarged relative to the size of the object, a condition that usually necessitates the use of intense artificial object illumination to provide an adequately illuminated image. Moreover, the lens and screen combinations of Class 353, Optics: Image Projectors, always have their object and screen in the conjugate focal planes of the projection lens employed with the screen spaced more distant from the lens than the object, while the lens and screen combinations of this subclass 448 have their object and screen substantially at infinity and at the principal focal plane of the lens respectively.

SEE OR SEARCH THIS CLASS, SUBCLASS:

369, and 400, for a compound lens system combined with a viewing screen.

SEE OR SEARCH CLASS:

353, Optics: Image Projectors, subclasses 18, 47, 67, 72+, 74+, and 79+ for an image projector having a light source or means to concentrate solar light and including a lens and screen combination. See (2) Note above.

449 With reflector or additional screen:

This subclass is indented under subclass 443. Subject matter including another screen or a reflector which usually is between the first screen and a projector.

SEE OR SEARCH THIS CLASS, SUBCLASS:

447, for camera lucidas which include reflectors.

SEE OR SEARCH CLASS:

353, Optics: Image Projectors, subclasses 67, 73, 77, and 78 for an image projector having a screen and a reflector.

450 Border, mask, shade, or curtain:

This subclass is indented under subclass 443. Subject matter including means connected to the screen to shield or shade the screen or to modify the contrast between the screen and the surrounding area.

(1) Note. For the purpose of this subclass, drapes, hoods, and covers are considered to be curtains.

451 Curved:

This subclass is indented under subclass 443. Subject matter wherein the surface of the screen is articulated rather than flat.

(1) Note. In this subclass the overall shape or surface of the screen is curved but subclasses 455 and 459 have curved individual elements but the overall surface of the screen is generally flat.

452 Embedded particles:

This subclass is indented under subclass 443. Subject matter including a mass or sheet of material (e.g., resin, etc.) with particles partially or fully embedded therein to affect the light transmission or reflection characteristics of the screen, the particles having characteristics such as a particular geometric shape, size, or refractive index.

(1) Note. The screens in Class 428, Stock Material or Miscellaneous Articles, subclasses 143+ may include particles claimed as light diffusing or as causing translucency. However, if the particles are claimed as having certain refractive index, size or shape, or an index or size relative to the remainder of the screen material, the patent is classified here in subclass 452. Further, if a geometric configuration is formed by the particles in the screen the patent is also classified here in subclass 452.

SEE OR SEARCH CLASS:

427, Coating Processes, subclasses 162+ for coating processes, per se, wherein the product is an optical element.

428, Stock Material or Miscellaneous Articles, subclasses 143+ for a stock material product containing embedded particles which diffuse light, and see (1) Note above.

453 Rear projection screen:

This subclass is indented under subclass 452. Subject matter wherein an image is projected on one side of a screen and viewed from the opposite side.

454 Unitary sheet comprising plural refracting areas:

This subclass is indented under subclass 443. Subject matter wherein a plurality of refracting elements are each part of a unitary plate or mass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

455, for a lenticular screen.

542, for signal reflectors with plural refracting elements formed as a unitary mass.

455 Lenticular:

This subclass is indented under subclass 454. Subject matter wherein at least some of the plurality of refracting elements have spherical or cylindrical curvature.

SEE OR SEARCH THIS CLASS, SUBCLASS:

542, for signal reflectors with plural refracting elements formed as a unitary mass.

619+, for surfaces composed of lenticular elements.

456 Rear projection screen:

This subclass is indented under subclass 455. Subject matter wherein an image is projected on one side of a screen and viewed from the opposite side.

457 With Fresnel lens:

This subclass is indented under subclass 456. Subject matter wherein the lenticulated rear projection screen includes a Fresnel lens or a lens resembling a plano-convex or plano-concave lens that is cut into narrow rings and flattened out.

(1) Note. See subclass 742 for the definition of Fresnel type lens.

458 Stereoscopic imaging or three dimensional imaging:

This subclass is indented under subclass 455. Subject matter wherein a lenticulated refractive screen is placed between a picture and a viewer eye to provide an illusion of relief or an illusory three dimension picture of a single perspective.

SEE OR SEARCH THIS CLASS, SUBCLASS:

462+, for stereoscopic device that may include a nominal recitation of a projection screen.

478, for relief illusion.

SEE OR SEARCH CLASS:

352, Optics: Motion Pictures, subclasses 57+ for stereoscopic camera or projectors and subclasses 85+ for special effects, particularly subclass 86 for devices creating an illusion of three dimensional viewing without employing separate left and right images.

459 Unitary sheet comprising plural reflecting areas:

This subclass is indented under subclass 443. Subject matter wherein a plurality of discrete reflecting elements are part of a unitary plate or sheet, the reflecting elements redirecting the impinging light in different directions.

(1) Note. The discrete elements are usually angularly related or curved.

SEE OR SEARCH THIS CLASS, SUBCLASS:

530, for a unitary sheet comprising a plurality of cube corner or triple reflectors.

546, for discrete reflecting elements formed as a unitary mass.

619+, for surfaces composed of lenticular elements.

460 Rear projection screen:

This subclass is indented under subclass 443. Subject matter wherein an image is projected on one side of a screen and viewed from the opposite side.

461 Roll up screen:

This subclass is indented under subclass 443. Subject matter wherein the screen is flexible and can be wound around a roller for easy storage or for portability.

462 STEREOSCOPIC:

This subclass is indented under the class definition. Subject matter comprising (1) a separate optical system for each eye of one person, which are looking at a common object, for producing separate visual records containing information from the two different points of view relative to that object, or (2) the stereoscopic record itself, or (3) the devices for viewing such records.

(1) Note. This subclass takes optical systems of stereo projectors and cameras which are not sufficient to constitute a complete projector or camera.

SEE OR SEARCH THIS CLASS, SUBCLASS:

478, for devices giving an illusion of relief but where information is obtained only from a single point of view.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 1 for measuring stereoscopes and subclass 20.4 for plotting stereoscopes combined with a stylus.

40, Card, Picture, or Sign Exhibiting, subclass 1 for exhibitors in general, and subclasses 361+ for nonstereo transparent film viewers.

348, Television, subclasses 42+ for stereoscopic television systems.

352, Optics: Motion Pictures, subclasses 57+ for stereoscopic motion picture cameras.

353, Optics: Image Projectors, subclasses 7+ for attachments which convert a conventional projector to a stereoscopic image projector.

356, Optics: Measuring and Testing, subclasses 12+ for base line type range or height finders which include stereoscopic viewers and subclass 390 for mensuration or configuration comparison devices which may involve stereo-viewers.

378, X-Ray or Gamma Ray Systems or Devices, subclasses 41+ for a stereoscopic X-ray or gamma ray system.

396, Photography, subclasses 324+ for stereoscopic camera.

463 Having record with lenticular surface:

This subclass is indented under subclass 462. Subject matter comprising a record with a plurality of reflecting or transmitting elements, each having a curved or figured surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:

455+, for lenticular projection screens.

619+, for surfaces composed of lenticular elements.

642+, for lenses generally.

727, for lenses having concave and/or convex reflecting surfaces with coatings.

464 With right and left channel discriminator (e.g., polarized or colored light):

This subclass is indented under subclass 462. Subject matter associated with stereo systems wherein by appropriate viewing devices (e.g., colored or polarizing spectacles), light rays representing the right and left stereoscopic channels and having different optical properties (e.g., color, direction of polarization), in accordance with the channel they represent, will affect only the eye appropriate to a given channel.

(1) Note. This subclass includes for example, (1) apparatus for forming superimposed images from light rays having different optical properties, (2) the record containing right and left stereo images characterized by having different optical properties, or (3) the viewing devices for discriminating between the light rays from the right and left images.

465 Using polarized light:

This subclass is indented under subclass 464. Subject matter wherein the particles of the light vibrate perpendicular to the direction of travel and these vibrations are either in straight lines, circles, or ellipses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

483.01, through 494.01, for optics, systems, and elements for polarization of light or using polarized light.

466 Stereo-viewers:

This subclass is indented under subclass 462. Subject matter comprising either (1) viewing devices which are used to aid the observer in fusing adjacently mounted right and left stereoscopic pictures or (2) the adjacently mounted right and left stereoscopic pictures themselves.

SEE OR SEARCH THIS CLASS, SUBCLASS:

804+, for nonstereo viewers with a significant lens system.

467 View changers:
This subclass is indented under subclass 466. Subject matter including means to facilitate changing from one stereoscopic slide or picture to another.

SEE OR SEARCH CLASS:
40, Card, Picture, or Sign Exhibiting, subclasses 446+ for changeable exhibitors in general.
353, Optics: Image Projectors, subclass 92 and 103+ for a slide changer for an image projector.

468 Picture moves linearly past viewing aperture:
This subclass is indented under subclass 467. Subject matter wherein the slide or picture being viewed moves linearly past the viewing aperture, i.e., each point on the picture generates a straight line as it passes the aperture.

469 Using film-strips:
This subclass is indented under subclass 468. Subject matter wherein a carrier is formed as a tape or strip with individual elements of a motion picture sequence uniformly spaced along the strip.

(1) Note. Film strips may include moving film, film-roll band, ribbon of film, film tape, or film spools.

SEE OR SEARCH CLASS:
352, Optics: Motion Pictures, subclass 37 for strip type films with a sound record, subclass 56 for methods of working or making a film strip, subclass 59 for stereoscopic apparatus involving plural film strips, subclasses 166+ for drive mechanisms for film strips, and subclasses 232+ for motion picture carriers.
353, Optics: Image Projectors, subclass 120 for picture carriers for still projectors.

470 Compensates for camera position (e.g., plotting or mapping type):
This subclass is indented under subclass 466. Subject matter wherein compensation is made for the orientation or position of the recording device or devices which produced the stereo pictures.

(1) Note. This subject matter generally involves stereoscopes for plotting, mapping, or measuring where the raw data must be adjusted to compensate for such things as parallax, different image size, skew, or tilt, etc., caused by a particular camera orientation.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, subclass 1 for similar subject matter combined with measuring means and subclass 20.4 for similar subject matter combined with scribing means.
250, Radiant Energy, subclasses 200+ for similar devices employing photocells.
353, Optics: Image Projectors, subclass 6 for an image projector for stereoscopic mapping or for rectifying an aerial photograph.
356, Optics: Measuring and Testing, subclass 2 for contour plotting devices which may involve stereo-viewers.

471 Reflected line of sight:
This subclass is indented under subclass 466. Subject matter including means for reflecting the line of sight of at least one eye of the observer.

472 Pictures offset, transposed, or have respective right or left sides adjacent:
This subclass is indented under subclass 471. Subject matter wherein (1) the pictures viewed are vertically offset (i.e., the tops and bottoms are not in line), (2) the picture to be viewed by the right eye is on the left side of the picture to be viewed by the left eye, or (3) the respective right or left sides of the stereo pictures are adjacent.

473 Ocular spacing or angle between ocular axes adjustable:
This subclass is indented under subclass 466. Subject matter comprising means for adjusting the spacing of the stereoscope oculars or means for adjusting the angular relationship of their optical axes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

412+, for binocular lenses having adjustable interocular spacing.

474 Collapsible:

This subclass is indented under subclass 466. Subject matter wherein the stereoscope after use can be folded, collapsed, or dismantled to form a more compact package or wherein the stereoscope, prior to use, is folded, collapsed, or dismantled.

SEE OR SEARCH THIS CLASS, SUBCLASS:

817, for lenses with foldable or collapsible supports.

475 Having Illumination:

This subclass is indented under subclass 466. Subject matter including means to illuminate or improve the illumination of the stereo picture.

SEE OR SEARCH THIS CLASS, SUBCLASS:

798+, for illuminating a viewer including a significant lens system.

476 Ocular to picture distance adjustable:

This subclass is indented under subclass 466. Subject matter including adjustment of the distance between the stereoscopic eyepieces and the viewed picture.

477 Supporting, mounting, enclosing, or light shielding structure:

This subclass is indented under subclass 466. Subject matter comprising supporting, mounting, enclosing or light shielding structure for stereo viewer or its components.

(1) Note. Examples of this subclass are stereoscopic hoods, cases or handles.

SEE OR SEARCH THIS CLASS, SUBCLASS:

407+, for compound lens binocular with supports or handles.

811+, for lenses with supports.

478 RELIEF ILLUSION:

This subclass is indented under the class definition. Subject matter for giving a depth or relief effect comprising a visual record which contains information of the object viewed obtained from only one point of view.

SEE OR SEARCH THIS CLASS, SUBCLASS:

462+, for stereoscopic devices where the visual record contains information obtained from two different points of view.

SEE OR SEARCH CLASS:

348, Television, subclass 44 for pseudo stereoscopic television.

352, Optics: Motion Pictures, subclass 86 for a motion picture device for depth illusion.

479 Reflected line of sight:

This subclass is indented under subclass 478. Subject matter wherein the line of sight of at least one eye of the observer is reflected.

480 BINOCULAR DEVICES:

This subclass is indented under the class definition. Subject matter comprising one separate optical element, aperture or tube for each eye of the user or comprising a single optical element used alternately by each eye.

SEE OR SEARCH THIS CLASS, SUBCLASS:

404, for telescopic binocular having plural optical axes.

407+, for binocular type compound lens system.

466+, for stereoscopic viewing devices.

618+, for systems including a single optical channel which merges to or from a plural optical channel, the plural channel lacking the binocular use.

481 Binocular loupe type:

This subclass is indented under subclass 480. Subject matter including a support shaped to position one or more lenses before each eye so that the lenses move with the head of the user.

(1) Note. The support may be adapted to be attached directly to either the head, e.g., a head band, or spectacle frames.

SEE OR SEARCH THIS CLASS, SUBCLASS:

407+, for binocular type compound lens systems.

815, for such structure which is body or apparel carried.

816, for monocular loupes.

SEE OR SEARCH CLASS:

2, Apparel, subclasses 426+ for goggles.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 41+ for spectacles and eyeglasses. See Lines With Other Classes and Within This Class, Lenses, in the 351 Class Definition for the distinction between the vision correcting structure of Class 351 and the magnifying structure of Class 359.

482 Reflected line of sight:

This subclass is indented under subclass 480. Subject matter wherein the line of sight of at least one eye of the observer is reflected.

483.01 POLARIZATION WITHOUT MODULATION:

This subclass is indented under the class definition. Subject matter wherein a polarization of an incident light beam is produced or modified in a time invariant fashion as a result of passing through an optical device.

(1) Note. Where both a polarizing device and a composition are claimed, the patent is classified here and cross-referenced to class 252, subclass 585.

(2) Note. Where a method of making the polarizing device is claimed as well as the polarizing device, the patent is classified here and cross-referenced to any other class providing for the method.

(3) Note. The nominal recitation of a polarizing area in the form of a design, image, etc., or specifics of a polarization element (e.g., polarization light characteristics) is sufficient to include this subject matter in these subclasses. However, the nominal recitation of a polarization element in an optical system is not sufficient to include the subject matter in these subclasses and should be classified elsewhere where such combination meets the class requirements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

204.3, for polarized light to be deflected using moving element.

246, through 258, for polarization with modulation by eletro-optic devices with applied time variant electric signal.

281, through 289, for polarization with modulation by magneto-optic devices with applied time variant magnetic signal.

301, for light wave directional control of polarized light.

352, for a polarizing element having significant infrared or ultraviolet properties.

371, and 386, for compound lens systems combined with polarizers.

437, for polarizers used in a scale or indicia reading.

465, for polarizers used in stereoscopic systems.

484.01, for polarization using an applied external time-invariant electric, magnetic, or electromagnetic signal.

484.02, through 484.1, for polarization requires magneto rotation.

485.01, through 485.07, for polarization by reflection or refraction.

486.01, through 486.03, for polarization direction or magnitude varied over surface of the medium.

487.01, through 487.06, for polarization by dichroism.

489.01, through 489.2, for polarization by birefringence.

601, through 614, for optical structure in general used to reduce unwanted light, not polarizing structure for reducing antiglare.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, particularly subclasses 434 and 548 for illuminated signs utilizing polarizers.

65, Glass Manufacturing, subclasses 30.1 and 32.1 for processes for forming polarizing glass material.

250, Radiant Energy, subclasses 225 and 559.09 for a light polarizer and a photocell and subclass 341.3 for invisible radiation energy response methods including polarization means.

252, Compositions, subclass 585 for chemical compositions which produce polarized light.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 1.31 for light polarizing articles.

313, Electric Lamp and Discharge Devices, subclass 112 for electric lamps and electronic tubes combined with a polarizer.

343, Communications: Radio Wave Antennas, subclass 756 for antennas with a polarization converter and subclasses 909+ for radio wave polarizations, per se.

348, Television, subclasses 57 and 58 for stereoscopic displays with polarization.

349, Liquid Crystal Cells, Elements and Systems, subclass 9 for projectors with liquid crystal cell which produces S and P polarized light, subclass 80 for color polarizers in a liquid crystal cell, subclass 87 for variable polarizers in a liquid crystal cell, subclasses 96-103 for liquid crystal cell structure with polarizing element, and subclass 194 for liquid crystal polarizer.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 49, 215, and 232 for light-polarizing devices used in eye examining vision testing and correcting means.

353, Optics: Image Projectors, subclasses 8 and 20 for polarizers used with image projectors.

355, Photocopying, subclass 71 for photocopy system having illumination system with a polarizer.

356, Optics: Measuring and Testing, subclasses 30 and 31 for gem or crystal examining using polarized light; subclass 33 for material strain analysis with polarized light, subclasses 322 and 327 for spectrometers which utilize polarized light, subclasses 364-370 for polarized light examination devices generally, and subclasses 453, 487 and 491 for interferometers with polarizing elements.

362, Illumination, subclass 19 for illumination systems with a polarizing element.

365, Static Information Storage and Retrieval, subclasses 121 and 122 for polarization techniques used in the storage and retrieval of information.

369, Dynamic Information Storage or Retrieval, subclasses 13.29 through 13.31 for employing polarized light in a storage or retrieval device and subclasses 110.01-110.04 and 112. 16-112.21 for polarizing optical elements in an optical pick-up device.

372, Coherent Light Generators, subclass 106 for a polarizer in a coherent light generator (i.e., laser).

385, Optical Waveguides, subclass 11 for polarization devices without modulation and including an optical waveguide.

398, Optical Communications, subclass 65 for polarization in multiplexing optical communication devices, subclass 152 for transmitter/receiver systems that include polarization.

427, Coating Processes, subclasses 163.1 through 163.4 for coating processes, per se, where the product is an optical element.

428, Stock Material or Miscellaneous Articles, subclass 1.31 for liquid-crystal layers including polarizer.

472, Amusement Devices, subclasses 57 through 84 for a theatrical stage device which may use a polarizer.

501, Compositions: Ceramic, subclasses 30 and 56 for polarizers with specified glass compositions.

977, Nanotechnology, subclass 834 for nanomaterials having optical properties that may include polarization.

484.01 Polarization using a time invariant electric, magnetic, or electromagnetic field (e.g., electro-optical, magneto-optical):

This subclass is indented under subclass 483.01. Subject matter wherein an electric, magnetic, or electromagnetic field, which is

unchanging in time, is applied to the optical device to produce or alter the polarization.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclass 368 for polarimeters which include electro-optical light rotation.
365, Static Information Storage and Retrieval, subclasses 121 and 122 for information masking using magneto-optical polarization.
369, Dynamic Information Storage or Retrieval, subclasses 13.01 through 13.55 for magneto-optical storage systems.
385, Optical Waveguides, subclass 11 for polarization devices without modulation and including an optical waveguide.

484.02 Faraday effect:
This subclass is indented under subclass 484.01. Subject matter wherein the applied field is a magneto-optic field in which the magneto-optic field interacts with the optical device to produce a rotation in the plane of polarization (i.e., Faraday effect).

(1) Note. Included in this subclass are Faraday rotation devices without modulation. Faraday rotation devices that include modulation would be appropriate for subclasses 280-284.

SEE OR SEARCH CLASS:
365, Static Information Storage and Retrieval, subclass 122 for information masking using magneto-optical polarization.
369, Dynamic Information Storage or Retrieval, subclasses 13.01 through 13.55 for magneto-optical storage systems.
385, Optical Waveguides, subclass 11 for polarization devices without modulation and including an optical waveguide.

484.03 Isolator:
This subclass is indented under subclass 484.02. Subject matter wherein a Faraday effect element is used in an optical isolator.

(1) Note. An optical isolator is an optical device which allows the transmission of light in only one direction.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclass 703 for optical isolator in a coherent light generator (i.e., laser).
385, Optical Waveguides, subclass 11 for polarization devices without modulation and including an optical waveguide.

484.04 With reflector:
This subclass is indented under subclass 484.03. Subject matter wherein the optical isolator includes at least one reflective element (e.g., mirror, retroreflector, etc).

484.05 Circulator:
This subclass is indented under subclass 484.02. Subject matter wherein a Faraday effect element is used in an optical circulator.

(1) Note. An optical circulator is an at least three-port device that allows light to travel in only one direction (e.g., lights travels from port 1 to port 2, then from port 2 to port 3).

SEE OR SEARCH CLASS:
385, Optical Waveguides, subclass 11 for polarization devices without modulation and including an optical waveguide.
398, Optical Communications, subclass 65 for polarization in multiplexing optical communication devices, subclass 152 for transmitter/receiver systems that include polarization, subclass 205 for heterodyne receiver including polarization.

484.06 Optical switch:
This subclass is indented under subclass 484.02. Subject matter wherein a Faraday effect element is used in an optical switch.

(1) Note. An optical switch is an optical device which enables light to be selectively switched from one port to another.

SEE OR SEARCH CLASS:
385, Optical Waveguides, subclasses 16 through 23 for optical switches utilizing an optical waveguide.
398, Optical Communications, subclasses 45 through 57 for optical switching in multiplexing optical communication devices.

484.07 Interleaver:
This subclass is indented under subclass 484.02. Subject matter wherein a Faraday effect element is used in an optical interleaver.

(1) Note. An optical interleaver is an at least 3-port device that is used to combine two sets of wavelength-division multiplexing (WDM) channels (e.g., odd and even channels) into a composite signal stream in an interleaving way.

SEE OR SEARCH CLASS:
385, Optical Waveguides, subclass 11 for polarization devices without modulation and including an optical waveguide.
398, Optical Communications, subclass 65 for polarization in multiplexing optical communication devices, subclass 152 for transmitter/receiver systems that include polarization, subclass 205 for heterodyne receiver including polarization.

484.08 Attenuator:
This subclass is indented under subclass 484.02. Subject matter wherein a Faraday effect element is used in an optical attenuator.

(1) Note. An optical attenuator is an optical device that reduces the amplitude or power of a signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
337.1, through 337.13, for spectral gain flattening or equalization.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclass 370 for measuring/testing of polarized light having light attenuation.
385, Optical Waveguides, subclass 140 for optical attenuators including an optical waveguide.

484.09 Interference or comb filter:
This subclass is indented under subclass 484.02. Subject matter wherein a Faraday effect element is used in an interference or comb filter.

(1) Note. An interference or comb filter is an optical filter that selectively reflects or transmits light in a narrow band of wavelengths.

SEE OR SEARCH THIS CLASS, SUBCLASS:
489.19, for frequency filters used for polarization by birefringence.
589, and 590, for general interference filters.

SEE OR SEARCH CLASS:
353, Optics: Image Projectors, subclass 20 for polarizers used with image projectors.
356, Optics: Measuring and Testing, subclasses 491 through 495 for interferometers having polarization.

484.1 With particular Faraday effect material:
This subclass is indented under subclass 484.02. Subject matter wherein details of materials that are involved in the generation of the Faraday effect are recited.

SEE OR SEARCH CLASS:
117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, subclass 54 for the process of growing magnetic compositions.
252, Compositions, subclass 585 for chemical compositions which produce polarized light and subclasses 62.51+ for the magnet material composition.
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 209 through 306 for the magnet structure.

485.01 Polarization by reflection or refraction:
This subclass is indented under subclass 483.01. Subject matter wherein a light beam is polarized as a result of either (1) by striking a surface and returning into the originating medium of an optical element or (2) by redirecting as it passes through media of differing indices of refraction of the optical element.

(1) Note. The reflection or refraction phenomena must follow Snell's Law to be appropriate for this subclass.

SEE OR SEARCH CLASS:
349, Liquid Crystal Cells, Elements and Systems, subclass 9 for projectors with liquid crystal cell which produces S and P polarized light, subclasses 96-103 for liquid crystal cell structure with polarizing element and subclass 194 for liquid crystal polarizer.
353, Optics: Image Projectors, subclass 20 for polarizers used with image projectors.
362, Illumination, subclass 19 for illumination systems with a polarizing element.

485.02 Brewster angle polarizer (reflective or transmissive):
This subclass is indented under subclass 485.01. Subject matter wherein the polarizing optical element reflects or transmits light at Brewster's angle.

(1) Note. Since the reflection coefficient for light which has an electric field parallel to the plane of incidence goes to zero at some incidence angle between 0 and 90, the reflected light at that angle (Brewster's angle) is linearly polarized with its electric field vectors perpendicular to the plane of incidence and parallel to the plane of the surface from which it is reflecting.

SEE OR SEARCH CLASS:
372, Coherent Light Generators, subclass 106 for a polarizer in a coherent light generator (i.e., laser).

485.03 Multilayer polarizer:
This subclass is indented under subclass 485.01. Subject matter wherein the polarizing optical element includes a plurality of layers, at least one of which is reflective or refractive.

(1) Note. Multilayer optical elements which operate using optical interference are appropriate for this subclass.

(2) Note. Multilayer optical elements that include one or more birefringent layers should be classified in 489.19 and are not appropriate for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
371, for interference microscopes which may utilize polarized light.
580, through 590, for general optical inference elements.

485.04 Pile-of-plates polarizer:
This subclass is indented under subclass 485.03. Subject matter wherein a polarization is reflected or transmitted from a stack of plates (e.g., dielectric plates).

485.05 Wire grid polarizer:
This subclass is indented under subclass 485.01. Subject matter wherein the polarizing optical element includes metallic conductors in the form of a reflective grid (i.e., each grid opening forms a half wavelength of the applied light) to produce a polarization of the applied light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
352, for a polarizing element having significant infrared or ultraviolet properties.
569, through 576, for diffractive optical elements.

SEE OR SEARCH CLASS:
216, Etching a substrate: Processes, subclass 24 for general etching processes.

485.06 Prism:
This subclass is indented under subclass 485.01. Subject matter wherein the polarizing optical element has at least two plane surfaces

inclined relative to each other, from which light is reflected or through which light is refracted.

(1) Note. A prism may be employed for refracting or reflecting light. Prism reflections are considered to be internal reflections; that is, the light is inside the prism body both before and immediately after the reflection.

(2) Note. The prismatic element may include a plurality or an array of prisms (e.g., crossed prisms, x-prisms or kernel prisms).

SEE OR SEARCH THIS CLASS, SUBCLASS:

489.09, and 489.1, for prisms used for polarization by birefringence.
629, through 638, for general beam splitting elements.
831, through 837, for prisms, per se.

SEE OR SEARCH CLASS:

349, Liquid Crystal Cells, Elements and Systems, subclasses 8 through 9 for projectors with liquid crystal cell which produces S and P polarized light.
353, Optics: Image Projectors, subclass 20 for polarizers used with image projectors.

485.07 Mirror:

This subclass is indented under subclass 485.01. Subject matter wherein the reflective element is a mirror.

(1) Note. The reflective element may include a plurality or an array of mirrors.

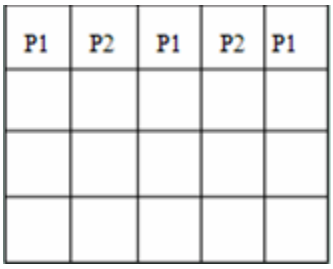
486.01 Polarization (direction or magnitude) variation over surface of the medium:

This subclass is indented under subclass 483.01. Subject matter comprising a surface which transmits or reflects light and whose ability to polarize light is not uniform across the surface.

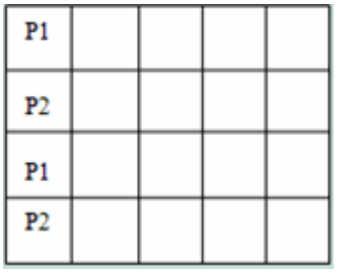
(1) Note. This variation in polarizing ability may be continuous or discontinuous and may form any type of pattern. For example, the different areas of a surface may form an image or design as in a vectograph.

486.02 Linear variation:

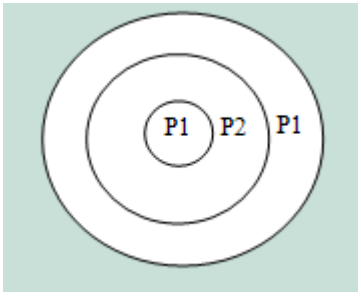
This subclass is indented under subclass 486.01. Subject matter wherein the polarization varies along a single direction or two orthogonal directions (e.g., matrix or checkerboard).



A typical example of the subject matter.



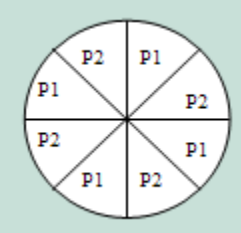
A typical example of the subject matter.



A typical example of the subject matter.

486.03 Radial variation:

This subclass is indented under subclass 486.01. Subject matter wherein the polarization varies around an optical axis.



A typical example of the subject matter.

487.01 Polarization by dichroism:
This subclass is indented under subclass 483.01. Subject matter including an optical element made of dichroic materials which have different absorption for different incident polarization planes of light.

(1) Note. Included here are elements where the medium comprises a lamination or a coating on a supporting structure and where the supporting structure is significant or the means to form the lamination or coating is significant.

SEE OR SEARCH THIS CLASS, SUBCLASS:
352, for a polarizing element having significant infrared or ultraviolet properties.
580, for general dichroic elements without polarization properties.

SEE OR SEARCH CLASS:
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 99 through 108 for processes of adhesively bonding laminae.
252, Compositions, subclass 585 for chemical compositions which produce polarized light.
427, Coating Processes, subclasses 163.1 through 163.4 for coating processes, per se, where the product is an optical element.

487.02 With stain or dye:
This subclass is indented under subclass 487.01. Subject matter wherein the polarizing optical element is made of dichroic coloring agent, such as a dye or stain (e.g., Polaroid H or K sheets or dichroic iodine-based films).

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, subclass 1.31 for liquid crystal layers including polarizer.

487.03 Wire grid polarizer:
This subclass is indented under subclass 487.01. Subject matter wherein the polarizing optical element includes metallic conductors in the form of an absorptive grid (i.e., each grid opening forms a half wavelength of the applied light) to produce polarization of the applied light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
569, through 576, for diffractive optical elements.

SEE OR SEARCH CLASS:
216, Etching a substrate: Processes, subclass 24 for general etching processes

487.04 Wavelength-selective beamsplitter:
This subclass is indented under subclass 487.01. Subject matter wherein the polarizing dichroic optical element is used to selectively separate or split the light beam into components of different wavelengths.

SEE OR SEARCH THIS CLASS, SUBCLASS:
634, for wavelength-selective, dichroic reflectors.

SEE OR SEARCH CLASS:
349, Liquid Crystal Cells, Elements and Systems, subclasses 8 through 9 for projectors with liquid crystal cell which produces S and P polarized light.
353, Optics: Image Projectors, subclass 20 for polarizers used with image projectors.

487.05 Having plural elements:
This subclass is indented under subclass 487.01. Subject matter wherein the polarizing optical device includes a plurality of dichroic elements.

(1) Note. The plurality of dichroic elements may include a plurality of layers, films, coatings or optical devices.

487.06 Oriented particles:

This subclass is indented under subclass 487.01. Subject matter wherein the polarization of the applied light is dependent upon the spatial positioning of microscopic particles embedded in the dichroic medium of the polarizing optical element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

487.01, for polarization caused by the molecular orientation of the matrix material or of a reaction product.

487.02, for stain or dye molecules acting as oriented particles.

488.01 Glare prevention by discriminating against polarized light:

This subclass is indented under subclass 483.01. Subject matter wherein unwanted glare-producing polarized light is eliminated by a polarizing structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

490.01, through 490.03, for two superimposed relatively adjustable polarizers mounted as a unit and used to reduce or control light intensity.

601, through 614, for glare reduction not utilizing a polarizer.

489.01 Polarization by birefringence:

This subclass is indented under subclass 483.01. Subject matter wherein the polarizing optical element includes crystalline materials having two distinct indices of refraction associated with different crystallographic directions, i.e. birefringent materials.

(1) Note. A birefringent element has the property of dividing a ray or beam of energy into two polarized rays or beams (known as the ordinary and extraordinary rays), the directions of polarization being at right angles to each other.

SEE OR SEARCH THIS CLASS, SUBCLASS:

489.09, for a birefringent element in the form of a Nicol prism where the unwanted ray is deflected.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclasses 30.1 and 32.1 for processes for forming polarizing glass material.

356, Optics: Measuring and Testing, subclass 365 for measuring/testing of polarized light having a birefringent element.

501, Compositions: ceramic, subclasses 30 and 56 for polarizers with specified glass compositions.

489.02 With compensation techniques:

This subclass is indented under subclass 489.01. Subject matter wherein the birefringent element corrects for unwanted effects.

SEE OR SEARCH CLASS:

349, Liquid Crystal Cells, Elements and Systems, subclasses 117 through 121 for liquid crystal cell including compensation.

489.03 Intrinsic birefringence or photoelastic (stress) effect:

This subclass is indented under subclass 489.02. Subject matter wherein the unwanted effect is intrinsic birefringence or photoelastic (stress) effect.

SEE OR SEARCH CLASS:

349, Liquid Crystal Cells, Elements and Systems, subclass 120 for liquid crystal cell including compensation for negative intrinsic birefringence (i.e., negative refractive index anisotropy).

489.04 Temperature:

This subclass is indented under subclass 489.02. Subject matter wherein the unwanted effect is temperature.

489.05 Path length:

This subclass is indented under subclass 489.02. Subject matter wherein the unwanted effect is changes in optical or physical path length.

(1) Note. Included in this subclass are optical delay lines.

489.06 Form birefringent element:
This subclass is indented under subclass 489.01. Subject matter wherein the optical element exhibits different refractive indices as a result of an anisotropic physical structure on a scale much larger than molecular but much smaller than the wavelength of light.

(1) Note. Examples of such elements may include polarizing dielectric diffraction gratings or polarizing lattice grids.

(2) Note. Form birefringence is also known as structural birefringence or structure-induced birefringence.

SEE OR SEARCH THIS CLASS, SUBCLASS:
566, through 576, for diffractive optical elements.

SEE OR SEARCH CLASS:
369, Dynamic Information Storage or Retrieval, subclasses 112.03 through 112.15 for optical pick-up devices having a diffractive element.

489.07 Waveplate or retarder:
This subclass is indented under subclass 489.01. Subject matter wherein the birefringent element is used to alter the polarization state of a light wave traveling through it by shifting the phase between the two perpendicular polarization components of the incident light beam, i.e., birefringent waveplate or retarder.

(1) Note. Included in this subclass are waveplates or retarders that are EXPLICITLY birefringent, i.e. the waveplate or retarder is birefringent, anisotropic, uniaxial, biaxial or double (doubly) refractive; the waveplate or retarder is made from a birefringent crystalline material such as quartz, calcite, tourmaline, rutile, sodium nitrate, magnesium fluoride, sapphire, etc.; or the waveplate or retarder has been specified to have two distinct indices of refraction associated with different crystallographic directions, such as those producing ordinary and extraordinary rays.

SEE OR SEARCH CLASS:
349, Liquid Crystal Cells, Elements and Systems, subclass 18 for projectors with liquid crystal cell that includes a variable or rotatable retarder and subclasses 117-118 for specific liquid crystal cell structures with birefringent retarders.

489.08 Beam deflector or splitter:
This subclass is indented under subclass 489.01. Subject matter wherein the birefringent element is used to change the direction of the entire beam or a portion of the beam for positioning purposes or is used to split the beam into two or more portions.

(1) Note. The polarization splitter may include a plurality or an array of splitters.

SEE OR SEARCH THIS CLASS, SUBCLASS:
485.01, through 485.07, and 487.04, for polarized beam deflection and splitting using nonbirefringent medium.
489.09, for prism structures which could be used for beam splitting.
629, through 638, for diffractive optical elements.

489.09 Prism:
This subclass is indented under subclass 489.08. Subject matter wherein the birefringent element has at least two plane surfaces inclined relative to each other, from which light is reflected or through which light is refracted.

(1) Note. A prism may be employed for refracting or reflecting light. Prism reflections are considered to be internal reflections; that is, the light is inside the prism body both before and immediately after the reflection.

(2) Note. The prismatic element may include a plurality or an array of prisms (e.g., crossed prisms, x-prisms or kernel prisms).

(3) Note. The prismatic element may also be doubly refractive, wherein light incident on the prismatic element undergoes decomposition into two rays, the ordinary ray and the extraordinary ray (e.g., Glan prism, Wollaston prism, Rochon prism, Sernarmont prism, Nicol prism, Feussner polarizer, etc.). This phenomena occurs when the optic axis of the element is at an arbitrary angle with respect to the incident beam direction (i.e., not parallel).

SEE OR SEARCH THIS CLASS, SUBCLASS:

485.06, for prisms used for polarization by reflection or refraction.

639, and 640, for refraction at the beam splitting or combining surface of a prismatic element.

831, through 837, for prisms, per se.

SEE OR SEARCH CLASS:

349, Liquid Crystal Cells, Elements and Systems, subclasses 8 through 9 for projectors with liquid crystal cell which produces S and P polarized light.

353, Optics: Image Projectors, subclass 20 for polarizers used with image projectors.

489.1 Adjustable element(s):

This subclass is indented under subclass 489.09. Subject matter wherein the prismatic element is movable to adjust the optical characteristics of the prismatic element (e.g., Soleil-Babinet compensators).

489.11 Film or layer:

This subclass is indented under subclass 489.08. Subject matter wherein the polarization splitter includes at least one thin film, layer, or coating of birefringent materials.

SEE OR SEARCH CLASS:

427, Coating Processes, subclasses 163.1 through 163.4 for coating processes, per se, where the product is an optical element.

489.12 Uniaxial:

This subclass is indented under subclass 489.11. Subject matter including birefringent materials wherein the refractive indices of two of the three orthogonal directions are the same.

(1) Note. Included in this subclass are both positive and negative birefringent uniaxial materials.

489.13 Biaxial:

This subclass is indented under subclass 489.11. Subject matter including birefringent materials wherein the refractive indices of all three orthogonal directions are different.

489.14 Lens:

This subclass is indented under subclass 489.01. Subject matter wherein the birefringent element is a lens.

(1) Note. A birefringent lens is defined as either a single transparent mass of birefringent refractive material having opposed refracting surfaces or a plurality of such masses arranged along an optical axis with their opposed refracting surfaces disposed transversely of such axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

489.18, for optical systems with lenses and plural birefringent elements.

489.15 Plural birefringent elements:

This subclass is indented under subclass 489.01. Subject matter wherein beam polarization is achieved by multiple birefringent elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

371, and 386, for microscopes using polarized light which may utilize birefringent elements.

465, for stereoscopic systems with polarizing elements which may be birefringent.

489.01, for elements where the polarization varies over surface of the medium.

489.09, through 489.1, for prism structures made up of plural elements.

SEE OR SEARCH CLASS:

349, Liquid Crystal Cells, Elements and Systems, subclasses 8 through 9 for projectors with liquid crystal cell which produces S and P polarized light.

353, Optics: Image Projectors, subclass 20 for polarizers used with image projectors.

362, Illumination, subclass 19 for illumination systems with polarizing elements.

489.16 Three or more birefringent elements:

This subclass is indented under subclass 489.15. Subject matter wherein beam polarization is achieved by at least three birefringent elements.

489.17 In parallel:

This subclass is indented under subclass 489.15. Subject matter wherein the birefringent elements are arranged transverse to the light propagation direction, i.e., positioned in parallel.

489.18 With lenses:

This subclass is indented under subclass 489.15. Subject matter wherein the optical system also includes a plurality of lenses in series or in a lens array.

(1) Note. Included in this subclass are optical systems with plural birefringent elements including lens (or lenses) that are NOT birefringent.

489.19 Frequency filter or interference effects:

This subclass is indented under subclass 489.15. Subject matter wherein plural elements act to pass a particular frequency or band of frequencies, or wherein interference effects are used to produce effects such as color or an interference pattern.

SEE OR SEARCH THIS CLASS, SUBCLASS:

370, and 371, for interference microscopes which may utilize birefringent elements.

487.01, for color effects using dichronic medium.

580, through 590, for prism structures made up of plural elements.

634, for wavelength selective beam splitting systems.

885, through 892, for an absorption filter.

489.2 Mounting structure:

This subclass is indented under subclass 489.01. Subject matter wherein detailed structures for mounting the birefringent element are recited.

SEE OR SEARCH THIS CLASS, SUBCLASS:

819, through 830, for generic lens mounts.

SEE OR SEARCH CLASS:

349, Liquid Crystal Cells, Elements and Systems, subclasses 58 through 60 for generic mounting structures to hold liquid crystal cells.

490.01 By relatively adjustable superimposed or in series polarizers:

This subclass is indented under subclass 483.01. Subject matter wherein the polarizers are positioned one on top of another or arranged in a row and their positions are adjustable.

SEE OR SEARCH THIS CLASS, SUBCLASS:

489.2, for mounting structure of superimposed birefringent elements.

SEE OR SEARCH CLASS:

349, Liquid Crystal Cells, Elements and Systems, subclass 18 for projectors with liquid crystal cell that includes a variable or rotatable retarder.

490.02 Rotating elements:

This subclass is indented under subclass 490.01. Subject matter wherein the elements are adjustable by rotation.

490.03 Translating or sliding elements:

This subclass is indented under subclass 490.01. Subject matter wherein the elements are adjustable by translation or sliding.

491.01 With color filter:
This subclass is indented under subclass 483.01. Subject matter where a polarizing structure is combined with structure to selectively absorb or transmit specific light wavelengths.

SEE OR SEARCH THIS CLASS, SUBCLASS:
485.03, for similar subject matter where the only color produced is a result of interference.
487.01, through 487.06, for similar subject mater where the color is produced by a dichoric medium. (See (1) Note under subclass 487.01 for the definition of dichronic.)
489.19, for similar subject matter where the only color produced is a result of interference.

SEE OR SEARCH CLASS:
349, Liquid Crystal Cells, Elements and Systems, subclasses 80 through 97 for liquid crystal cell structure with color filter.

492.01 Polarization by optical activity:
This subclass is indented under subclass 483.01. Subject matter wherein the material of the optical element naturally rotates the plane of polarization of the incident light beam without the application of any external applied fields (e.g., electrical, magnetic, stress or pressure).

SEE OR SEARCH CLASS:
252, Compositions, subclass 585 for chemical compositions which produce polarized light.

493.01 Polarization by scattering:
This subclass is indented under subclass 483.01. Subject matter wherein a light beam is polarized as a result of scattering or diffusing from an optical medium.

(1) Note. The scattering or diffusing phenomena must NOT follow Snell's Law to be appropriate for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
599, for general optical elements that diffuse incident light.

494.01 Depolarization:
This subclass is indented under subclass 483.01. Subject matter wherein the optical element converts an incident polarized light beam to produce an unpolarized, depolarized or randomly polarized output light beam.

503 EXTENDED SPACING STRUCTURE FOR OPTICAL ELEMENTS:
This subclass is indented under the class definition. Subject matter including (a) means for maintaining different types of optical elements significantly separated in a fixed or adjustable relationship along the optical axis or (b) means for maintaining lenses significantly separated as in a Galilean telescope or door peep.

SEE OR SEARCH THIS CLASS, SUBCLASS:
744, for afocal lenses (e.g., Galilean telescopes).
894+, for optical apertures or tubes or transparent closures.
896, for miscellaneous optical devices.

504 Wide angle (e.g., door peep):
This subclass is indented under subclass 503. Subject matter wherein an objective element is designed to give a wide field of view, usually at least 120 degrees.

SEE OR SEARCH THIS CLASS, SUBCLASS:
744, for afocal lenses (e.g., Galilean telescopes).
819+, for lens mounts.

505 With screen or reticle in real image plane:
This subclass is indented under subclass 503. Subject matter including a real image display structure or a cross-hair or emblem at a real image plane.

SEE OR SEARCH THIS CLASS, SUBCLASS:
369, for a microscope with a screen.
400, for a telescope with a screen.

422, for a variable magnification telescope including a relay and a reticle.
424, for a telescope with a relay and reticle.
427, for a telescope with focusing or relatively sliding barrels and a reticle.
428, for a telescope with reticle.

506 Extension of tubular element adjustable:
This subclass is indented under subclass 503. Subject matter including a sliding structure, a bellows, or a telescoping structure for adjusting an optical barrel along the optical axis relative to another structure.

(1) Note. Other subclasses in this class indented under subclass 362, Compound lens system and titled "Separation of optical elements axially adjustable", "Variable magnification" or including the word "focusing" may include subject matter related to subject matter in this subclass.

507 PROTECTION FROM MOISTURE OR FOREIGN PARTICLE:
This subclass is indented under the class definition. Subject matter including structure to stop moisture or foreign matter from coming into contact with optical elements or means to remove moisture or foreign matter from optical elements.

(1) Note. Storage or container, per se, for an optical element is classified in Class 206, Special Receptacle or Package, particularly subclasses 5+ for eyeglasses or spectacles and subclasses 316.1+ for other optical or photographic devices or elements.

SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, subclasses 300.1+ for cleaning machines involving air blast or suction.
134, Cleaning and Liquid Contact With Sol-ids, appropriate subclasses.
427, Coating Processes, subclasses 162+ for an optical element produced with a coating process.

508 Optical element rotates:
This subclass is indented under subclass 507. Subject matter where an optical element or a shield therefor is rotated or otherwise moved to throw off moisture or other foreign matter, usually by centrifugal force.

(1) Note. The optical element may be rotated by any motor including one operated by air passing over vanes as in an air operated turbine.

509 Fluid directed across optical element:
This subclass is indented under subclass 507. Subject matter with structure to direct a fluid across an optical element to blow or wash moisture, or other foreign matter off or to pull such matter off by suction created by the moving fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
508, for apparatus where fluid is directed to vanes, as in a turbine, which rotates the optical element or a shield therefor, such as a transparent disc in front of an objective lens.

SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, subclasses 300.1+ for cleaning machine involving air blast or suction.

510 Microscope drape:
This subclass is indented under subclass 507. Subject matter including a thin flexible structure loosely encircling a microscope to isolate the microscope from its surroundings.

SEE OR SEARCH THIS CLASS, SUBCLASS:
368+, for microscope, per se.

SEE OR SEARCH CLASS:
206, Special Receptacle or Package, subclasses 305 and 316.1+ for a special container for an optical instrument.

511 Cap or cover:
This subclass is indented under subclass 507. Subject matter wherein a usually flanged or flat member covers the end of a barrel of an optical

device in order to protect an unused lens, located within a barrel, from dust or from damage by impact with foreign objects.

SEE OR SEARCH THIS CLASS, SUBCLASS:
611+, for a shade to deflect unwanted light from a lens.

SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, subclass 247 for a cover or cover holder.
439, Electrical Connectors, appropriate subclasses for movable or removable nonuse covering means.

512 Humidity or temperature control:
This subclass is indented under subclass 507. Subject matter with means for maintaining a desired humidity level or temperature or for increasing or decreasing the humidity level or temperature from its ambient value.

SEE OR SEARCH THIS CLASS, SUBCLASS:
395, for a stage or slide carrier with temperature control.

SEE OR SEARCH CLASS:
34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses.
219, Electric Heating, subclass 219 for an electrically heated mirror.

513 Sealing:
This subclass is indented under subclass 507. Subject matter with means to seal the optical elements from the atmosphere so that dust or moisture, etc., does not fall on them.

514 Mirror, prism or signal reflector:
This subclass is indented under subclass 513. Subject matter wherein an element being sealed includes a mirror, prism, or signal reflecting structure.

515 SIGNAL REFLECTOR:
This subclass is indented under the class definition. Subject matter wherein elements may be specular or diffusing to reflect a light to an observer for signalling purposes.

(1) Note. The presence of a reflector usually is the desired information communicated to an observer, i.e., any light, as from an observer's automobile headlights, reflected from the reflector makes the presence of the reflector, and thus danger or need for caution, known to the observer; however, in indented subclass 527, below, some of the reflectors reflect light from a traffic signal light to an observer or reflect light from a source to an observer merely to determine if the source is operating.

(2) Note. The structure of signs with the nominal recitation of a signal reflector are classified in Class 40. In particular an "indicia" design or the conveyance of specific information would be classifiable in Class 40.

(3) Note. Most of the patents in these subclasses relate to highway traffic in the form of indicating the presence of an approaching curve, vehicle, or pedestrian on a roadway.

(5) Note. Since Class 359 is considered superior to Class 116 (See Lines With Other Classes and Within This Class), the use of a signal reflector as a signal source or indicator will be classified in Class 359, unless the details of the signals and indicators are specified.

(6) Note. Track reflectors having utility with railroads are classified in Class 246.

(7) Note. A nominal recitation, i.e., no optical limitations, of a signal reflector combined with the specifics of its support is classified in Class 248.

(8) Note. The patents of this and indented subclasses are to use the signal reflector to attract attention as opposed to being the source of illumination of Class 362.

(9) Note. A lens, as in a plastic tail light of an automobile used to identify an automobile's presence to a following automobile, is classified in Signal Reflectors

(subclasses 515+), rather than Lens (subclasses 642+).

(10) Note. A mirror, located along the side of the road to cause a light flash for identification of the edge of the road as an automobile approaches, is classified in Signal Reflectors (subclasses 515+), rather than Mirror, (subclasses 838+) since a nominal recitation of a mirror claimed with other structure is classified with the other structure.

(11) Note. The combination of an article of clothing and a signal reflector is classified in this subclass since the combination only is classified in Class 2, if not otherwise classifiable.

(12) Note. The combination of an animal collar (i.e., nominal recitation of a collar or harness) together with a signal reflector is classified with the signal reflector of this and indented subclasses, while a reflector claimed in combination with more than a nominal collar is classified in Class 119, subclass 858.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514, for signal reflector sealing from moisture or foreign particles.

838+, for mirrors which reflect a substantial portion of incident light, but the reflected light is not used for signalling purposes.

SEE OR SEARCH CLASS:

36, Boots, Shoes, and Leggings, subclass 137 for light reflecting or illumination attached to a shoe.

40, Card, Picture, or Sign Exhibiting, sub-class 208 for a license plate and reflector, subclass 219 for translucent mirrors with indicia, and subclasses 582+ for illuminated signs which may include reflective elements.

116, Signals and Indicators, subclass 20 for helios graphic code signaling and subclasses 63+ for mechanical street traffic signalling structure, such as a semphore, light shutter, or pointer.

119, Animal Husbandry, subclass 858 for an animal collar including a reflector.

246, Railway Switches and Signals, subclass 474 for railway track reflectors which are disclosed as having special utility with railroads.

248, Supports, subclasses 201+ for brackets and subclasses 466+ for mirror or picture type supports.

250, Radiant Energy, subclasses 483.1+ for reflectors including luminescent, fluorescent or phosphorescent material.

264, Plastic and Nonmetallic Article Shaping or Treating Processes, subclass 1.9 for reflective type.

301, Land Vehicles: Wheels and Axles, subclass 37 for protectors or trim members.

313, Electric Lamp and Discharge Devices, subclasses 113+ for an electric lamp or discharge device with a reflector integral therewith.

340, Communications: Electrical, appropriate subclasses for traffic and vehicle signal lights, subclasses 815.4+ for visual indicator, and subclass 815.76 for lens type indicator.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 5+ for radar reflectors, i.e., reflectors of radio frequency waves.

362, Illumination, for artificial illumination means, subclasses 296.01 through 296.1 for projectors with reflectors, subclasses 341-350 for constant reflectors, and subclasses 459-549 for illumination with vehicle structure.

404, Road Structure, Process, or Apparatus, subclasses 9+ includes reflector support structure combined with road structure.

427, Coating Processes, subclasses 162+ for optical element produced.

428, Stock Material or Miscellaneous Articles, subclass 98 for structurally defined web or sheet.

516 Body carried:

This subclass is indented under subclass 515. Subject matter including apparatus to enable a user (human or animal) to carry the reflector.

(1) Note. A reflector carried by the hand or wrist but not worn by the user, belongs in this subclass, rather than subclass 517.

(2) Note. The combination of either a flashlight or a cane with an attached reflector, which is normally carried by the hand, belongs in this subclass.

(3) Note. The combination of an article of clothing and a signal reflector belongs in this subclass not with the apparel of Class 2, since the combination only belongs in Class 2, if not otherwise classifiable.

(4) Note. The combination of an animal collar (i.e., nominal recitation of a collar or harness) together with a signal reflector is classified with the signal reflector not the collar of Class 119, subclass while a reflector claimed in combination with more than a nominal collar is classified in Class 119, subclass 858.

SEE OR SEARCH THIS CLASS, SUBCLASS:

517, for a signal reflector that is part of or attached to an article worn on the hand or wrist of the user.

518, for reflectors that are an integral part of the clothing used as apparel.

519, for reflectors that are worn over clothing, but not held.

SEE OR SEARCH CLASS:

36, Boots, Shoes, and Leggings, subclass 137 for light reflecting or illumination attached to a shoe.

63, Jewelry, for pertinent subclass(es) as determined by schedule review.

116, Signals and Indicators, subclass 35 for motion and direction indicators for vehicles.

119, Animal Husbandry, subclass 858 for an animal collar including a reflector.

340, Communications: Electrical, subclass 321 for portable self-contained (e.g., movie usher's signalling flashlight) and subclass 475 for turn signals.

362, Illumination, subclass 103 for wearing apparel or body support, subclass 104 for jewelry with wearing apparel or body support.

517 Worn by hand or wrist:

This subclass is indented under subclass 516. Subject matter wherein the reflector is a part of or attached to clothing or a device both of which are worn by the wrist or hand.

(1) Note. A glove having a reflector is classified in this subclass.

(2) Note. A wrist band having a reflector is classified in this subclass.

(3) Note. A reflector carried by the hand or wrist, but not worn, is classified in subclass 516.

(4) Note. Safety belts, pins, etc., wherein the sole function of the apparatus is to mount a signal reflector for safety purposes are classified in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

516, for reflectors that are carried by the body and not worn by the user.

SEE OR SEARCH CLASS:

2, Apparel, subclasses 158+ for hand or arm covering.

36, Boots, Shoes, and Leggings, subclass 71.5 for preformed, externally applied, wear-connecting attachments.

63, Jewelry, subclasses 3+ for bracelets and subclasses 15+ for finger rings.

362, Illumination, subclass 104 for jewelry with wearing apparel or body support.

518 Permanently fixed to clothing:

This subclass is indented under subclass 516. Subject matter wherein a reflector is attached to an article of clothing and remains on the clothing when a person discontinues wearing the clothing.

(1) Note. Signal reflectors that are part of the clothing a person wears and the clothing serves other purposes than as a mount for a reflector are classified in this subclass.

(2) Note. A belt, having a reflector, worn through the loops of a pair of trousers functions as an article of clothing and is classified and in this subclass.

(3) Note. Signal reflectors that are transparent spheres permanently fixed to clothing by glue, transparency, etc., are classified in this subclass.

(4) Note. A helmet, hat, shoe, or boot is considered clothing for this subclass, but Class 36, subclass 137 takes light reflecting or illumination attached to a shoe.

(5) Note. A pin with a reflector is not permanently fixed to clothing, but is classified in subclass 519.

(6) Note. A signal reflector permanently attached to an animal collar, leash, or harness is classified in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

519, for safety belts, pins, etc., having a reflector and the sole purpose of wearing the article is for safety reasons. A safety belt is not worn through the loops of a pair of trousers.

538, for minute transparent reflective spheres mounted on a flexible substrate that is not clothing.

SEE OR SEARCH CLASS:

2, Apparel, subclasses 158+ for hand or arm covering.

36, Boots, Shoes, and Leggings, subclass 71.5 for preformed, externally applied, wear-connected attachments.

63, Jewelry, subclasses 3+ for bracelets and subclasses 15+ for finger rings.

519 Worn over clothing:

This subclass is indented under subclass 516. Subject matter wherein the reflector is mounted on apparatus that is placed over the apparel of a user.

(1) Note. This would include a safety belt, a safety belt harness, and pins that are worn solely for the reflecting properties not as part of the normal dress of the person. A safety belt is not used through the loops of a pair of trousers.

SEE OR SEARCH THIS CLASS, SUBCLASS:

516, for a signal reflector that is held by the user rather than worn.

518, for a belt used as an article of clothing for a pair of trousers which also has a reflector integral or as part of the belt.

SEE OR SEARCH CLASS:

2, Apparel, subclasses 158+ for hand or arm covering.

36, Boots, Shoes, and Leggings, subclass 71.5 for preformed, externally applied, wear-connecting attachments.

63, Jewelry, subclasses 3+ for bracelets and subclasses 15+ for finger rings.

520 Moving:

This subclass is indented under subclass 515. Subject matter where the signal reflector is in a continuous state of motion to be more easily observed.

(1) Note. The continuous state of motion could be vibration, oscillation, or rotation on a specified device whether or not they are “claimed” as rotating etc.

(2) Note. The motion of reflectors resulting from vehicle vibration, vehicle wheels, wind action, etc., are considered to be an irregular nature for this subclass and not periodic.

(3) Note. The beam deflection caused by a nonperiodic moving reflector solely to present a clearer observation of the reflector belong in this subclass not beam deflection by the reflector to communicate some specific information via the modulation produced by the signal reflector beam deflection.

(4) Note. Rigidly mounted reflectors such as bicycle reflectors mounted on the frame do not belong here but in subclass 550.

SEE OR SEARCH THIS CLASS, SUBCLASS:

212.1 through 215.1, for a periodically moving reflector to produce light beam deflection/scanning without modulation.

508, for rotating reflector to throw off moisture or foreign particle.

526, for reflectors that are wobbly mounted on the support.

549+, for reflectors rigidly mounted to a vehicle in order to move exactly as the vehicle.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclass 208 for a license plate and reflector, subclasses 427+ and 446+ for display devices that simulate motion or a changing exhibitor, subclasses 582+ for illuminated signs which may include reflective elements.

116, Signals and Indicators, subclasses 28+ for vehicle, subclasses 46+ for rotatable motion and direction indicators for vehicles, and subclass 56 for vehicle-energy actuated.

246, Railway Switches and Signals, subclass 125 for electric automatic highway signals, mine doors, and gates.

521 Pedal mounted:

This subclass is indented under subclass 520. Subject matter wherein the reflector is attached to the pedal of a vehicle that requires pedal movement for vehicle motion.

(1) Note. These patents are generally bicycle pedals but are not limited only to bicycles.

SEE OR SEARCH THIS CLASS, SUBCLASS:

523, for spoke mounted moving reflectors.

524, for tire, valve stem, wheel, hub cap, or axle mounted moving reflectors.

550, for reflectors rigidly mounted to a bicycle or motorcycle.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 560 for pedals and subclasses 594.4 for pedals connected to a crank.

522 Rotating:

This subclass is indented under subclass 520. Subject matter wherein the reflector movement is rotational about some axis.

(1) Note. This includes reflectors that are rotated by the gases expelled from the exhaust pipe of a vehicle.

(2) Note. The structure of signs with the nominal recitation of a signal reflector are classified in Class 40. In particular, an “indicia” design or the conveyance of specific information would be classifiable in Class 40.

SEE OR SEARCH THIS CLASS, SUBCLASS:

508, for optical elements that are rotated for protection from moisture or foreign particles.

520, for reflectors that appear to move but are stationary and moving apertures in front of the reflectors make them appear to be moving.

525, for wind driven rotating reflectors.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclasses 430+ for rotatable displays with special effects.

116, Signals and Indicators, subclasses 28+ for vehicle, subclasses 46+ for rotatable motion and direction indicators for vehicles, and subclass 56 for vehicle-energy actuated.

523 Spoke mounted:

This subclass is indented under subclass 522. Subject matter wherein the reflector is attached onto one or more spokes that position the rim from the hub.

(1) Note. This subclass includes bicycle and motorcycle spokes as well as any other type of spoked wheel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

521, for pedal mounted moving reflectors.

524, for tire, valve stem, wheel, hub cap, or axle mounted moving signal reflectors.

550, for reflectors rigidly mounted on a bicycle or motorcycle.

SEE OR SEARCH CLASS:

301, Land Vehicles: Wheels, and Axles, subclass 37 for wheel covers fastened to the spokes of a wheel.

340, Communications: Electrical, appropriate subclasses for bicycle traffic and vehicle communications.

362, Illumination, subclasses 473+ with a bicycle or motorcycle supporting the illumination source.

524 Tire, wheel, valve stem, hub cap, or axle mounted:

This subclass is indented under subclass 522. Subject matter wherein the reflector is attached to either a rotating tire, valve stem, wheel, hub cap, or axle of a vehicle.

(1) Note. This also includes reflectors attached to or part of a dust cover of a valve stem.

SEE OR SEARCH THIS CLASS, SUBCLASS:

521, for pedal mounted moving reflectors.

523, for spoke mounted moving reflectors.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclass 587 for tire and wheel signs.

138, Pipes and Tubular Conduits, subclass 89.4 for inflation stem dust covers.

301, Land Vehicles: Wheels, and Axles, subclass 37 for wheel protectors or trim members, or wheel covers fastened to the spokes of a wheel, and subclass 108 for wheel hub caps.

340, Communications: Electrical, appropriate subclasses for bicycle traffic and vehicle communications.

362, Illumination, subclasses 473+ with a bicycle or motorcycle supporting the illumination source.

525 Wind driven:

This subclass is indented under subclass 522. Subject matter wherein the rotation of the reflector, attached to a vehicle, is controlled by wind.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclass 440 for rotatable fluid operated display with special effects and subclass 479 for rotatable fluid operated changing exhibitor.

116, Signals and Indicators, digest 7 for fluid actuated.

446, Amusement Devices: Toys, subclasses 217+ for fluid driven rotatable blade (e.g., pinwheel).

526 Vibration:

This subclass is indented under subclass 520. Subject matter wherein the signal reflector attracts attention by its own random movement relative to its support.

(1) Note. This reflector is not driven by any motor or other source of energy such as the wheel of a vehicle or the wind.

(2) Note. The reflector is wobbly mounted with respect to its support.

(3) Note. The reflector has additional movement from that created by its support (i.e., it is suspended from its support bracket).

(4) Note. Reflectors rigidly mounted to a support via a helical or other spring belong in this subclass since they will vibrate.

(5) Note. A reflector attached to a mudflap of a vehicle would be classified here since the movement of the mudflap having the reflector attracts attention.

(6) Note. Rigidly mounted reflectors such as bicycle reflectors mounted on the frame do not belong here but in subclass 550.

SEE OR SEARCH THIS CLASS, SUBCLASS:

520, for reflectors that are in a continuous state of motion relative to their support.

549, for reflectors that are rigidly mounted on a moving vehicle.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclasses 613+ for vibratory signs.

527 For a signal source remote from observer:

This subclass is indented under subclass 515. Subject matter including structure to reflect light from a signal originating from a source remote from the observer, i.e., not coming from a light source at the location of the observer.

(1) Note. This structure may be merely a plane mirror mounted on an automobile hood to reflect light from an overhead traffic signal to the driver or it may be a reflector at a street intersection which reflects light from the headlights of one car to the driver of another car travelling in a direction approximately 90 degrees different than that of the first car.

(2) Note. Road reflectors remote from the vehicle, to reflect all of an automobile's headlight beams back to the driver are not classified in this subclass since the source of the vehicle headlight beams are at the location of the observer.

(3) Note. The reflection of the light beams of one vehicle's headlights to another vehicle would be classified in this subclass.

(4) Note. A reflector which reflects a portion of the light output of a vehicle's headlight or taillight to be observable by the driver of the vehicle is classified in this subclass, rather than Class 362, since the reflection is for observation rather than illumination.

SEE OR SEARCH THIS CLASS, SUBCLASS:

529+, for 3 corner retroreflectors which return a light beam back to the source.

531, for unitary retroreflectors mounted on the road surface.

546+, for plural reflecting elements for a single sheet or plate such as in some road reflectors.

551, for reflectors mounted on the roadway that reflect the light from a vehicle back to the driver of the vehicle.

552, for reflectors mounted adjacent the roadway which reflect the light beams from a vehicle's headlights back to the driver of the vehicle.

838, for similar mirrors which are not disclosed as signal mirrors, which only have to reflect light, but which are disclosed as reflecting images.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclass 559 for illuminated sign external light source if indicia is present.

246, Railway Switches and Signals, subclass 474 for track reflectors. A railway and switch in combination with a nominally recited signal reflector are also classified in this class (246).

248, Supports, subclasses 476+ for adjustable mirror or picture position.

296, Land Vehicles: Bodies and Tops, subclass 97.1 for glare or screen body and subclass 97.2 for specific structure or properties for diffusing or reflecting light to reduce the glare on the viewer's eyes.

362, Illumination, subclasses 341+ for a reflector light modifier.

404, Road Structure, Process, or Apparatus, subclass 16 for reflectors used to detect the presence of traffic.

528 Light transmitting from source behind a reflector:

This subclass is indented under subclass 515. Subject matter where the reflector is adapted to transmit light from a source which is behind the surface of the reflector which is normally viewed, such as in a tail-light reflector which transmits light from a light bulb behind the reflector or lens and also reflects a large amount of light which is directed to the front surface of the reflector by an external source such as the headlights of an approaching automobile.

(1) Note. The patents of this subclass use a signal reflector combination with a light source behind the reflector in order to attract attention of other vehicles, either by the light source itself or reflection of the other vehicle's light.

(2) Note. The use of a reflector to change (i.e., concentrate, disperse, collimate) the light from a source for illumination purposes belong in Class 362 (e.g., the reflector behind the light source of a headlight used to direct the outgoing beam in a particular pattern).

SEE OR SEARCH THIS CLASS, SUBCLASS:

549, for a taillight that reflects incoming light from a reflector behind the light source that transmits away from the vehicle.

SEE OR SEARCH CLASS:

362, Illumination, subclasses 296.01 through 296.1 for a light source and modifier including a reflector where the reflector is used to modify the outgoing source light beam, subclasses 341-350 for reflector light modifiers, subclasses 459-549 for illumination with vehicle structure, and subclass 494 for mirror or reflector with vehicle structure (e.g., rear view mirror).

428, Stock Material or Miscellaneous Articles, subclass 31 for vehicle body ornament.

529 3-Corner retroreflective (i.e., cube corner, trihedral, or triple reflector type):

This subclass is indented under subclass 515. Subject matter wherein the light is reflected from three reflecting surfaces and wherein after the three reflections, it moves in a direction opposite to and parallel to its direction before the three reflections.

(1) Note. The reflections may be external or internal, i.e., the light may be reflected without entering the material from which the reflector is made or the light may enter one surface of the reflector, be reflected three times internally, and exit through the same surface.

(2) Note. Single or plural 3-corner reflectors are classified in this subclass but plural reflectors formed into a single substrate are classified in subclass 530.

SEE OR SEARCH THIS CLASS, SUBCLASS:

527, for a structure which reflects light from a signal source remote from an observer.

530, for plural 3-corner reflectors in a single substrate.

831+, for prisms, per se.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclasses 357+ for a mold with separating or clamping.

72, Metal Deforming, subclasses 379.2+ for deforming sheet metal.

204, Chemistry: Electrical and Wave Energy, subclass 281 for electroforming mold or strips, plates, electrodes apparatus for forming electrolytic elements.

228, Metal Fusion Bonding, subclasses 141.1+ for the process of shaping.

249, Static Molds, subclass 117 for container type molding device.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 1.9 for reflective composite or multilayer optical article shaping or treating.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 7+ for radio wave cube corner reflectors.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 403 for shaping surfaces, per se, and subclass 808 for lens mold.

530 Unitary plate or sheet comprising plural reflecting elements:

This subclass is indented under subclass 529. Subject matter wherein the reflective elements, such as the individual triple reflectors, are part of a single plate or sheet comprising a plurality of the 3-corner reflective elements.

(1) Note. The reflective elements are a part of the structure of the plate or sheet.

(2) Note. Many of these retroreflectors are used on highways for road makers.

(3) Note. Plural reflectors combined into a single substrate are classified in this subclass whereas plural reflectors using multiple substrates are classified in subclass 529.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclasses 357+ for a mold with separating or clamping.

72, Metal Deforming, subclasses 379.2+ for deforming sheet metal.

204, Chemistry: Electrical and Wave Energy, subclass 281 for electroforming mold or strips, plates, electrodes apparatus for forming electrolytic elements.

228, Metal Fusion Bonding, subclasses 141.1+ for the process of shaping.

249, Static Molds, subclass 117 for container type molding device.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 1.9 for reflective composite or multilayer optical article shaping or treating.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 7+ for radio wave cube corner reflectors.

404, Road Structure, Process, or Apparatus, subclass 14 for lane marker impregnated with reflective material, subclass 16 for vibration inducing member including a reflector.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 403 for shaping surfaces, per se, and subclass 808 for lens mold.

531 Mounted on roadway:

This subclass is indented under subclass 530. Subject matter wherein the reflector is positioned onto the vehicle road surface in order to enable easier viewing of that portion of the roadway.

(1) Note. A reflector sign, having a unitary plate of 3-corner reflectors, permanently fastened to a road surface would belong in this subclass but the same reflector counterbalanced within a recess in the roadway - ordinarily up and visible but capable of retraction into the recess when contacted by the vehicle wheel - is classified in Class 404.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514, for signal reflector sealing from moisture or foreign particle.

547, for a unitary mass of discrete reflecting elements mounted on or adjacent the roadway.

551, for a broad reflector mounted on the roadway.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclass 612 for highway or street marker.

180, Motor Vehicles, subclass 168 having controlling apparatus adapted to interact with stationary apparatus which describes the course of the vehicle's travel.

404, Road Structure, Process, or Apparatus, subclasses 9+ for traffic director where the reflector is not permanently fixed to the road surface.

532 Mounted adjacent roadway:

This subclass is indented under subclass 530. Subject matter wherein the reflector is positioned off of the roadway surface but within viewing distance of the driver of a vehicle in order to enable easier viewing of the edge of the roadway.

(1) Note. A reflector sign permanently fastened to a road surface would belong in this subclass but the same reflector counterbalanced within a recess in the roadway - ordinarily up and visible but capable of retraction into the recess when contacted by the vehicle wheel is classified in Class 404.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514, for signal reflector sealing from moisture or foreign particle.

547, for a unitary mass of discrete reflecting elements mounted on or adjacent the roadway.

552, for a broadly recited reflector mounted adjacent the roadway.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclass 612 for highway or street marker.

116, Signals and Indicators, subclasses 63+ for street traffic where the device for giving signals are generally due to some movement of some part or element from a normal or nonsignalling or signal-controlled position (e.g., a semaphore).

180, Motor Vehicles, subclass 168 having controlling apparatus adapted to interact with stationary apparatus which describes the course of the vehicle's travel.

404, Road Structure, Process, or Apparatus, subclasses 9+ for traffic director where the reflector is not permanently fixed to the road surface.

533 Mounted on vehicle:

This subclass is indented under subclass 530. Subject matter wherein the reflector is positioned on a vehicle.

(1) Note. This vehicle could be an airplane, boat, automobile, train, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

548, for discrete reflecting elements formed as a unitary mass mounted on a vehicle.

549, for broadly recited reflectors mounted on a vehicle.

534 Including a curved refracting surface:

This subclass is indented under subclass 515. Subject matter including a surface which is curved and which refracts or bends the light before or after it is reflected.

(1) Note. The reflector operates as a separate function and is located behind the actual curved refracting surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:

546+, for reflecting elements formed as a unitary piece.

642+, for lenses generally, and especially subclasses 727+ for lenses including concave or convex reflecting surfaces.

535 Within individual indentations:

This subclass is indented under subclass 534. Subject matter wherein the curved refracting surface is positioned either within an indentation of the substrate or within a socket created by a plurality of elements to hold it in place.

(1) Note. Multiple minute spheres used to retain a much larger curved refracting optical element within a socket for the larger element belong in this subclass.

(2) Note. These indentations can be produced by a platen which forces refracting beads against a substrate to form indentations, thus producing separate indentations for each bead.

SEE OR SEARCH THIS CLASS, SUBCLASS:

543, for individual reflector (not microsphere) element mount.

536 Minute transparent spheres:

This subclass is indented under subclass 534. Subject matter where the elements which refract and reflect are tiny transparent spheres, commonly called "little glass beads".

(1) Note. The elements may be partially or fully embedded. The matrix may be attached to a surface of any shape such as a spherical or a flat surface.

(2) Note. These spheres range in size between 3-6 mils (i.e., 0.003 - 0.006 inches).

SEE OR SEARCH THIS CLASS, SUBCLASS:

539, for a mixture of spheres in a liquid binder (e.g., paint or resin).

540, for spheres placed on top of a binder (e.g., resin, asphalt, glue).

SEE OR SEARCH CLASS:

501, Compositions: Ceramic, subclass 34 for reflective glass beads.

523, Synthetic Resins or Natural Rubbers, subclass 219 for process of forming glass void.

537 Directional reflection (e.g., prevent viewing unless critical angle of light is used):

This subclass is indented under subclass 536. Subject matter wherein the reflective structure behind the spheres is arranged to permit viewing of the image behind the spheres, only if the incident light is transmitted to the spheres at the desired critical angle.

(1) Note. The directional reflection of this subclass permits viewing of the image only by those authorized (i.e., knowing the angle).

(2) Note. The image is not changed by the directional reflection but observation is accomplished dependent upon viewing at the proper angle.

(3) Note. A picture that is covered by a substrate containing minute glass spheres to permit viewing of the picture via the reflected light only if the incident light is at a predetermined angle belongs in this subclass.

SEE OR SEARCH CLASS:

380, Cryptography, subclass 54 for modifying optical image (e.g., transmissive overlay) by changing its visible appearance.

538 On flexible substrate (e.g., flexible sheeting, bumper sticker, etc.):

This subclass is indented under subclass 536. Subject matter wherein the spheres are placed on a flexible material by transfer, glue, etc., and this material can be used for an reflective purpose.

(1) Note. Spheres embedded in a resin that remains flexible (e.g., elastomeric composition) are classified in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

518, for signal reflectors (e.g., transparent spheres, etc.) permanently fixed to clothing (e.g., by glue, transparency, etc.).

SEE OR SEARCH CLASS:

2, Apparel, for apparel, per se.

539 Mixture in liquid binder (e.g., paint, resin):

This subclass is indented under subclass 536. Subject matter wherein the spheres are located within the mixture of paint or resin and are simultaneously applied to the surface as a complete mixture.

(1) Note. This mixture can be painted onto signs, vehicles, or roadway surfaces.

SEE OR SEARCH THIS CLASS, SUBCLASS:

540, for spheres that are placed on top of a binder prior to the hardening of the binder.

551, for reflective paint that does not have minute spheres.

SEE OR SEARCH CLASS:

106, Compositions: Coating or Plastic, subclasses 228 and 253 for a natural resin or derivative containing filler, dye, or pigment.

523, Synthetic Resins or Natural Rubbers, subclass 527 for glass DNRM nonreactive material mixed with a composition.

540 Placed on top of binder (e.g., resin, asphalt, glue, etc.):

This subclass is indented under subclass 536. Subject matter wherein the binder is first placed on the surface and subsequently, prior to hardening of the binder, the spheres are placed thereon to ensure that they are fixed to the surface via the binder.

(1) Note. This includes exposed spheres which are glued to the surface, resulting in an exposed glass-sphere surface.

(2) Note. Spheres which are not completely surrounded by the binder belong in this subclass.

(3) Note. A monolayer (single) of spheres on a binder belong in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

539, for spheres which are completely surrounded by the binder.

541 With single transparent coating between spheres and atmosphere:

This subclass is indented under subclass 540. Subject matter wherein a single coating, which is transparent to light, surrounds and either (1) completely envelopes the normally exposed surface of the sphere, (2) touches only a portion of the spheres, or (3) is an interface for the minute spheres where the spheres are confined but not touching the exposed surface.

(1) Note. This single coating will cover the sphere relative to the environment yet have no optical effect on the light that would impinge on a normally exposed surface of the sphere. If reference is made to protection of the reflector from moisture or foreign particle it belongs in subclass 514.

(2) Note. A transparent coating used simply to hold the spheres onto the binder is not considered a sealer as in subclass 514.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514, for a sealed signal reflector to protect it from moisture or foreign particle.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclass 34 for light transmissive sheets with gas space therebetween and edge sealed (e.g., double glazed storm window, etc.).

542 Plural refracting elements formed as a unitary mass:

This subclass is indented under subclass 534. Subject matter including a unitary mass of transparent material which comprises a plurality of curved refracting surfaces.

(1) Note. This unitary mass performs refraction of the incoming light prior to reflection by the reflector, and also of the outgoing light after reflection.

SEE OR SEARCH THIS CLASS, SUBCLASS:

454+, for projection screens having a unitary sheet of plural refracting areas.

530, for plural cube corner reflectors which together make up a unitary plate.

546, for discrete reflecting elements which comprise a unitary mass.

543 With individual reflector element mount:

This subclass is indented under subclass 534. Subject matter including means for mounting the individual optical elements such as small socket-like mounts in which the elements are inserted and held or further including means for mounting the small socket-like mounts.

(1) Note. Reflector buttons that simply reflect light falling on them, autocollimating, without the creation of a single image of an object at a focal point are classified in this subclass rather than the lens subclasses of this class.

(2) Note. Although reflector buttons are often called “lenses” they are not classified in the lens subclasses of this class unless they create a single image of an object at a focal point.

SEE OR SEARCH THIS CLASS, SUBCLASS:

535, for minute transparent spheres within individual indentations.

546, for a multifaceted single glass reflector which is considered a unitary mass of discrete reflecting elements.

642+, for lenses, per se.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclasses 201+ for a license plate with a theft-preventive feature.

404, Road Structure, Process, or Apparatus, subclasses 9+ for reflector support structure combined with road structure.

544 Including a snap, spring clip, or spring retainer:

This subclass is indented under subclass 543. Subject matter wherein either the curved refracting surface or the reflecting surface behind the refractor are individually mounted on a support by being pushed into a retainer which opens for entrance and closes around a portion of the element when it is in the settled position or a coil spring holds each element in place.

(1) Note. The snap or spring clip retainer could either clamp onto the refractor/reflector or could be used to clamp a retainer to a housing and the refractor/reflector force fitted into the retainer. The combination of a refractor/reflector and a retainer that is snapped into a third device belong in this subclass.

(2) Note. A rubber slot into which the refractor or reflector are pushed into for retention in the slot belong in subclass 543.

(3) Note. Although the reflector buttons of this subclass are often referred to as lenses, these have not been crossed into lenses since these simply reflect the light falling on them rather than create a single image of an object at a focal point. These buttons are often referred to as auto collimating.

SEE OR SEARCH THIS CLASS, SUBCLASS:

545, for a mount using a threaded member.

SEE OR SEARCH CLASS:

248, Supports, subclass 27.3 for holding an instrument in a panel by a biased clip.

267, Spring Devices, subclass 159 for a snap spring and subclasses 166+ for coil springs.

545 Including a threaded member:

This subclass is indented under subclass 543. Subject matter where the means for mounting includes a threaded member for screw attachment and this can be used to mount the curved refracting surface that is located in front of the reflecting surface.

(1) Note. Reflector buttons that simply reflect light falling on them, autocollimating, without the creation of a single image of an object at a focal point are classified in this subclass rather than the lens subclasses of this class.

(2) Note. Although reflector buttons are often called “lenses” they are not classified in the lens subclasses of this class unless they create a single image of an object at a focal point.

SEE OR SEARCH CLASS:

411, Expanded, Threaded, Driven, Headed, Tool-Deformed, or Lock-Threaded Fastener, subclasses 81+ for threaded fastener and means for restricting rotation thereof relative to coacting substructure.

546 Discrete reflecting elements formed as a unitary mass:

This subclass is indented under subclass 515. Subject matter wherein a plurality of reflective elements are each part of a unitary plate or sheet.

(1) Note. This unitary mass performs the actual reflection of the incoming beam.

(2) Note. This includes a single glass reflector having multiple facets.

(3) Note. The individual reflectors are arranged to reflect light as if it came from one single reflector having a particular characteristic.

SEE OR SEARCH THIS CLASS, SUBCLASS:

459, for a unitary sheet comprising plural reflecting elements on a projection screen.

527, for reflectors that reflect headlight beams to the eyes of the driver.

529, for retroreflective reflectors that reflect the light directly to the source of the light.

530, for a plurality of triple reflectors which are each part of a unitary plate or sheet.

542, for a plurality of signal reflectors with a curved reflecting and a curved refracting surface which are each part of a unitary plate or sheet.

547 Mounted on or adjacent roadway:

This subclass is indented under subclass 546. Subject matter wherein the unitary mass is positioned either on or off of the roadway surface within viewing distance of the driver of a vehicle in order to enable an easier view of that portion of the roadway or the edge of the roadway.

(1) Note. A reflector sign, having discrete reflecting elements, permanently fastened to a road surface would belong in this subclass but the same reflector counterbalanced within a recess in the roadway - ordinarily up and visible but capable of retraction into the recess when contacted by the vehicle wheel is classified in Class 404.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514, for signal reflector sealing from moisture or foreign particle.

531, for a unitary plate of 3-corner reflectors mounted on the roadway.

532, for a unitary plate of 3-corner retroreflectors mounted adjacent the roadway.

551, for a broad reflector mounted on the roadway.

552, for a broadly recited reflector mounted adjacent the roadway.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclass 612 for highway or street marker.

116, Signals and Indicators, subclasses 63+ for street traffic where the device for giving signals are generally due to some movement of some part or element from a normal or nonsignalling or signal-controlled position (e.g., a semaphore).

404, Road Structure, Process, or Apparatus, subclasses 9+ for traffic director where the reflector is not permanently fixed to the road surface.

548 Mounted on vehicle:

This subclass is indented under subclass 546. Subject matter wherein the unitary mass is positioned on a vehicle.

(1) Note. This vehicle could be an airplane, boat, automobile, train, etc.

(2) Note. This includes a single glass reflector having multiple facets.

SEE OR SEARCH THIS CLASS, SUBCLASS:

533, for a unitary plate of 3-corner retroreflectors mounted on a vehicle.

549, for broadly recited reflectors mounted on a vehicle.

549 Rigidly mounted on vehicle:

This subclass is indented under subclass 515. Subject matter wherein the reflector is rigidly attached to any type of vehicle used to carry passengers.

(1) Note. This vehicle could be an airplane, boat, automobile, train, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

520, for reflectors that are in a continuous state of motion relative to a vehicle.

526, for reflectors that attract attention by the random movement with respect to the support.

533, for a unitary plate of 3-corner retroreflectors mounted on a vehicle.

548, for discrete reflecting elements formed as a unitary mass mounted on a vehicle.

550 Bicycle or motorcycle:
This subclass is indented under subclass 549. Subject matter wherein the vehicle is a two wheeled vehicle in the form of either a bicycle or motorcycle.

SEE OR SEARCH THIS CLASS, SUBCLASS:
521, for pedal mounted reflectors.
523, for spoke mounted reflectors.

551 Mounted on roadway:
This subclass is indented under subclass 515. Subject matter wherein the reflector is attached to the road surface itself either in the form of individual reflector units fastened to the road surface or reflective paint.

(1) Note. Reflective paint, without minute transparent spheres, for highway marking is classified in this subclass.

(2) Note. A reflector sign (not having a unitary plate of 3-corner reflectors or a unitary mass of discrete reflecting elements) permanently fastened to a road surface would belong in this subclass but the same reflector counterbalanced within a recess in the roadway - ordinarily up and visible, but capable of retraction into the recess when contacted by the vehicle wheel - is classified in Class 404.

SEE OR SEARCH THIS CLASS, SUBCLASS:
531, for a unitary plate of 3-corner retroreflectors mounted on the roadway.
539, for paint containing minute transparent spheres.
547, for a unitary mass of discrete reflecting elements mounted on or adjacent the roadway.

SEE OR SEARCH CLASS:
106, Compositions: Coating or Plastic, subclasses 228 and 253 for a natural resin or derivative containing filler, dye, or pigment.
523, Synthetic Resins or Natural Rubbers, subclass 527 for glass DNRM nonreactive material mixed with a composition.

552 Mounted adjacent roadway:
This subclass is indented under subclass 515. Subject matter wherein the reflector is permanently mounted next to the roadway for viewing by the driver of an automobile and generally reflecting the beams of automobile headlights.

(1) Note. A reflector sign permanently fastened to a road surface would belong in this subclass but the same reflector counterbalanced within a recess in the roadway - ordinarily up and visible but capable of retraction into the recess when contacted by the vehicle wheel is classified in Class 404.

SEE OR SEARCH THIS CLASS, SUBCLASS:
532, for a unitary plate of 3-corner retroreflectors mounted adjacent the roadway.
547, for a unitary mass of discrete reflecting elements mounted on or adjacent the roadway.
553, for a reflector which is portable, i.e., temporarily placed.

SEE OR SEARCH CLASS:
40, Card, Picture, or Sign Exhibiting, subclass 612 for highway or street marker.
116, Signals and Indicators, subclasses 63+ for street traffic where the device for giving signals are generally due to some movement of some part or element from a normal or nonsignalling or signal - controlled position (e.g., a semaphore).
180, Motor Vehicles, subclass 168 having controlling apparatus adapted to interact with stationary apparatus which describes the course of the vehicle's travel.
404, Road Structure, Process, or Apparatus, subclasses 9+ for traffic director where the reflector is not permanently fixed to the road surface.

553 Emergency or temporary reflectors (i.e., portable self standing):
This subclass is indented under subclass 515. Subject matter wherein the reflectors are used as temporary barricades placed on or adjacent the roadway, foldable or collapsible reflectors for use when a car breaks down or directing traffic.

(1) Note. These reflectors are not rigidily mounted but simply placed on the surface (roadway or adjacent areas) to warn oncoming traffic of a necessary change in driving conditions along the roadway.

SEE OR SEARCH THIS CLASS, SUBCLASS:
529+, for 3-corner retroreflectors.
532, for 3-corner retroreflectors which are permanently adjacent the roadway.
534+, for reflectors having a curved refracting surface.
546+, for discrete reflecting elements formed as a unitary mass.
552, for reflectors which are permanently adjacent the roadway.

SEE OR SEARCH CLASS:
116, Signals and Indicators, subclass 63 for specific mechanisms for folding and expanding a portable street traffic signal and indicator with only a nominal recitation of a signal reflector.
248, Supports, subclass 472 for a foldable mirror or picture type.

554 IMAGE STABILIZATION:
This subclass is indented under the class definition. Subject matter wherein an optical element moves or changes its optical characteristic to compensate for vibrations, atmospheric turbulence, etc., to maintain a stable image.

SEE OR SEARCH THIS CLASS, SUBCLASS:
399+, for telescopes.
401, for a telescope with antirotation.
402+, for periscopes.
407+, for binoculars.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclass 5.22 for gyroscopes combined with other structure.
250, Radiant Energy, subclass 201.1 for photocell control that could include image stabilization.

555 By movable reflective structure:
This subclass is indented under subclass 554. Subject matter wherein the motion or turbulence compensating optical element is a light reflecting device for redirecting a light beam and movable such that the combined effects of motion and reflection provides the desired compensation.

556 Having plural reflecting surfaces:
This subclass is indented under subclass 555. Subject matter having a movable compensation reflector having multiple reflective surfaces.

(1) Note. This subclass includes reflector binocular devices wherein one side is stabilized relative to the other side.

(2) Note. This subclass includes image stabilization of a reflective telescope.

SEE OR SEARCH THIS CLASS, SUBCLASS:
480+, for binocular devices.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclass 149 for gyroscope or pendulum stabilized optical element and subclass 250 for pendulum suspension of optical element or reticle fiducial instruments.

557 By movable refractive structure:
This subclass is indented under subclass 554. Subject matter wherein image stabilization is accomplished via the movements of a light bending (i.e., refracting) optical element.

(1) Note. Gyroscopically supported lenses to compensate for motion belong in this subclass.

(2) Note. Compensation for the bending of periscopes also belongs here if the opti-

cal elements are movable for the compensation.

(3) Note. The refractive elements are moved individually or as a unit to compensate for the instability of the image.

(4) Note. Motion picture cameras (Class 352) would take precedence over this class but cross references for motion picture camera lenses that are gyroscopically controlled for image stabilization should go in this subclass.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 268 for celestial straightline light ray type.

89, Ordnance, subclass 41.09 for gyroscopically or pendulum controlled motor operated ordnance training mechanism.

248, Supports, subclass 123.1 for counter balanced stand and bracket.

348, Television, subclass 208 for camera image stabilization.

352, Optics: Motion Pictures, subclass 140 for focus control having gyroscopically controlled lenses.

356, Optics: Measuring and Testing, subclass 149 for gyroscope or pendulum stabilized optical element angle measuring or axial alignment.

558 DIFFRACTION:

This subclass is indented under the class definition. Subject matter wherein a light beam is split and caused to interfere with itself, which causes a change in the direction of the beam.

(1) Note. Diffraction bands result from interference of one part of a beam with another, as when the ray is deflected at the edge of an opaque obstacle, passed through a narrow slit, or deflected by an optical element such as a prism.

(2) Note. Diffraction usually, but not always, causes a break-up of the light into bands or a spectrum. Additionally, diffraction may also form a plurality of images from an object or merely redirect it, as in light diffractive scanners.

(3) Note. This subclass includes systems operating on diffraction from a straight edge, a circular disk or aperture, a slit or a grating; and also includes systems operating on Fraunhofer diffraction (far field wherein the incident light rays are parallel and the diffracted rays are brought to a focus by a focusing means) or on Fresnel diffraction (near field wherein the incident light rays arise from a finite source and no focusing means are used for rendering the diffracted rays parallel, or convergent).

(4) Note. Devices for producing moire fringes by shadow casting through grating-like elements are excluded from this subclass.

(5) Note. All diffraction has interference but interference does not require diffraction.

SEE OR SEARCH THIS CLASS, SUBCLASS:

577+, for interference of light waves.

831+, for prisms.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclass 59.1 for the process of bonding and subclass 154 for bonding glass to metal.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 81 with melting or gasification of permanently associated solid material in situ in airtight cavity.

204, Chemistry: Electrical and Wave Energy, subclass 192.26 for the coating, forming or etching with optical or photoactive deposition material by glow discharge sputter deposition.

264, Plastic and Nonmetallic Article Shaping and Treating: Processes, subclasses 1.1+ for optical article shaping or treating.

356, Optics: Measuring and Testing, subclasses 485, 494, 499, and 521 for dif light interference, and subclass 618 for moire fringe generation by shadow casting through grating-like elements.

365, Static Information Storage and Retrieval, subclass 124 for systems utilizing diffraction for selected masking of information.

369, Dynamic Information Storage or Retrieval, subclasses 109.01 through 109.02 with diffrac radiation beam modification.

382, Image Analysis, subclasses 210+ for pattern recognition using spatial filtering (e.g., holography).

427, Coating Processes, subclasses 164+ for transparent base optical element production and subclass 166 for vapor depositing.

428, Stock Material or Miscellaneous Articles, subclass 167 for parallel ribs or grooves.

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclass 5 for radiation mask, subclasses 9+ for imaged product, subclass 32 for making an optical device, subclass 323 for etching, and subclass 325 for elevated pattern.

451, Abrading, subclasses 41+ for a process of grinding glass or stone.

559 Using Fourier transform spatial filtering:
This subclass is indented under subclass 558. Subject matter wherein an optical Fourier transform is taken of a diffracted beam of light and a spatial filter is placed at the Fourier transform plane to spatially limit the output optical wave to those having Fourier transform coefficients passed by the filter.

(1) Note. A spatial filter is generally an emulsion mask having a transparent annular region in an otherwise opaque region used to eliminate undesired radiation that diverges from the optical axis beyond the confines of the transparent region.

(2) Note. A spatial filter is sometimes referred to as a mask used as an aperture to cause diffraction of the light beam passing therethrough.

(3) Note. A Fourier transform of a wave function is the amplitude representation of the components of each frequency of a given wavefront.

(4) Note. Amplitude and phase information over a discrete spatial area of the diffracted energy pattern is obtained by placing a lens at one focal length from the aperture to produce a “Fourier Transform”, and the aperture at the second focal plane of the lens creates a diffraction pattern.

SEE OR SEARCH THIS CLASS, SUBCLASS:

29, for Fourier transform holography.

SEE OR SEARCH CLASS:

382, Image Analysis, subclasses 181+ for pattern recognition where an image analyzing system possesses the capability of identifying discrete patterns, subclasses 210+ for spatial filtering wherein the optical image of each pattern to be recognized is transformed into a light amplitude distribution that is proportional to the two dimensional Fourier Transform of the pattern image, subclasses 276+ for mathematical image transformation or pre-recognition processing transformation of an image into another representation to facilitate the acquisition or subsequent recognition of imaging patterns, and subclasses 280+ for Fourier, Hadamard, or Walsh Transform of an image prior to the recognition processing.

708, Electrical Computers: Arithmetic Processing and Calculating, subclass 821 for Fourier transform computation in electrical analog computers.

560 For convolution (cross-correlation):
This subclass is indented under subclass 559. Subject matter wherein the optical Fourier transform spectrum is mathematically convolved (cross-correlated) with the spectrum of the spatial filter at the Fourier transform plane.

(1) Note. As opposed to the perfect match of the correlation function in matched filtering systems, the convolution function indicates a partial match between the optical Fourier transform spectrums of object and spatial filter.

(2) Note. A spatial filter is generally an emulsion mask having a transparent annular region in an otherwise opaque region used to eliminate undesired radiation that diverges from the optical axis beyond the confines of the transparent region.

(3) Note. The cross-correlation function is a measure of the similarity between two signals when one is delayed with respect to the other.

(4) Note. "Convolution" and "Cross-correlation" are interchangeable terms.

SEE OR SEARCH CLASS:
365, Static Information Storage and Retrieval, subclass 106 for radiant energy.
708, Electrical Computers: Arithmetic Processing and Calculating, subclass 816 for optical correlation and convolution in electrical analog computers.

561 For correlation:
This subclass is indented under subclass 559. Subject matter wherein the optical Fourier transform spectrum is mathematically correlated with the spectrum of the spatial filter at the Fourier transform plane.

(1) Note. Included in this subclass are the so-called "matched filtering systems", wherein the Fourier transform spectrum of an object is perfectly matched or correlated to a spectrum presented at the Fourier transform plane (usually by means of a previously generated spatial filter).

(2) Note. A spatial filter is generally an emulsion mask having a transparent annular region in an otherwise opaque region used to eliminate undesired radiation that diverges from the optical axis beyond the confines of the trans-parent region.

(3) Note. Correlation is a measure, expressed as a number between minus one and plus one between two sets of data, of the similarity of two signals.

(4) Note. Correlation is also a relationship between two variables where the strength of the linear relationship is indicated by the coefficient of correlation.

562 For changing zeroth order intensity:
This subclass is indented under subclass 559. Subject matter wherein the spatial filter located at the Fourier transform plane is designed to have a positive effect (i.e., blocks, transparent, increase intensity, etc.) on the zeroth order term in the Fourier series representative of the light wave input.

SEE OR SEARCH THIS CLASS, SUBCLASS:
559, for spatial filtering at the Fourier transform plane.

563 With diffraction grating:
This subclass is indented under subclass 559. Subject matter wherein a series of very fine, closely spaced parallel slits, or of very narrow, parallel reflecting surfaces are included in the optical system, either before or at the Fourier transform plane in order to produce a succession of spectra when light is incident thereon at a specific angle.

(1) Note. An example of a diffraction grating is a glass substrate carrying a layer of deposited aluminum that has been pressure-ruled with a large number of fine equidistant grooves, using a diamond edge as a tool.

(2) Note. Light falling on a diffraction grating is dispered into a series of spectra on both sides of the incident beam, the angular dispersion being inversely proportional to the line spacing.

(3) Note. Phase gratings using Fourier transform filtering also belongs in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1+, for holograms and holographic systems.
560, for systems using a spatial filter placed at the Fourier transform plane for convolution (cross-correlation).

561, for systems using a spatial filter placed at the Fourier transform plane for correlation.

564 With photographic media:
This subclass is indented under subclass 559. Subject matter wherein a photographic negative, transparency, plate, etc., is used at or near the Fourier transform plane to record the data at that plane.

565 From zone plate:
This subclass is indented under subclass 558. Subject matter comprising a plate of glass, usually a photograph, on which there is a central spot surrounded by concentric annular zones, alternately opaque and transparent, the radii of the boundaries between the zones being proportional to the square roots of the natural numbers 1,2,3, etc. It has the property of forming a real image of a point on the axis, as does a lens, but by a process of diffraction instead of refraction.

(1) Note. Zone plates are also known as "Fresnel zone plates".

(2) Note. The diffraction occurs from a circular diffraction grating of variable spacing having focal properties, and also including means for forming such a circular focal grating.

(3) Note. Phase zone plates are also included in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
742, for Fresnel lenses.

566 From grating:
This subclass is indented under subclass 558. Subject matter wherein diffraction occurs at an optical element having a series of very close lines or fine slits.

(1) Note. The lines on the grating may be ruled grooves or fine slits may be applied by other mechanical, photographic, holographic, or chemical processes.

(2) Note. This subclass includes both amplitude and phase gratings and also includes gratings having mounting means therefor.

(3) Note. Excluded from this subclass are acoustic or other compression wave diffraction gratings, see Search Class note to subclass 358.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1+, for holographic production of diffraction gratings.
285+, for light control by causing a fluid or deformable medium to act as a diffraction grating under the influence of compressional waves.

SEE OR SEARCH CLASS:
348, Television, subclass 291 for diffraction gratings which are used for frequency separation in color television systems ("strip filters").
356, Optics: Measuring and Testing, subclass 51 for devices which utilize diffraction gratings in optical test devices involving infrared or ultraviolet application, subclasses 300+ for spectroscopic instruments, including spectrographic devices in subclasses 305 and 328 which utilize a diffraction grating, subclass 334 for monochromators which use diffraction gratings, subclasses 485, 494, 499, and 521 for wavefront division by diffraction in interferometers, and subclass 395 for optical test devices employing relatively movable diffraction gratings.
385, Optical Waveguides, subclass 37 for an input/output optical coupler using a grating.

567 For ornamental effect or display:
This subclass is indented under subclass 566. Subject matter wherein the diffraction of light from the grating is purely for an aesthetic or ornamental effect or for display purposes.

SEE OR SEARCH CLASS:
40, Card, Picture, or Sign Exhibiting, subclasses 427+ for display devices exhibiting special optical effects.

568 For diffractive subtractive filtering:
This subclass is indented under subclass 566. Subject matter wherein diffraction gratings are used to diffractively remove unwanted spectral wavelengths from polychromatic incident light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
885+, for optical filters in general and particularly subclass 888 for neutral or different density filters.

569 Including particular grating characteristic:
This subclass is indented under subclass 566. Subject matter wherein the diffraction grating has one or more particular structural characteristics, such as thickness, shape, line spacing, aspect ratio, etc.

570 Nonplanar grating substrate (e.g., concave):
This subclass is indented under subclass 569. Subject matter wherein the diffractive surface of the grating is of a shape other than planar, for example, a concave diffraction grating.

SEE OR SEARCH THIS CLASS, SUBCLASS:
534+, for a signal refletor having a curved refracting surface.

571 Echelette or blazed grating:
This subclass is indented under subclass 569. Subject matter wherein the diffraction grating is an echelette (sawtooth) type of grating or wherein the grating is designed for maximum intensity at a desired region of the diffraction spectrum.

(1) Note. Theoretically, the most efficient groove shape for any grating is a right triangle. The inclination of its hypotenuse is called the blaze angle because it determines the direction in which a diffracted beam has its greatest efficiency. Such gratings are termed blazed.

(2) Note. A blazed diffraction grating is one having properly shaped grooves to concentrate most of the energy into a single spectral order.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1+, for blazed holograms.

572 Reflection grating (e.g., retrodirective):
This subclass is indented under subclass 569. Subject matter wherein the grating reflects a desired wave while at the same time allowing one or more waves to pass freely.

(1) Note. A reflection grating reflects the desired wave whereas a “transmission” grating passes the diffracted light through the grating in the same general direction as the incident light.

(2) Note. Aluminizing of a grating will cause it to be a reflecting grating.

(3) Note. Reflection back in the opposite direction to the incident light would be considered retrodirective.

SEE OR SEARCH THIS CLASS, SUBCLASS:
529+, for 3-corner retroreflectors (i.e., cube corner, trihedral or triple reflector type).
838+, for optical mirrors and other reflecting elements.

SEE OR SEARCH CLASS:
342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclass 7 for radio frequency corner reflectors which are retrodirective.

573 Variable grating:
This subclass is indented under subclass 569. Subject matter wherein the optical characteristics of the diffraction grating can be altered by the application of an external force.

(1) Note. Examples of variable gratings included in this subclass are gratings comprised of electro-optical or magneto-optical stripe domains.

(2) Note. A stripe domain is a stripe-shaped region having its own proper-ties, such as an ion-shiny electro-optic stripe.

SEE OR SEARCH THIS CLASS, SUBCLASS:

95, for liquid crystal devices exhibiting variable diffraction.

240, for temporal modulation of a light beam by changing the bulk optical parameter.

301+, for polarizer light wave spatial modulation.

483.01, through 494.01, for polarization without modulation.

SEE OR SEARCH CLASS:

365, Static Information Storage and Retrieval, subclass 122 for polarization information masking using magneto-optical devices.

574 With curved or geometrically shaped corrugation:

This subclass is indented under subclass 569. Subject matter wherein the grating has at least one ridge or groove for the light to impinge and the edges of the ridge or groove are either nonlinear or form some geometrical shape by the connection of plural lines.

(1) Note. The geometric corrugations are in the form of a circle, parallelogram, rhombus, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

575, for nonuniform corrugation width, spacing, or depth.

576, for a laminated or layered grating which usually has parallel corrugations.

575 With nonuniform corrugation width, spacing, or depth:

This subclass is indented under subclass 569. Subject matter wherein the grating has at least one ridge or groove for the light to impinge and the width, depth, height, or spacing of each ridge or groove varies along the corrugation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

574, for curved or geometrically shaped corrugations of a grating.

576, for laminated or layered grating which usually has parallel corrugations.

576 Laminated or layered:

This subclass is indented under subclass 569. Subject matter wherein multiple layers of different optical materials are formed into a single mass to form the optical grating.

(1) Note. The corrugations of this type of grating are usually parallel to one another.

SEE OR SEARCH THIS CLASS, SUBCLASS:

574, for curved or geometrically shaped corrugations of a grating.

575, for nonuniform corrugation width, spacing, or depth.

586+, for laminated or layered articles which produce nondiffractive interference.

SEE OR SEARCH CLASS:

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 1.7 for composite or multiple layer optical article shaping or treating.

577 LIGHT INTERFERENCE:

This subclass is indented under the class definition. Subject matter wherein two light waves, as a result of their relative phases, interact to produce a cancellation or reinforcement of wave energy.

SEE OR SEARCH THIS CLASS, SUBCLASS:

370+, for interference microscopes.

489.19, for frequency filter or interference effect where the light is polarized.

SEE OR SEARCH CLASS:

356, Optics: Measuring and Testing, subclass 450 for optical test devices which utilize light interference.

578 Electrically or mechanically variable (e.g., tunable, adjustable):

This subclass is indented under subclass 577. Subject matter including means for producing a change in a geometric or optical characteristic of an interfering light wave or beam.

579 By nonmovable driving element (e.g., piezoelectric, magnetostrictive):
This subclass is indented under subclass 578. Subject matter including an element for causing motion of an optical interference element without itself moving.

(1) Note. Piezoelectric and magnetostrictive driving elements are classified in this subclass.

580 Produced by coating or lamina:
This subclass is indented under subclass 577. Subject matter wherein the light interference occurs by applying multiple light beams to either (1) a structure comprising a base material impregnated by causing a coating material to extend or penetrate into the material or into the interstices of a porous, cellular or foraminous material or (2) a product consisting of multiple layers of material.

SEE OR SEARCH CLASS:
427, Coating Processes, subclasses 162+ for coating processes, per se, wherein the product is an optical element.

581 By transmissive coating on lens:
This subclass is indented under subclass 580. Subject matter wherein a lens is provided with a transparent reflection-reducing coating on surface of air-contacting refracting portions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
642+, for lenses generally, and subclass 726 for lenses coated with reflecting element.

SEE OR SEARCH CLASS:
65, Glass Manufacturing, subclasses 30.1+ and 31 for processes of applying such a coating or surface to a glass preform.

582 Layer having specified nonoptical property:
This subclass is indented under subclass 580. Subject matter wherein a layer of insulator or spacer is placed between optical layers, the changes in thickness of this layer control the location of the transmission bands in the spectrum.

(1) Note. A layer of dielectric material placed alternatively between reflective or transmissive layers is classified in this subclass.

(2) Note. The location of the transmissive band is dependent on the distance between the reflectors. As the distance is made larger, the transmission bands move toward the higher end of the spectrum, also the width of the transmission bands and the distance between adjacent transmission bands decrease.

583 Beam splitter or combiner:
This subclass is indented under subclass 580. Subject matter wherein light interference is produced by partial-reflected or by partial-transmitted layers.

SEE OR SEARCH THIS CLASS, SUBCLASS:
629+, and 639+, for light dividing or combining by partial reflection or refraction at beam splitting or combining surface.

584 Reflector:
This subclass is indented under subclass 580. Subject matter including a reflector or a reflective coating layer.

585 Including metal or conductive layer:
This subclass is indented under subclass 580. Subject matter including a metal or an electric-conductive layer.

(1) Note. The metal or conductive layer is used for static electric elimination, radio frequency shielding, producing space charges of electricity, or heating the coated glass to prevent fogging by condensation.

586 Layers having specified index of refraction:
This subclass is indented under subclass 580. Subject matter wherein the refraction index of each layer is specified.

587 Plural layer groups lateral in parallel light paths:
This subclass is indented under subclass 586. Subject matter including layers which are parallel with the light paths.

588 Filter having four or more layers:
This subclass is indented under subclass 586. Subject matter including light interference filter with four or more layers.

589 Selective wavelength transmission or reflection:
This subclass is indented under subclass 580. Subject matter wherein the coated optical medium selectively reflects or transmits light.

590 Having another filter:
This subclass is indented under subclass 589. Subject matter having both an interference filter and another type of filter (e.g., absorption filter).

591 BUILDING INTERIOR ILLUMINATION WITH REFLECTED, REFRACTED OR PRE-DETERMINED ANGLE OF ENTRANCE OF OUTSIDE LIGHT:
This subclass is indented under the class definition. Subject matter including means to reflect or refract light to the interior of a building from the exterior or to allow only light from predetermined angles to enter the building.

(1) Note. The light is usually sun or natural light. However, light from an incident artificial source which is outside for some other purpose, such as a street light, may be directed into the building.

(2) Note. For classification here, the direction of the light must be changed to facilitate its entry into the building or for controlling the direction of light. A mere window pane which is flat on both sides is not here but is in Class 52, Static Structures (e.g., Buildings), subclasses 204+.

(3) Note. A combination of nominal fiber optics structure with structure appropriate to this subclass is classified here. However, similar subject matter with details to fiber optic structure is classified in Class 385, Optical Waveguides.

SEE OR SEARCH THIS CLASS, SUBCLASS:
290+, for fluids which may be chemically or physically altered to control the amount of light passing through a panel.
483.01, through 494.01, for light control with polarizers.
601+, for glare reducing structure.
885+, for light filters.

SEE OR SEARCH CLASS:
40, Card, Picture, or Sign Exhibiting, subclass 559 for signs using external light source.
52, Static Structures (e.g., Buildings), subclasses 204.1+ for windows. See (2) Note above.
126, Stoves and Furnaces, subclasses 561+ for solar heat collector.
165, Heat Exchange, subclass 48.2 for solar heating and cooling.
362, Illumination, for artificial light directing, especially subclasses 317+.

592 Unitary light transmitting member comprising plural reflecting or refracting elements:
This subclass is indented under subclass 591. Subject matter including a one piece mass of transparent material which has a plurality of light reflecting or refracting surfaces.

SEE OR SEARCH THIS CLASS, SUBCLASS:
529+, 534+ and 546, for unitary plates with plural elements used as signal reflectors.
619+, for surfaces composed of lenticular elements.

593 Plural members in series:
This subclass is indented under subclass 592. Subject matter including a plurality of unitary light transmitting members arranged so that light travels sequentially from one member to the other, the light being refracted or reflected by the respective members.

594 Elements on two sides of member:
This subclass is indented under subclass 592. Subject matter where there are a plurality of reflecting or refracting surfaces on opposing sides of the transparent mass.

595 With internal reflections:
This subclass is indented under subclass 592. Subject matter where light from certain angles is internally reflected, i.e., the light is inside the transparent mass immediately before and immediately after the reflection.

SEE OR SEARCH THIS CLASS, SUBCLASS:
593, and 594, above which also have patents that disclose internal reflection.
598, for internal reflection in single optical elements.

596 Slats or strips:
This subclass is indented under subclass 591. Subject matter including a plurality of, usually parallel, thin, flat or long narrow members which reflect or refract light rays.

(1) Note. The slats or strips may be made of any material, for example, metal, glass, or plastic. They may be adjustable or stationary.

SEE OR SEARCH THIS CLASS, SUBCLASS:
227, for opaque means insertable on light path.

SEE OR SEARCH CLASS:
160, Flexible or Portable Closure, Partition, or Panel, subclasses 130+ for plural slats or strips used as closures which are not specifically designed to reflect or refract light.

597 With reflection:
This subclass is indented under subclass 591. Subject matter wherein light is reflected at least once from a surface upon entering the building.

SEE OR SEARCH THIS CLASS, SUBCLASS:
596, for building interior illumination with reflecting slats or strips.
609, for glare reduction in display windows.
838+, for mirrors not specifically designed for building interior illumination.

598 Internal reflection in single optical element:
This subclass is indented under subclass 597. Subject matter where the reflection is internal, i.e., the light is inside the transparent mass immediately before and immediately after the reflection.

599 DIFFUSING OF INCIDENT LIGHT:
This subclass is indented under the class definition. Subject matter wherein light is scattered into many different directions and is not intensely polarized when it illuminates surfaces.

(1) Note. With diffused light, a high brightness level may be achieved with minimal glare.

(2) Note. Diffusion patents are classified here whether it is purposeful, incidental, or undesirable.

SEE OR SEARCH THIS CLASS, SUBCLASS:
577+, for light interference.
591, for building or interior illumination with reflectors, refractors, etc.
601+, for glare or unwanted light reduction.
614, for glare or unwanted light reduction with absorption.
707, for a diffusing lens which produces an image having soft or indistinct outlines.

SEE OR SEARCH CLASS:
313, Electric Lamp and Discharge Devices, subclass 116 for light diffusing with optical device or special ray transmission envelope.
362, Illumination, subclasses 355+ for diffusing type translucent or transparent (e.g., “shade”) light modifier with a light source.

600 BARREL END EYE GUARD (E.G., SHIELD OR CUSHION, ETC.):
This subclass is indented under the class definition. Subject matter wherein an eye end of a barrel is shaped to conform to the engaging

portion of a viewer's face for providing a cushion to the optical apparatus or for shielding the viewer's eyes from undesired radiation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

611, for a shade which restricts light which is lateral of the optical path from striking an objective lens.

601 GLARE OR UNWANTED LIGHT REDUC-TION:

This subclass is indented under the class definition. Subject matter including structure to primarily reduce the intensity of nonimaging light for an optical means or a viewer's eyes.

(1) Note. Such intensity reduction may be performed by blocking, absorbing, transmitting away, or reflecting an undesired part of the light.

(2) Note. This and the indented subclasses include angle discriminator, glare reducing mirror, mirror with glare shield, and display window. For classification here, the claims should include structure which reduces glare, as indicated therein or in the specification.

SEE OR SEARCH THIS CLASS, SUBCLASS:

229, for glare elimination by placing an opaque element in an optical path.

290+, for light control by altering an optical medium.

488.01, for glare prevention by means of polarizers.

580+, for light interference coatings which reduce glare.

591+, for natural or sun light directing for illumination.

SEE OR SEARCH CLASS:

296, Land Vehicles: Bodies and Tops, subclasses 97.1+ for vehicle glare screens, per se.

348, Television, subclass 834 for cathode-ray tubes combined with a glare reduction filter.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 44+ for glare reduction in spectacles.

602 With mirror (e.g., mirror with glare screen, etc.):

This subclass is indented under subclass 601. Subject matter including an image reflecting mirror which inherently reduces the glare otherwise coming from its reflecting surface or wherein the image reflecting mirror is combined with or includes structure which reduces the glare otherwise coming from its reflecting surface or from behind the mirror.

(1) Note. Anti-glare mirrors which modify the light reflected from the face of the mirror are in the indented subclasses 603+ below. This subclass (602) has shields which primarilty control light from the sun and headlight which comes from behind the mirror and would not strike the reflecting face of the mirror.

SEE OR SEARCH THIS CLASS, SUBCLASS:

507, for moisture protection shield which could also be a light shield.

SEE OR SEARCH CLASS:

296, Land Vehicles: Bodies and Tops, subclasses 97.1+ for vehicle glare screens, per se.

603 Anti-glare mirror:

This subclass is indented under subclass 602. Subject matter with means to control the light going to and from the mirror's reflecting face to eliminate or reduce the intensity of the light going to a viewer's eyes.

(1) Note. Since any mirror may be adjusted to reflect given rays of light away from an observer's eyes, the disclosure must be relied on to determine if the purpose of using the mirror is to eliminate glare.

SEE OR SEARCH THIS CLASS, SUBCLASS:

488.01, for glare prevention by means of polarizers.

602, for mirror combined with glare screen or shield where the light to be controlled is other than that which would be incident on the mirror face.

884, for coated mirror used for purposes other than glare reduction.

604 Adjustable:
This subclass is indented under subclass 603. Subject matter including means to adjust part of the mirror or associated glare reducing structure to modify the intensity of or eliminate the light reaching the viewer's eyes.

SEE OR SEARCH CLASS:
248, Supports, subclasses 466+ for adjustable mirror supports.

605 Plural reflecting surfaces:
This subclass is indented under subclass 604. Subject matter including a plurality of reflecting surfaces which may be selectively positioned to reflect light to the viewer.

SEE OR SEARCH THIS CLASS, SUBCLASS:
608, for a semi-transparent panel placed in front of a mirror to reflect some of the light, before it reaches the mirror, away from the observer's eyes.

606 Prismoidal:
This subclass is indented under subclass 605. Subject matter including a wedge shaped transparent body, usually silvered on the rear surface, which reflects light to a viewer from the front surface or from the rear surface through the transparent body.

(1) Note. There are reflecting surfaces which are at an angle to each other in subclass 605 above, but the reflective surfaces are not on the same transparent body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
831+, for prisms, per se.

607 Reversible:
This subclass is indented under subclass 605. Subject matter including two mirror surfaces mounted back to back, one being more highly reflective than the other, with means to select the surface to be viewed from a given position.

(1) Note. The less reflective surface of these mirrors is employed when the headlights of a following vehicle annoy the driver of a car.

SEE OR SEARCH THIS CLASS, SUBCLASS:
840, in general for mirrors which are mounted back to back.

608 Translucent or other semitransmitting panel selectively positioned in front of mirror:
This subclass is indented under subclass 604. Subject matter including a translucent or other semi-transmitting panel which may be positioned in front of the mirror to reduce the amount of light reflected to the viewer.

SEE OR SEARCH THIS CLASS, SUBCLASS:
229, for an opaque panel selectively positioned in front of a mirror to eliminate the light reflected from the mirror to a viewer.
602, for glare shield positioned near a mirror to reduce glare from light coming from behind a mirror which is not incident on the mirror reflecting face.
605+, for a semi-transparent mirror positioned in front of another mirror.
884, for colored mirror or selective absorption means with mirror.
885+, for absorption filter, per se.

609 Display window:
This subclass is indented under subclass 601. Subject matter wherein the amount of glare or unwanted light reflected to a viewer's eyes from glass, which is covering an opening in a wall or the like for light transmission to enable the viewer to look in or out, is reduced.

610 With blind for nonviewing eye:
This subclass is indented under subclass 601. Subject matter wherein light to the nonviewing eye or the eye not using the instrument is blocked.

611 Barrel end or lens mount shade:
This subclass is indented under subclass 601. Subject matter including a tubular member which is secured to a barrel end, a lens mounting, or a support and which extends from a face of a lens, wherein the tubular axis is coaxial with the lens axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

511, for a cap or cover which protects a lens when it is not being used.

600, for barrel end eye guard, shield or cushion.

SEE OR SEARCH CLASS:

2, Apparel, subclasses 15+ for eyeshields and subclasses 431+ for goggles included in a shield for eyes.

612 Collapsible or foldable:

This subclass is indented under subclass 611. Subject matter wherein a shade includes telescoping, flexible or hinged portions to permit substantial reduction of the space occupied by the shade when not in use.

613 Directional or angular discrimination:

This subclass is indented under subclass 601. Subject matter wherein light from certain angles is deflected away from imaging light.

614 With absorption means:

This subclass is indented under subclass 601. Subject matter including a layer of coating material or a filter or screen, which absorbs part of the light incident thereon.

(1) Note. The light absorbed may be of particular wavelengths, e.g., color filter, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

603, for antiglare mirror coated with light absorbing material.

884, for mirror coated with light absorbing material.

615 LIGHT DISPERSION:

This subclass is indented under the class definition. Subject matter including a body having an index of refraction that varies according to the wavelength for separation of the spectral components of incident light.

(1) Note. A dispersive monochromator, which separates the spectral components of incident light, is classified in this subclass.

(2) Note. The optical system of a monochromator forms a series, one for each wavelength, of its entrance slit in the plane of the exit slit.

616 KALEIDOSCOPE:

This subclass is indented under the class definition. Subject matter including a plurality of reflecting surfaces so arranged that objects viewed in the reflecting surfaces appear as multiple images of the objects arranged in a symmetrical pattern, relative motion between the objects and the reflecting surfaces or between the reflecting surfaces and observer changing the patterns.

(1) Note. The reflecting surfaces are usually elongated and at an angle to each other which forms a V-shaped trough when two mirrors are employed.

(2) Note. Kaleidoscopic image projectors which project a real image on a viewing screen are classified in Class 353, Optics: Image Projectors, if projection structure such as a projecting lens, projection screen, projection light source, or slide holder is claimed.

SEE OR SEARCH CLASS:

353, Optics: Image Projectors, subclasses 1 and 2 for a kaleiodoscopic image projector. See (2) Note above.

617 Including particles loosely housed for agitation:

This subclass is indented under subclass 616. Subject matter including a chamber of loosely assorted objects, usually of irregular shapes, transparent and varicolored, which may be tumbled over each other by rotation of the chamber or moved in other ways to give ever changing visual effects.

618 SINGLE CHANNEL SIMULTANEOUSLY TO OR FROM PLURAL CHANNELS (E.G., LIGHT DIVIDING, COMBINING, OR PLURAL IMAGE FORMING, ETC.):

This subclass is indented under the class definition. Subject matter wherein either (1) a single light ray is used to produce a plurality of groups of different optical axes light rays, which may have different directions or be par-

allel and displaced relative to one another, each containing the same information as the single light ray or (2) a single light ray is derived from a plurality of groups of light rays having different optical axes in order to include the same information contained in each of the plurality of groups of light rays.

(1) Note. This subclass includes partially transmitting reflector type beam splitters wherein each split channel contains identical information.

(2) Note. This subclass includes a system comprising a plurality of adjacent lenses which form a plurality of similar rather than identical images as a result of parallax.

SEE OR SEARCH THIS CLASS, SUBCLASS:
462+, particularly subclasses 464+ for somewhat analogous structure used in stereoscopic systems.
480+, for systems including a single optical channel which merges to or from a plural optical channel, where the plural channel is used for binocular purposes.

SEE OR SEARCH CLASS:
352, Optics: Motion Pictures, subclasses 66+ for color cameras and projectors.
353, Optics: Image Projectors, subclasses 30+ for an image projector which combines subject matter to form a composite image and which may include the combining of light paths.
396, Photography, subclasses 305+ for color cameras containing similar structure.

619 By surface composed of lenticular elements:
This subclass is indented under subclass 618. Subject matter comprising a body with a surface configured so as to form a regular array of reflecting or transmitting elements, each having a curved or figured surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:
455+, for lenticular projection screens.
463, for stereoscopic record with lenticular surface.
642+, for lenses generally.
727+, for lenses having concave or convex reflecting surfaces with coatings.

SEE OR SEARCH CLASS:
399, Electrophotography, subclasses 30+ and 177+ for an optical element in a photocopier projection arrangement.

620 Having particular composition:
This subclass is indented under subclass 619. Subject matter wherein the configured body is composed of a specific material.

SEE OR SEARCH CLASS:
252, Compositions, subclass 501.1 for electrically conductive or emissive light sensitive composition.
430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclass 946 for a cross-reference art collection of photographically produced lenticular elements.
501, Compositions: Ceramic, subclasses 900+ for an optical glass composition.

621 Plural lenticular plates:
This subclass is indented under subclass 619. Subject matter having two or more elements with lenticular surfaces.

622 Serially disposed along optic axis:
This subclass is indented under subclass 621. Subject matter in which multiple elements with lenticular surfaces are placed along a single light path.

623 Cylindrical lenslets:
This subclass is indented under subclass 622. Subject matter in which the body is formed by an array of small cylindrical elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:
710, for cylindrical lenses.

624 Having crossed axes:
This subclass is indented under subclass 623. Subject matter having nonparallel element or array axes.

625 Focusing or defocusing by noncurved surfaces (e.g., prismatic, etc.):
This subclass is indented under subclass 619. Subject matter wherein the elements of the array are planar surface elements.

(1) Note. Prismatic elements are classified in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
831+, for prism (including mount).

626 Particular focusing or defocusing characteristic:
This subclass is indented under subclass 619. Subject matter in which the elements of the lenticular array cooperate to produce an imaging effect upon a light beam incident thereon.

627 Reflective:
This subclass is indented under subclass 619. Subject matter wherein the direction of the component of incident light normal to the surface of the lenticular body is reversed or bent off.

628 Noncircular cross section:
This subclass is indented under subclass 619. Subject matter wherein the lenticular elements have a cross section in the plane of the surface which is not a circle.

629 By partial reflection at beam splitting or combining surface:
This subclass is indented under subclass 618. Subject matter including a surface which transmits and reflects substantial portions of the incident light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
583, for a beam splitter which selectively separates the incident light by interference in a coating or lamina of an optical element.

630 Superimposing visual information on observer's field of view (e.g., head-up arrangement, etc.):
This subclass is indented under subclass 629. Subject matter which forms a composite image by combining visual display information with the light incident on an observer's field of view.

631 Including curved reflector:
This subclass is indented under subclass 630. Subject matter including a reflecting element having a surface with a smoothly concave or convex configuration in the optical path of the light that produces an image.

(1) Note. The curved configuration may be for focusing or collimating reflected light rays.

(2) Note. Helmet mounted partial reflectors and curved windshield light combining systems are classified in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
364+, for compound lens system with curved reflective imaging element.
726+, for lenses with reflecting element.
831+, for prisms, per se.
838+, for mirrors, per se.

632 Rotatable heads-up device or combiner:
This subclass is indented under subclass 630. Subject matter including structure to enable circular movement of light combining element.

633 With additional reflector (e.g., serial reflections, etc.):
This subclass is indented under subclass 630. Subject matter having an image reflecting element additional to a partially reflective light combiner or divider.

(1) Note. This additional reflecting element may be another partially reflecting element.

SEE OR SEARCH THIS CLASS, SUBCLASS:
850, for a plural mirror optical system.

634 Wavelength selective (e.g., dichroic mirror, etc.):
This subclass is indented under subclass 629. Subject matter wherein an optical property of the partially reflecting light combining or dividing element for a component of incident light is wavelength dependent.

(1) Note. The term “optical property” is intended to include transmittance and reflectance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
583, for a dichroic beam splitter or combiner using layers producing light interference.
838+, for mirrors, per se.

635 Drawing or plotting aid:
This subclass is indented under subclass 629. Subject matter including forming a composite image on a surface on which visual information or other representation is manually placed.

636 Including full reflection and transmission of a beam at different portions of a beam divider:
This subclass is indented under subclass 629. Subject matter wherein the partially reflective element has selected areas of full light reflection interrupted by light transmissive areas.

637 With path length or aberration correcting element:
This subclass is indented under subclass 629. Subject matter which includes a device, circuit, or circuit component that corrects an undesirable condition which affects a light beam.

638 With partial reflection at a surface of a prism:
This subclass is indented under subclass 629. Subject matter wherein the surface at which partial reflection takes place is the surface of a prismatic element.

639 By refraction at beam splitting or combining surface:
This subclass is indented under subclass 618. Subject matter including a surface which refracts substantial portions of the incident light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
737, for lens with refracting element.
837, for prism with refracting surface.

640 Including prismatic element:
This subclass is indented under subclass 639. Subject matter including a transparent optical element having at least two polished plane faces, inclined relative to each other, to cause refraction through the faces.

(1) Note. A prism is geometrically constructed of parallel bases or ends and congruent polygons and sides that are parallelograms in order to either (a) disperse light into a spectrum or (b) reflect rays of light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
831+, for prisms generally.

641 COLLIMATING OF LIGHT BEAM:
This subclass is indented under the class definition. Subject matter wherein a bundle of light rays emanating from a single point are made to be parallel to one another, as opposed to converging or diverging rays.

(1) Note. A collimator reticle will produce collimated light wherein the light appears to originate from an infinitely distant real or apparent source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
642+, for lenses.
838+, for mirrors.

642 LENS:
This subclass is indented under the class definition. Subject matter including either a single transparent mass of refractive material having opposed refracting surfaces or a plurality of such masses arranged along an optical axis with their opposed refracting surfaces disposed transversely of such axis, the said opposed surfaces being so shaped and spaced that the mass or plurality of masses are capable of producing, from light rays passing therethrough from an object external to the mass or masses, a single image of that object at a focal point.

(1) Note. The plurality of masses of material act upon light rays proceeding from an object in a manner similar to that in which the single mass of material acts

upon such rays; i.e., no real image is formed between the front most and rear most axially spaced refracting surfaces of either the single mass or the plurality of masses.

(2) Note. Of the opposed refracting surfaces provided on each lens mass, one is usually spherical and the other is usually spherical or planar, but there may be deviations from such shapes in which any or all of the surfaces depart from the spherical shape or the planar shape.

(3) Note. The lens masses referred to above will be designated hereafter as lens "components" or lens "elements" depending on the design of the lens.

(4) Note. The term "component" as applied to a lens designates either a single transparent mass of refractive material having two opposed refracting surfaces or a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations, the two refracting surfaces of the single mass and the two axially extreme refracting surfaces of the plurality of masses having at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens. The axial dimension of the air-spacing between either the opposed surfaces of the single mass or the axially extreme surfaces of the grouped plurality of masses and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

(5) Note. The term "element" as applied to a lens designates any single transparent mass of refractive material having two opposed refracting surfaces, which surfaces are disposed transversely of the optical axis of the lens and spaced therealong, i.e., any one of the masses in the above component definition regardless of its spacing from adjacent refracting surfaces that may be present in the lens.

(6) Note. A correcting plate such as that used in the "Schmidt type lens" to correct the aberrations of a spherical mirror is considered a lens component under this subclass definition.

(7) Note. The optical system of a Galilean telescope is considered a lens under this subclass definition, since no image is formed between the objective and eyepiece of the telescope.

(8) Note. This subclass also includes, especially in subclasses 726+, 737, and 738+, combination of a lens or lenses with other than nonlens optical elements which reflect, control or deflect light passing through the lens and which are not provided for above.

(9) Note. This subclass further includes in subclasses 811+ lens supports and mountings for maintaining the various lens components in proper alignment and spacing for intended operation of the lens.

(10) Note. Compound lens systems in which one lens is employed to examine the image formed by another lens will be found in this class, subclasses 362+.

(11) Note. This is the residual subclass for lenses. See the search notes below for classes where lenses peculiar to particular applications such as signalling, illuminating, and ophthalmic may be found.

SEE OR SEARCH THIS CLASS, SUBCLASS:

355+, for lenses peculiarly adapted for operation within the nonvisible spectrum.

362+, for compound lens systems. See also (11) Note above.

440+, for scale-reading systems involving lenses.

462+, for plural optical paths including lenses or lenses with plural optical paths.

503+, for lens-spacing structure.

591+, for natural light directing systems.
611+, for lens shades.
619+, for surfaces composed of lenticular elements.

SEE OR SEARCH CLASS:
351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 159.01+ for ophthalmic lenses or blanks.
356, Optics: Measuring and Testing, subclasses 124+ for lens or reflective image-former testing devices and subclasses 128+ for refraction test devices generally.
362, Illumination, subclasses 317+ for illuminating refractor lenses.
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, appropriate subclasses for a molding apparatus used to shape or reshape a nonmetal; see especially subclass 808 for a cross-reference digest of such apparatus including a lens mold.

643 Eyepiece:
This subclass is indented under subclass 642. Subject matter wherein the lens creates a magnified virtual image of a rear object.

(1) Note. The eyepiece in an optical instrument is the lens or lenses nearest the viewer's eye.

644 Having four components:
This subclass is indented under subclass 643. Subject matter wherein the lens comprises four sections (i.e., components), each containing two refractive surfaces, arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:
650, for projection type field curvature shaping lenses having four components.
660, for microscope objective having four components.
682, for variable magnification reverse telephoto having seven or less components.
715, for nonspherical lens system having four components.
734, for four component multiple component lenses with a reflecting element.
747, for a telephoto lens having four components.
753, for wide angle lenses having five or less components.
754, for multiple component lens systems generally.
771, for multiple component lenses having four components.

645 Having three components:
This subclass is indented under subclass 643. Subject matter wherein the lens comprises three sections (i.e., components), each contain-

ing two refractive surfaces, arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

651, for projection type field curvature shaping lenses having less than four components.

661, for microscope objective having less than four components.

682, for variable magnification reverse telephoto having seven or less components.

716, for nonspherical lens system having three components.

735, for three component multiple component lenses with a reflecting element.

748, for a telephoto lens having less than four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

784, for multiple component lenses having three components.

646 Having two components:

This subclass is indented under subclass 643. Subject matter wherein the lens comprises two sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses and the other adjacent refracting surfaces

that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

651, for projection type field curvature shaping lenses having less than four components.

661, for microscope objective having less than four components.

682, for variable magnification reverse telephoto having seven or less components.

717, for non spherical lens system having two components.

736, for two component multiple component lenses with a reflecting element.

748, for a telephoto lens having less than four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

793, for multiple component lenses having two components.

647 Having one component:

This subclass is indented under subclass 643. Subject matter wherein the lens comprises one section (i.e., component), containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such component is refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

651, for projection type field curvature shaping lenses having less than four components.

661, for microscope objective having less than four components.

682, for variable magnification reverse telephoto having seven or less components.

718, for nonspherical lens system having one component.

748, for a telephoto lens having less than four components.

753, for wide angle lenses having five or less components.

796, for a single component lens with multiple elements.

648 With field curvature shaping:

This subclass is indented under subclass 642. Subject matter wherein the curvature of the refractive surface controls the altering of the curvature of the image or the production of an image of a curved object field.

649 Projection type:

This subclass is indented under subclass 648. Subject matter wherein an image of an image plane is caused to be visible at an object plane.

650 Having four components:

This subclass is indented under subclass 649. Subject matter wherein the lens comprises four sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

644, for eyepieces having four components.

660, for microscope objective having four components.

682, for variable magnification reverse telephoto having seven or less components.

715, for nonspherical lens system having four components.

734, for four component multiple component lenses with a reflecting element.

747, for a telephoto lens having four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

771, for multiple component lenses having four components.

651 Having less than four components:

This subclass is indented under subclass 649. Subject matter wherein the lens comprises less than four sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed sur-

faces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

645+, for eyepieces having three or less components.

661, for microscope objective having less than four components.

682, for variable magnification reverse telephoto having seven or less components.

716+, for nonspherical lens system having three or less components.

735+, for three or less component multiple component lenses with a reflecting element.

748, for a telephoto lens having less than four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

784+, for multiple component lenses having three or less components.

796, for a single component lens with multiple elements.

652 With graded refractive index:

This subclass is indented under subclass 642. Subject matter wherein a lens has an index of refraction which varies in space.

SEE OR SEARCH CLASS:

385, Optical Waveguides, subclass 124 for optical waveguides having a graded refractive index.

653 Having an axial gradient:

This subclass is indented under subclass 652. Subject matter wherein the index of refraction varies along an optical axis.

654 Having a radial gradient:

This subclass is indented under subclass 652. Subject matter wherein the index of refraction varies in a direction at a right angle to an optical axis.

655 In a variable media (e.g., gas, elastomer, etc.):

This subclass is indented under subclass 654. Subject matter wherein the chemical composition of the lens varies in a spatial dimension.

656 Microscope objective:

This subclass is indented under subclass 642. Subject matter wherein the focal length of the lens is relatively short and the lens produces a highly magnified real image.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643+, for eyepieces which may be used in conjunction with microscope objectives.

657 Having seven components:

This subclass is indented under subclass 656. Subject matter wherein the lens comprises seven sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

682, for variable magnification reverse telephoto having seven or less components.

708, for nonspherical surface variable magnification lenses having more than six components.

733, for more than four multiple component lenses with a reflecting element.

745, for telephoto lenses having more than five components.

751, for wide angle lenses having seven components.

755, for multiple component lenses having seven components.

658 Having six components:

This subclass is indented under subclass 656. Subject matter wherein the lens comprises six sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

649, for projection type field curvature shaping lenses having more than four components.

682, for variable magnification reverse telephoto having seven or less components.

713, for nonspherical surface lens system having six components.

733, for more than four multiple component lenses with a reflecting element.

745, for telephoto lenses having more than five components.

752, for wide angle lenses having six components.

754, for multiple component lens systems generally.

756, for multiple component lens having six components.

659 Having five components:

This subclass is indented under subclass 656. Subject matter wherein the lens comprises five sections (i.e., components), each containing two refractive surfaces arranged in series along

the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact, or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

682, for variable magnification reverse telephoto having seven or less components.

714, for nonspherical surface lens system having five components.

733, for more than four multiple component lenses with a reflecting element.

746, for telephoto lenses having five components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

763, for multiple component lenses having five components.

660 Having four components:

This subclass is indented under subclass 656. Subject matter wherein the lens comprises four sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the

lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

644, for eyepieces having four components.

650, for projection type field curvature shaping lenses having four components.

682, for variable magnification reverse telephoto having seven or less components.

715, for nonspherical lens system having four components.

734, for four component multiple component lenses with a reflecting element.

747, for a telephoto lens having four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

771, for multiple component lenses having four components.

661 Having less than four components:

This subclass is indented under subclass 656. Subject matter wherein the lens comprises less than four sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

645+, for eyepieces having three or less components.

651, for projection type field curvature shaping lenses having less than four components.

682, for variable magnification reverse telephoto having seven or less components.

716+, for nonspherical lens system having three or less components.

735+, for three or less component multiple component lenses with a reflecting element.

748, for a telephoto lens having less than four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

784+, for multiple component lenses having three or less components.

796, for a single component lens with multiple elements.

662 High distortion lens (e.g., fQ, etc.):

This subclass is indented under subclass 642. Subject matter wherein the image formed by the lens is not in proportion to the source of the image.

663 Telecentric system:
This subclass is indented under subclass 642. Subject matter wherein all of the primary rays are parallel to the optical axis in either object or image space.

SEE OR SEARCH THIS CLASS, SUBCLASS:
740, for particular diaphragms employed to produce the telecentric result.

664 Spherical:
This subclass is indented under subclass 642. Subject matter wherein one of the lens elements has two convex refractive surfaces which are concentric and of equal curvature.

665 Fluid:
This subclass is indented under subclass 642. Subject matter wherein the lens has at least one component or one element which uses a transparent liquid or gas as its refractive material.

(1) Note. The lens components or elements under this definition may comprise either a mass of fluid supported in a capillary channel which has its refracting surfaces freestanding and formed by surface tension or a mass of fluid which is enclosed in and shaped by a transparent shell or casing. In the latter form of component or element, the fluid may be either a liquid or a gas, and in addition to refraction, may perform other functions (e.g., cooling).

SEE OR SEARCH THIS CLASS, SUBCLASS:
886, for fluid filters.
894, for gas-filled telescope or microscope barrels.

SEE OR SEARCH CLASS:
351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 159.01+ for spectacle lenses having a fluid-refractive element.

666 With variable magnification:
This subclass is indented under subclass 665. Subject matter wherein at least one refracting surface of the lens is deformable to vary the focal length of the lens.

(1) Note. The refracting surface of the lens may be accomplished by either applying mechanical force to the periphery of the lens casing or varying the quantity of fluid within the lens casing. In the type of fluid lens which has a freestanding surface tension formed refracting surface, the refracting surface may be deformed by impressing an electric potential upon the fluid lens.

SEE OR SEARCH CLASS:
351, Optics: Eye Examining, Vision Testing and Correcting, subclass 159.68 for spectacle lenses of the fluid type having a variable focal length.

667 With gas:
This subclass is indented under subclass 665. Subject matter wherein the refractive material is a transparent gas.

668 Anamorphic:
This subclass is indented under subclass 642. Subject matter wherein the lens has or produces unequal magnifications in two planes that are at an angle (usually perpendicular) to each other.

(1) Note. These lenses employ at least one element or component having one or more cylindrical surfaces thereupon to produce the unequal magnifications of the lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:
710, for lenses having elements or components with one or more cylindrical surfaces thereon.

669 With prism anamorphoser:
This subclass is indented under subclass 668. Subject matter wherein the components that produce the unequal magnifications in the lens are symmetrically refracting prisms disposed with their refracting surfaces transversely of the optical axis of the lens.

(1) Note. The prism components may be mounted either in a fixed relation to the optical axis of the lens or each of these components may be mounted to rotate

about an axis parallel to its refracting edge, in which latter case the difference between the magnifications in the two planes is variable.

(2) Note. See subclass 831 for the definition of a prism.

670 Variable magnification anamorphoser:
This subclass is indented under subclass 668. Subject matter wherein the magnification factor of the lens is selectively variable.

671 Having four or more components:
This subclass is indented under subclass 668. Subject matter wherein the lens comprises four or more sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643+, for eyepieces having four or more components.
648+, for field curvature shaping lenses having four or more components.
656+, for microscope objectives having four or more components.
708+, for nonspherical surface lens systems having four or more components.
726+, for lens systems with reflecting elements having four or more components.
745+, for telephoto lenses having four or more components.
749+, for wide angle lenses having four or more components.
754+, for multiple component lenses in general which have four or more components.

672 Selective magnification by exchanging or adding a lens component:
This subclass is indented under subclass 642. Subject matter wherein one or more components of a basic lens are replaceable by one or more other components to produce in combination with any remaining components of the basic lens having substantially the same image plane as that of the basic lens but having a different equivalent focal length from that of the original basic lens.

(1) Note. The number of original components removed from the basic lens may not always be the same as the number of components which replace such original components, in which case the exchange of components may result in the addition of components to the original lens. This subclass includes adding or subtracting lens components, while subclass 819 relates to the changing of the entire lens.

(2) Note. The prisms may be moved to vary the length in one plane only, while in subclass 678 the prisms are moved to vary the focal length in all planes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

676+, for variable magnification lenses generally.

678, for lenses wherein at least one component is formed of symmetrically refracting prisms which are rotatable about axes parallel to their refracting edges. See (2) Note above.

737, for lenses combined with a nonlens refracting element which is usually a wedge-shaped prism.

744, for a focal lens attachments to be used with lenses to change the equivalent focal lengths of the lenses

754+, for multiple component lenses.

821+, for plural lenses in a common carrier selectively operable. See (1) Note above.

673 To the front of a basic lens:

This subclass is indented under subclass 672. Subject matter wherein a lens component is exchanged or added to the objective side (i.e., front) of a basic lens for selective magnification.

674 To the middle of a basic lens:

This subclass is indented under subclass 672. Subject matter wherein a lens component is exchanged or added to the center of a basic lens for selective magnification.

675 To the rear of a basic lens:

This subclass is indented under subclass 672. Subject matter wherein a lens component is exchanged or added to the image side (i.e., rear) of a basic lens for selective magnification.c

676 With variable magnification (e.g., zoom type):

This subclass is indented under subclass 642. Subject matter wherein the equivalent focal length of the lens may be continuously varied between predetermined limits.

(1) Note. The variation of the equivalent focal length of the lenses of this generic subclass is accomplished by axially shifting certain components of the lens relative to other components.

SEE OR SEARCH THIS CLASS, SUBCLASS:

432, for variable magnification compound lens systems.

672+, for lenses whose focal length may be selected by exchanging, adding, or removing lens components.

694+, for mechanisms that axially shift the lens components whereby the continuous variation of the equivalent focal length is accomplished.

754+, for fixed focal length lenses.

823+, for mechanisms that axially shift the lens components for the purpose of axially adjusting the focal plane of the lens.

677 Optically compensated:

This subclass is indented under subclass 676. Subject matter wherein the lens is physically linked and dependently moved to maintain an equivalent focal length.

678 Prism lens type:

This subclass is indented under subclass 676. Subject matter where the lens includes prisms disposed along the optical axis which are movable to vary the equivalent focal length of the lens.

(1) Note. See subclass 831 for the definition of a prism.

SEE OR SEARCH THIS CLASS, SUBCLASS:

669+, for lenses with prisms which are movable for varying the focal length in only one plane.

679 With fixed conjugates:

This subclass is indented under subclass 676. Subject matter wherein an object plane and its corresponding (i.e., conjugate) image plane are fixed and are located at finite distances from the lens.

680 Reverse telephoto:

This subclass is indented under subclass 676. Subject matter wherein the lens includes a negative group on the longer conjugate side and a positive group on the shorter conjugate side with the spacing between these groups being

varied to vary the overall focal length of the combination.

(1) Note. See subclasses 749+ for reverse telephoto lenses that are not of variable focal length.

681 Having eight or nine components:

This subclass is indented under subclass 680. Subject matter wherein the reverse telephoto lens comprises eight or nine sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact, or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

656, for microscope objective having more than seven components.

708, for nonspherical surface variable magnification lenses having more than six components.

733, for more than four multiple component lenses with a reflecting element.

745, for telephoto lenses having more than five components.

750, for reverse telephoto lenses with eight components.

754, for more than seven multiple component lenses.

682 Having seven or less components:

This subclass is indented under subclass 680. Subject matter wherein the reverse telephoto lens comprises seven or less sections (i.e., components), each containing two refractive surfaces, arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact, or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a por-

tion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643+, for eyepieces having seven or less components.

648+, for projection type field curvature shaping lenses having seven or less components.

657+, for microscope objectives having seven or less components.

708+, for nonspherical surface variable magnification lenses having seven or less components.

733+, for seven or less multiple component lenses with reflecting element.

745+, for telephoto lenses having seven or less components.

751+, for wide angle lenses having seven or less components.

755+, for multiple component lenses having seven or less components.

796+, for a single component with multiple elements.

683 With mechanical compensation:

This subclass is indented under subclass 676. Subject matter wherein the lens includes at least a first lens group including a variator movable for varying the focal length and at least a second lens group including a compensator which moves independently of the first group for compensating for image plane deviation during focal length variation.

(1) Note. A group is an assembly of one or more components used as a single unit to achieve a particular function such as focussing, variating, compensating, or relaying.

(2) Note. Focusing is the action of converging light beams to a minimum size spot of light.

(3) Note. Relaying is the action of transferring an input light beam from a relay to another device without effecting any change between the relay input and output light beam.

(4) Note. A component consists of either (1) a single optical piece (i.e., element) comprising a single transparent mass of refractive material having two opposed refracting surfaces, which surfaces are disposed transversely of the optical axis of the lens and spaced therealong or (2) a plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact, or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

684 Other than first group moves for focusing (internal focus type):

This subclass is indented under subclass 683. Subject matter where other than the first assembly of components is moved for focusing.

685 Nonlinear variator/compensator movements:

This subclass is indented under subclass 683. Subject matter where the variator/compensator locus of movement is not a straight line.

686 Four groups:

This subclass is indented under subclass 683. Subject matter wherein four groups move independently of each other and at least two at the groups function respectively as a variator, movable for varing the local length, and a compensator which moves independently of the first group for compensating for image plane deviation during focal length variation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

689+, for mechanical compensation with variable magnification having three groups.

691+, for mechanical compensation with variable magnification having two groups.

687 **+-++ Arrangement:**
This subclass is indented under subclass 686. Subject matter wherein the plus and minus signs indicate convergent and divergent groups, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the left most sign representing the group at the entrant face of the lens, i.e., the direction of the light travelling through the lens is the same as the reading arrangement of the subclass title.

SEE OR SEARCH THIS CLASS, SUBCLASS:
774, for a +-++ arrangement in general multiple component lens having four components.

688 **+- -+ Arrangement:**
This subclass is indented under subclass 686. Subject matter wherein the plus and minus signs indicate convergent and divergent groups, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the left most sign representing the group at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

SEE OR SEARCH THIS CLASS, SUBCLASS:
775, for a +- -+ arrangement in general multiple component lens having four components.

689 **Three groups:**
This subclass is indented under subclass 683. Subject matter wherein three groups move independently of each other and at least two of the groups function respectively as (1) a variator movable of varying the focal length and (2) a compensator which moves independently of the first group for compensating for image plane deviation focal length variation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
686+, for mechanical compensation with variable magnification having four groups.
691+, for mechanical compensation with variable magnification having two groups.

690 **+-+ Arrangement:**
This subclass is indented under subclass 689. Subject matter wherein the plus and minus signs indicate convergent and divergent groups, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the left most sign representing the group at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

691 **Two groups:**
This subclass is indented under subclass 683. Subject matter wherein two groups move independently of each other and these groups function respectively as (1) a variator movable for varying the focal length and (2) a compensator which moves independently of the first group for compensating for image plane deviation during focal length variation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
686+, for mechanical compensation with variable magnification having four groups.
689+, for mechanical compensation with variable magnification having three groups.

692 **+- Arrangement:**
This subclass is indented under subclass 691. Subject matter wherein the plus and minus signs indicate convergent and divergent lens groups, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the left most sign representing the group at the entrant face of the lens, i.e., the direction of light travelling through the lens is the

same as the reading arrangement of the subclass title.

693 With macro-type focusing:
This subclass is indented under subclass 683. Subject matter wherein the mechanical compensation permits focusing at very close object distances without loss of definition and without the need for front or rear attachments.

694 Adjusting mechanism:
This subclass is indented under subclass 676. Subject matter comprising structure for changing the axial spacing between components of the lens.

(1) Note. This subclass provides for the mechanical adjusting structure. Where the optical relationship is set forth in the claims, classification is in subclasses 676-693.

SEE OR SEARCH THIS CLASS, SUBCLASS:
823+, for mechanisms that axially shift the lens components to axially adjust the focal plane of the lens.

SEE OR SEARCH CLASS:
396, Photography, subclasses 72+ for mechanisms that axially shift the components of the lens of a camera to accomplish a variation in the equivalent focal length of such lens and camera structure.

695 Three or more movable lens groups:
This subclass is indented under subclass 694. Subject matter wherein the optics to be adjusted includes three or more nonstationary combinations of lenses.

696 Motor driven:
This subclass is indented under subclass 694. Subject matter wherein the adjusting mechanism includes an engine to power any required adjustment.

697 Condition responsive:
This subclass is indented under subclass 696. Subject matter wherein the motor driven adjusting mechanism is actuated by a specific situation.

698 Auto focusing:
This subclass is indented under subclass 697. Subject matter wherein the condition that is responded to is changing of focal point.

699 Having cam device:
This subclass is indented under subclass 694. Subject matter wherein the adjusting mechanism includes a curved surface that causes changes in movement.

700 Cam groove type:
This subclass is indented under subclass 699. Subject matter wherein the cam device is a slot.

701 Cam ring type or zoom ring type:
This subclass is indented under subclass 699. Subject matter wherein the cam device is a circular adjustment mechanism.

702 With adjustment lock:
This subclass is indented under subclass 694. Subject matter wherein the adjustment is stopped to prevent movement.

703 With specified mount:
This subclass is indented under subclass 694. Subject matter wherein the axial spacing between lens components is adjusted and the structure to hold the components in place is specified.

704 Having detail of barrel:
This subclass is indented under subclass 703. Subject matter wherein the specified mount includes specifies of the cylindrical case which holds the lens components in position.

705 With macro type focusing:
This subclass is indented under subclass 694. Subject matter wherein the adjusting mechanism permits focusing at very close object distances without loss of definition and without the need for front or rear attachments.

706 With specified ring:
This subclass is indented under subclass 705. Subject matter having a specified circular band.

707 Diffusing:

This subclass is indented under subclass 642. Subject matter wherein the lens produces an image having soft or indistinct outlines.

(1) Note. The lens diffusion characteristics may be effected by any one of the following: (a) frosting the lens surface, (b) shifting the lens components relative to each other, (c) placing aspheric surfaces adjacent or on one or more components of the lens, (d) adding a transparent plate or additional lens component to the lens, (e) undercorrecting the lens, (f) introducing aberration to the lens, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

601+, for glare-reducing optical systems.

708 Including a nonspherical surface:

This subclass is indented under subclass 642. Subject matter wherein at least one of the refracting surfaces of the lens departs from a spherical shape.

(1) Note. One or more of the components of the lens may be formed of symmetrically refracting prisms.

(2) Note. The surfaces here are continuous curves and may be aspheric.

SEE OR SEARCH THIS CLASS, SUBCLASS:

668+, for anamorphic lenses having cylindrical components which magnify more in one plane than in another plane at an angle thereto, particularly subclass 669 for such lenses in which at least one of the components is formed of prisms whereby the lens has a different magnification in one plane from that which it has in a plane at right angles to the first mentioned plane.

678, for lenses wherein at least one component of the lens is formed of symmetrically refracting prisms which are rotatable about axes that are parallel to their refracting edges to vary the power of the lens.

725, for panoramic lenses.

728, for lenses having nonspherical reflecting surfaces.

742, for echelon lenses.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclasses 37+ for methods of lens making and subclass 61 for methods of shaping glass surfaces.

102, Ammunition and Explosives, subclasses 200+ for toroidal lenses combined with fuses, primers, and igniting devices utilizing radiation energy.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 159.41 through 159.48 for spectacle lenses having refracting surfaces which depart from the spherical form.

709 Conical:

This subclass is indented under subclass 708. Subject matter wherein the nonspherical surface has a shape bounded by a closed planar base and the surface formed by connecting line segments between every point on the perimeter of this base with a common point.

710 Cylindrical:

This subclass is indented under subclass 708. Subject matter wherein the nonspherical lens surface has a shape bounded by two parallel planes and a surface generated by a line tracing a closed curve where the line is parallel to an initial position.

711 Toroidal:

This subclass is indented under subclass 708. Subject matter wherein the nonspherical lens surface has a shape generated by the revolution of any closed plane curve about a nonintersecting axis lying in its plane.

712 Paraboloidal:

This subclass is indented under subclass 708. Subject matter wherein the nonspherical lens surface has a shape formed by revolving about an axis of symmetry a set of points equally distant from a fixed point and a fixed line.

713 Having six components:

This subclass is indented under subclass 708. Subject matter wherein the lens comprises six sections (i.e., components), each containing two refractive surfaces arranged in series along

the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

649, for projection type field curvature shaping lenses having more than four components.

658, for microscope objectives having six components.

682, for variable magnification reverse telephoto having seven or less components.

733, for more than four multiple component lenses with a reflecting element.

745, for telephoto lenses having more than five components.

752, for wide angle lenses having six components.

754, for multiple component lens systems generally.

756, for multiple component lens having six components.

714 Having five components:

This subclass is indented under subclass 708. Subject matter wherein the lens comprises five sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the

lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

649, for projection type field curvature shaping lenses having more than four components.

659, for microscope objectives having five components.

682, for variable magnification reverse telephoto having seven or less components.

733, for more than four multiple component lenses with a reflecting element.

746, for telephoto lenses having five components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

763, for multiple component lenses having five components.

715 Having four components:

This subclass is indented under subclass 708. Subject matter wherein the lens comprises four sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

644, for eyepieces having four components.

650, for projection type field curvature shaping lenses having four components.

660, for microscope objective having four components.

682, for variable magnification reverse telephoto having seven or less components.

734, for four component multiple component lenses with a reflecting element.

747, for a telephoto lens having four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

771, for multiple component lenses having four components.

716 Having three components:

This subclass is indented under subclass 708. Subject matter wherein the lens comprises three sections (i.e., components), each containing two refractive surfaces, arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a “component” comprising a single mass or the two axially extreme refracting surfaces of a “component” comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass “component” or the axially extreme surfaces of the “component” grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

645, for eyepieces having three components.

651, for projection type field curvature shaping lenses having less than four components.

661, for microscope objective having less than four components.

682, for variable magnification reverse telephoto having seven or less components.

735, for three component multiple component lenses with a reflecting element.

748, for a telephoto lens having less than four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

784, for multiple component lenses having three components.

717 Having two components:

This subclass is indented under subclass 708. Subject matter wherein the lens comprises two sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a “component” comprising a single mass or the two axially extreme refracting surfaces of a “component” comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass “component” or the axially extreme surfaces of the “component” grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

646, for eyepieces having two components.

651, for projection type field curvature shaping lenses having less than four components.
661, for microscope objective having less than four components.
682, for variable magnification reverse telephoto having seven or less components.
736, for two component multiple component lenses with a reflecting element.
748, for a telephoto lens having less than four components.
753, for wide angle lenses having five or less components.
754, for multiple component lens systems generally.
793, for multiple component lenses having two components.

718 Having one component:

This subclass is indented under subclass 708. Subject matter wherein the lens comprises one section (i.e., component), containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such component is refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

647, for eyepieces having one component.
651, for projection type field curvature shaping lenses having less than four components.
661, for microscope objective having less than four components.
682, for variable magnification reverse telephoto having seven or less components.
726+, for a single component lens with a reflecting element.
748, for a telephoto lens having less than four components.
753, for wide angle lenses having five or less components.
796, for a single component lens with multiple elements.

719 Objective for laser (e.g., optical disc, etc.):

This subclass is indented under subclass 718. Subject matter wherein the lens component is used in conjunction with a laser.

720 Asymmetric (e.g., prismatic or eccentric, etc.):

This subclass is indented under subclass 642. Subject matter wherein the center of mass of the lens is laterally spaced from the optical axis of the lens.

(1) Note. This subclass provides for both prismatic lenses which have at least one component formed with a wedge prism or the equivalent thereof between its opposed refracting surfaces, and eccentric lenses in which at least one component is formed as a segment of a symmetrical lens.

(2) Note. A substantial portion of the lenses under this definition are for mounting on automobile windshields to facilitate viewing of traffic lights by the operator of the automobile.

721 Plural focal length:

This subclass is indented under subclass 642. Subject matter wherein the lens has a plurality of light transmitting zones or areas of different focal lengths.

(1) Note. This subject matter includes the lens plus means to exclude light from passing through certain areas or zones while permitting light to pass through other zones or areas of the lens whereby a selection of focal length is provided.

(2) Note. See subclass 745 - (2) Note for the definition of focal length.

722 Selective wavelength transmitting or blocking:

This subclass is indented under subclass 642. Subject matter where the lens or structure combined with the lens exhibits spectrally differential transmission.

(1) Note. In the lenses of this and the indented subclass the means which gives the lens its particular light-transmitting properties may be either an integral part of the lens, i.e., the particular material from which the lens and the components are made, or a separate plate having opposed parallel plane surface disposed transversely of the optical axis of the lens, such plate being formed of a material which favors or hinders light transmission in a selected area of the spectrum more than it does in any other area of the spectrum.

(2) Note. The term spectrum as employed in this definition refers to light having wavelengths between 3850 and 7600 angstrom units, that is, visible light.

SEE OR SEARCH THIS CLASS, SUBCLASS:

350+, for lenses having significant characteristics in the infrared or ultraviolet spectrum.

885+, for light filters, per se.

SEE OR SEARCH CLASS:

351, Optics: Eye Examining, Vision Testing and Correction, subclasses 159.6 through 159.65 for spectacle lenses with light-filtering means.

362, Illumination, subclass 317 for refractors in the form of lenses not otherwise classified.

723 With separate filter:

This subclass is indented under subclass 722. Subject matter including a specific differentiating structure distinct from the lens elements.

724 Annular zonal correcting:

This subclass is indented under subclass 642. Subject matter wherein the lens comprises one or more annular components which are used either to correct aberrations present in an annular zone of the lens or of another lens or to increase the depth of focus of either lens.

(1) Note. This subclass provides for both the combination of the lens being corrected and its annular correcting lens for the annular correcting lens, per se.

SEE OR SEARCH THIS CLASS, SUBCLASS:

741, for lenses with multipart elements.

725 Panoramic:

This subclass is indented under subclass 642. Subject matter wherein the lens is capable of receiving light rays from the entire horizon simultaneously and producing from such rays a single image of the entire horizon.

(1) Note. The lens must be capable of receiving light rays from all portions of the entire horizon simultaneously. See this class, subclass 726 for lenses combined with a reflecting means for sequentially directing rays from fractional portions of the horizon through the

lens, but which cannot receive rays from the entire horizon simultaneously.

SEE OR SEARCH THIS CLASS, SUBCLASS:

504, for lenses maintained in an extended spacing structure to provide a wide field of view.

749, and 754, for lenses having a particularly wide field of view, but less than the requirement of the above definition.

726 With reflecting element:

This subclass is indented under subclass 642. Subject matter wherein the lens system includes a reflective surface transverse to the light path.

SEE OR SEARCH THIS CLASS, SUBCLASS:

503+, for extended spacing structure employing diverse refractive and reflective elements.

727 Including concave or convex reflecting surface:

This subclass is indented under subclass 726. Subject matter wherein the lens system includes a transparent refractive element and a curved reflective surface which coact to provide a single lens of both refractive and reflective components, i.e., a catadioptric lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:

364+, for lenses having both refracting and reflecting components combined with an ocular or viewing system.

838, for reflectors and reflecting systems.

SEE OR SEARCH CLASS:

348, Television, subclasses 744+ for catadioptric lenses combined with cathode-ray tubes.

396, Photography, appropriate subclasses for catadioptric lenses combined with significant camera structure.

728 With aspheric surface (e.g., Schmidt lens, etc.):

This subclass is indented under subclass 727. Subject matter in which one of the refracting or reflecting surfaces departs from the spherical shape (e.g., a Schmidt type lens).

SEE OR SEARCH THIS CLASS, SUBCLASS:

364+, for catadioptric lenses combined with an ocular or viewing system.

708+, for other aspheric-type lens.

729 With concave and convex reflectors in series:

This subclass is indented under subclass 728. Subject matter where the lens system includes both concave and convex reflecting elements consecutively receiving light.

730 Reflectors in series:

This subclass is indented under subclass 727. Subject matter where the lens system includes a second reflector receiving light rays reflected by a first reflector.

SEE OR SEARCH THIS CLASS, SUBCLASS:

503+, for extended spacing structure employing diverse refractive and reflective elements.

731 With concave and convex reflectors in series:

This subclass is indented under subclass 730. Subject matter where the lens system includes both concave and convex reflecting elements consecutively receiving light.

732 For producing a double pass:

This subclass is indented under subclass 726. Subject matter where a reflective surface mirror reflects light which has passed through a lens back through the same lens.

733 Multiple component lenses:

This subclass is indented under subclass 726. Subject matter wherein the lens comprises multiple sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their

axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643+, for eyepieces having multiple components.
648+, for projection type field curvature shaping lens having multiple components.
656+, for microscope objective having multiple components.
680+, for reverse telephoto lens of variable focal lengths.
708+, for a nonspherical lens having multiple components.
745+, for telephoto lens having multiple components.
749+, for reverse telephoto lens having multiple components.
754+, for multiple component lens systems generally.

734 Four components:

This subclass is indented under subclass 733. Subject matter wherein the lens comprises four sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

644, for eyepieces having four components.

650, for projection type field curvature shaping lenses having four components.

660, for microscope objective having four components.

682, for variable magnification reverse telephoto having seven or less components.

715, for nonspherical lens system having four components.

747, for a telephoto lens having four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

771, for multiple component lenses having four components.

735 Three components:

This subclass is indented under subclass 733. Subject matter wherein the lens comprises three sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

645, for eyepieces having three components.

651, for projection type field curvature shaping lenses having less than four components.

661, for microscope objective having less than four components.

682, for variable magnification reverse telephoto having seven or less components.

716, for nonspherical lens system having three components.

748, for a telephoto lens having less than four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

784, for multiple component lenses having three components.

736 Two components:

This subclass is indented under subclass 733. Subject matter wherein the lens comprises two sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

646, for eyepieces having two components.
651, for projection type field curvature shaping lenses having less than four components.
661, for microscope objective having less than four components.
682, for variable magnification reverse telephoto having seven or less components.
717, for nonspherical lens system having two components.
748, for a telephoto lens having less than four components.
753, for wide angle lenses having five or less components.
754, for multiple component lens systems generally.
793, for multiple component lenses having two components.

737 With diverse refracting element:

This subclass is indented under subclass 642. Subject matter wherein the lens is combined with a nonlens light-refracting element through which element the light must pass during the normal operation of the lens.

(1) Note. The refracting element is employed to redirect the optical axis of the lens (e.g., prisms).

SEE OR SEARCH THIS CLASS, SUBCLASS:

503+, for extended spacing structure employing diverse refractive light deflectors.
669, for amorphous refracting elements in the form of prisms.

738 With light limiting or controlling means:

This subclass is indented under subclass 642. Subject matter comprising the combination of a lens and means associated therewith to limit or control, without regard to wavelength, the amount of intensity of the light that passes through the lens.

(1) Note. The subject matter under this definition includes lamina between lens elements, coatings on the faces of elements, and pigment in the material of the lens elements themselves, all of which do not favor the transmission of any one particular wavelength of light over any other wavelength present in the light.

(2) Note. This class (359) provides for optical diaphragms and shutters, per se, in subclasses 227+. Lenses combined with shutters generally are provided for in subclass 738 and lens combined with diaphragms generally are in indented subclass 739. However, camera shutters and diaphragms, per se, are classified in Class 396, Photography, subclasses 452+ and 505+ respectively, the indicated use in cameras or camera background being sufficient for classification there as opposed to Class 359. Class 396 also provides for lenses broadly or specifically combined with camera shutter or

diaphragm details, it being emphasized that such combinations involving non-camera shutters or diaphragms are classified in subclasses 738+ of this class (359) as indicated above. The combination of a lens broadly or specifically claimed and a camera shutter or diaphragm broadly claimed (as well as shutters or diaphragms generally) are classified in this subclass (738). Projectors with shutters or diaphragms are provided for in Class 353, Optics: Image Projectors, subclasses 75, 88+, and 97.

SEE OR SEARCH THIS CLASS, SUBCLASS:

227+, for means to control the intensity or amount of light that passes along a certain path. See also (2) Note above.

611, for barrel end or lens mount shade to prevent glare or to reduce unwanted nonimaging light.

722, for a lens with means which favors the transmission or blocking of particular wavelengths of light.

888, for means to control the density of light flow through a predetermined area without regard to the wavelength of the light.

SEE OR SEARCH CLASS:

353, Optics: Image Projectors, subclasses 88+ for an image projector having a shutter.

396, Photography, subclasses 452+ for camera shutters, and see (2) Note above.

739 Diaphragm:

This subclass is indented under subclass 738. Subject matter in which the light-controlling means is in the form of an opaque screen having a variable aperture therein, such screen being disposed in the path of the light beam passing through the lens in such a position axially of the lens to either restrict the amount of light that reaches the lens or restrict the amount of light transmitted by the lens.

(1) Note. The subject matter under this definition includes opaque screens in which the aperture is of annular shape and located either within the screen or at the periphery thereof.

(2) Note. Mere recitation of a diaphragm is inadequate for classification here. This subclass and subclass 740 are limited to special shapes or locations of diaphragms.

SEE OR SEARCH CLASS:

353, Optics: Image Projectors, subclass 75 and 97 for an image projector having a diaphragm.

396, Photography, subclasses 505+ for camera diaphragms, and see (2) Note above.

740 Between lens components:

This subclass is indented under subclass 739. Subject matter wherein the diaphragm is located between components of the lens.

741 With multipart element:

This subclass is indented under subclass 642. Subject matter wherein a lens element is formed of a plurality of elements arranged side by side, transverse to the optical axis, and cooperating to form a single image.

(1) Note. The subject matter under this definition differs from the subject matter provided for in subclasses 754+ in that the various parts of the component or element in subclasses 754+ are in series along the optical axis of the component or element, while the various parts of the component or element of this subclass are in edge to edge relation, transversely of the optical axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

619+, for lenticular lenses where each element forms a spatially separate image of a single element.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclass 698 for lenses employed in solar heating.

742 Echelon (e.g., Fresnel lens, etc.):

This subclass is indented under subclass 741. Subject matter wherein at least one of the refracting surfaces of the lens is discontinuous, being formed of a plurality of stepped refracting surfaces connecting at their adjacent edges

by other surfaces which extend substantially parallel to the intended direction of light travel through the lens, the surfaces being so shaped and arranged that they form in conjunction with the opposed refracting surface of the lens, a plurality of lenses all of which have a common focus.

743 Having curvilinear lens:
This subclass is indented under subclass 742. Subject matter wherein the general shape of the lens surface is concave or convex on either side or on both sides.

744 Afocal (e.g., Galilean telescopes, etc.):
This subclass is indented under subclass 642. Subject matter wherein the components of the lens are so shaped and spaced along the optical axis of the lens that the total refracting power of the lens is zero, i.e., parallel light rays, upon entering the lens and passing through all components thereof are so refracted that they emerge from the lens as parallel rays.

(1) Note. These lenses may be attachments to be used with other lenses to change the equivalent focal lengths of the latter lenses.

745 Telephoto:
This subclass is indented under subclass 642. Subject matter wherein the lens is designed with the effective focal length equal to or greater than the distance from the first refracting surface to the focal plane.

(1) Note. This lens system is physically shorter than its rated focal length.

(2) Note. The focal length is the distance from the principle focus (focus of parallel rays of light) to the surface of a mirror or the optical center of a lens.

(3) Note. A focal point is the point at which a lens or mirror will focus parallel incident radiation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
643+, for eyepieces.
648+, for projection type field curvature shaping lens.
656+, for microscope objective.
672, for selective magnification.
676, for variable magnification.
680+, for reverse telephoto lens.
708+, for a nonspherical lens.
733+, for multiple component lenses having a reflecting element.
749+, for reverse telephoto lens.
754+, for multiple component lens systems generally.

746 With five components:
This subclass is indented under subclass 745. Subject matter wherein the lens comprises five sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a “component” comprising a single mass or the two axially extreme refracting surfaces of a “component” comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass “component” or the axially extreme surfaces of the “component” grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the

lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

659, for microscope objectives having five components.

682, for variable magnification reverse telephoto having seven or less components.

714, for nonspherical surface lens system having five components.

733, for more than four multiple component lenses with a reflecting element.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

763, for multiple component lenses having five components.

747 With four components:

This subclass is indented under subclass 745. Subject matter wherein the lens comprises four sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

644, for eyepieces having four components.

650, for projection type field curvature shaping lenses having four components.

660, for microscope objective having four components.

682, for variable magnification reverse telephoto having seven or less components.

715, for nonspherical lens system having four components.

734, for four component multiple component lenses with a reflecting element.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

771, for multiple component lenses having four components.

748 With less than four components:

This subclass is indented under subclass 745. Subject matter wherein the lens comprises less than four sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a “component” comprising a single mass or the two axially extreme refracting surfaces of a “component” comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass “component” or the axially extreme surfaces of the “component” grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

645+, for eyepieces having three or less components.
651, for projection type field curvature shaping lenses having less than four components.
661, for microscope objective having less than four components.
682, for variable magnification reverse telephoto having seven or less components.
716+, for nonspherical lens system having three or less components.
735+, for three or less component multiple component lenses with a reflecting element.
753, for wide angle lenses having five or less components.
754, for multiple component lens systems generally.
784+, for multiple component lenses having three or less components.
796, for a single component lens with multiple elements.

749 Reverse telephoto:

This subclass is indented under subclass 642. Subject matter wherein the lens is designed with the effective focal length equal to or less than the distance from the last refracting surface to the focal plane, i.e., the back focal length is equal to or greater than the effective focal length.

(1) Note. This is also known as a retrofocus lens and it consists of an ordinary objective with a negative component near its focal point, thus forming a large back focus relative to its focal length.

(2) Note. The focal length is the distance from the principle focus (focus of parallel rays of light) to the surface of a mirror or the optical center of a lens.

(3) Note. A focal point is the point at which a lens or mirror will focus parallel incident radiation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643+, for eyepieces.
648+, for projection type field curvature shaping lens.
656+, for microscope objective.
680+, for reverse telephoto lens of variable focal lengths.
708+, for a nonspherical lens.
733+, for multiple component lenses having a reflecting element.
745+, for telephoto lens.
754+, for multiple component lens systems generally.

750 With eight components:

This subclass is indented under subclass 749. Subject matter wherein the lens comprises eight sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their

axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

656, for microscope objective having more than seven components.

681, for variable magnification reverse telephoto having eight components.

708, for nonspherical surface variable magnification lenses having more than six components.

733, for more than four multiple component lenses with a reflecting element.

745, for telephoto lenses having more than five components.

754, for more than seven multiple component lenses.

751 With seven components:

This subclass is indented under subclass 749. Subject matter wherein the lens comprises seven sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such, axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

657, for microscope objectives having seven components.

682, for variable magnification reverse telephoto having seven or less components.

708, for nonspherical surface variable magnification lenses having more than six components.

733, for more than four multiple component lenses with a reflecting element.

745, for telephoto lenses having more than five components.

755, for multiple component lenses having seven components.

752 With six components:

This subclass is indented under subclass 749. Subject matter wherein the lens comprises six sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

658, for microscope objectives having six components.

682, for variable magnification reverse telephoto having seven or less components.

713, for nonspherical surface lens system having six components.

733, for more than four multiple component lenses with a reflecting element.

745, for telephoto lenses having more than five components.

754, for multiple component lens systems generally.

756, for multiple component lens having six components.

753 With five or less components:

This subclass is indented under subclass 749. Subject matter wherein the lens comprises five or less sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a “component” comprising a single mass or the two axially extreme refracting surfaces of a “component” comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass “component” or the axially extreme surfaces of the “component” grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643+, for eyepieces having five or less components.

648+, for projection type field curvature shaping lenses having five or less components.

659+, for microscope objectives having five or less components.

682+, for variable magnification reverse telephoto having five or less components.

714+, for nonspherical surface lens system having five or less components.

733+, for five or less multiple component lenses with a reflecting element.

746+, for telephoto lenses having five or less components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

763+, for multiple component lenses having five or less components.

796, for a single component lens with multiple elements.

754 Multiple component lenses:

This subclass is indented under subclass 642. Subject matter wherein the lens comprises multiple sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a “component” comprising a single mass or the two axially extreme refracting surfaces of a “component” comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass “component” or the axially extreme surfaces of the “component” grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643+, for eyepieces having multiple components.

648+, for projection type field curvature shaping lens having multiple components.

656+, for microscope objective having multiple components.

680+, for reverse telephoto lens of variable focal length.

708+, for a nonspherical lens having multiple components.

733+, for multiple component lenses having a reflecting element.

745+, for telephoto lens having multiple components.

749+, for reverse telephoto lens having multiple components.

755 Seven components:

This subclass is indented under subclass 754. Subject matter wherein the lens comprises seven sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

657, for microscope objectives having seven components.

682, for variable magnification reverse telephoto having seven or less components.

708, for nonspherical surface variable magnification lenses having more than six components.

733, for more than four multiple component lenses with a reflecting element.

745, for telephoto lenses having more than five components.

751, for wide angle lenses having seven components.

756 Six components:

This subclass is indented under subclass 754. Subject matter wherein the lens comprises six sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses

arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

658, for microscope objectives having six components.

682, for variable magnification reverse telephoto having seven or less components.

713, for nonspherical surface lens system having six components.

733, for more than four multiple component lenses with a reflecting element.

745, for telephoto lenses having more than five components.

752, for wide angle lenses having six components.

754, for multiple component lens systems generally.

757 First component positive:

This subclass is indented under subclass 756. Subject matter wherein the component at the entrant face of the lens, i.e., the first component hit by the light as the light begins travelling through the lens, is a convergent lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:

757+, for a multiple component lens having six components wherein the first component is positive (i.e., convergent).

759+, for a multiple component lens having six components wherein the first two components are positive(i.e., convergent).

764+, for a multiple component lens having five components wherein the first component is positive (i.e., convergent).

767+, for a multiple component lens having five components wherein the first two components are positive (i.e., convergent).

772+, for a multiple component lens having four components wherein the first two components are positive (i.e., convergent).

758 + - + + - + Arrangement:

This subclass is indented under subclass 757. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the left most sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

759 First two components positive:

This subclass is indented under subclass 757. Subject matter wherein the first two components at the entrant face of the lens, i.e., the first two components hit by the light as the light begins travelling through the lens, are convergent lenses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

757+, for a multiple component lens having six components wherein the first component is positive (i.e., convergent).

764+, for a multiple component lens having five components wherein the first component is positive (i.e., convergent).

767+, for a multiple component lens having five components wherein the first two components are positive (i.e., convergent).

772+, for a multiple component lens having four components wherein the first two components are positive (i.e., convergent).

760 **+ + - - + + Arrangement:**

This subclass is indented under subclass 759. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

761 **First component negative:**

This subclass is indented under subclass 756. Subject matter wherein the first component at the entrant face of the lens, i.e., the first component hit by the light as the light begins travelling through the lens, is divergent.

SEE OR SEARCH THIS CLASS, SUBCLASS:

770, for a multiple component lens having five components wherein the first component is negative.

781+, for a multiple component lens having four components wherein the first component is negative.

762 **First two components negative:**

This subclass is indented under subclass 761. Subject matter wherein the first two components at the entrant face of the lens, i.e., the first two components hit by the light as the light begins travelling through the lens, are divergent lenses.

763 **Five components:**

This subclass is indented under subclass 754. Subject matter wherein the lens comprises five sections (i.e., components), each containing two refractive surfaces arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a “component” comprising a single mass or the two axially extreme refracting surfaces of a “component” comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass “component” or the axially extreme surfaces of the “component” grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

643, for eyepieces having more than four components.

648, for projection type field curvature shaping lenses having more than four components.

659, for microscope objectives having five components.

682, for variable magnification reverse telephoto having seven or less components.

714, for nonspherical surface lens system having five components.

733, for more than four multiple component lenses with a reflecting element.

746, for telephoto lenses having five components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

764 First component positive:

This subclass is indented under subclass 763. Subject matter wherein the component at the entrant face of the lens, i.e., the first component hit by the light as the light begins travelling through the lens, is a convergent lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:

757+, for a multiple component lens having six components wherein the first component is positive (i.e., convergent).

759+, for a multiple component lens having six components wherein the first two components are positive (i.e., convergent).

767+, for a multiple component lens having five components wherein the first two components are positive (i.e., convergent).

772+, for a multiple component lens having four components wherein the first two components are positive (i.e., convergent).

765 + - - + +Arrangement:

This subclass is indented under subclass 764. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

766 + - + - + Arrangement:

This subclass is indented under subclass 764. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

767 First two components positive:

This subclass is indented under subclass 764. Subject matter wherein the first two components at the entrant face of the lens, i.e., the first two components hit by the light as the light begins travelling through the lens, are convergent lenses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

757+, for a multiple component lens having six components wherein the first component is positive (i.e., convergent).

759+, for a multiple component lens having six components wherein the first two components are positive (i.e., convergent).

764+, for a multiple component lens having five components wherein the first component is positive (i.e., convergent).

772+, for a multiple component lens having four components wherein the first two components are positive (i.e., convergent).

768 + + - - +Arrangement:

This subclass is indented under subclass 767. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the

direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

769 **+ + - + + Arrangement:**
This subclass is indented under subclass 767. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

770 **First component negative:**
This subclass is indented under subclass 763. Subject matter wherein the first component at the entrant face of the lens, i.e., the first component hit by the light as the light begins travelling through the lens, is divergent.

SEE OR SEARCH THIS CLASS, SUBCLASS:
761+, for a multiple component lens having six components wherein the first component is negative.
781+, for a multiple component lens having four components wherein the first component is negative.

771 **Four components:**
This subclass is indented under subclass 754. Subject matter wherein the lens comprises four sections (i.e., components), each containing two refractive surfaces, arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:
644, for eyepieces having four components.
650, for projection type field curvature shaping lenses having four components.
660, for microscope objective having four components.
682, for variable magnification reverse telephoto having seven or less components.
715, for nonspherical lens system having four components.
734, for four component multiple component lenses with a reflecting element.
747, for a telephoto lens having four components.
753, for wide angle lenses having five or less components.
754, for multiple component lens systems generally.

772 **First component positive:**
This subclass is indented under subclass 771. Subject matter wherein the component at the entrant face of the lens, i.e., the first component

hit by the light as the light begins travelling through the lens, is a convergent lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:

757+, for a multiple component lens having six components wherein the first component is positive (i.e., convergent).

759+, for a multiple component lens having six components wherein the first two components are positive (i.e., convergent).

764+, for a multiple component lens having five components wherein the first component is positive (i.e., convergent).

767+, for a multiple component lens having five components wherein the first two components are positive (i.e., convergent).

773 **+ - + - Arrangement:**

This subclass is indented under subclass 772. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

774 **+ - + + Arrangement:**

This subclass is indented under subclass 772. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

SEE OR SEARCH THIS CLASS, SUBCLASS:

687, for a + - + + arrangement in a mechanical compensation variable magnification lens.

775 **+ - - + Arrangement:**

This subclass is indented under subclass 772. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

SEE OR SEARCH THIS CLASS, SUBCLASS:

688, for a + - - + arrangement in a mechanical compensation variable magnification lens.

776 **With multiple element component:**

This subclass is indented under subclass 775. Subject matter wherein the lens comprises a single section (i.e., component) having a plurality of optical pieces (i.e., elements) arranged in laminated series along the light path or optical axis of the lens with their adjacent refracting surfaces either in full overall contact or so closely spaced that such spacing does not enter into the lens computations.

(1) Note. Each “component” contains two refractive surfaces, arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(2) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact, or in spaced parallel relation with the spacing being of such small magnitude that it

does not enter into the lens computations.

(3) Note. The "component" two refracting surfaces of the single mass or the two axially extreme refracting surfaces of the plurality of masses, have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(4) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

(5) Note. The term "element" as applied to a lens designates any single transparent mass of refractive material having two opposed refracting surfaces, which surfaces are disposed transversely of the optical axis of the lens and spaced therealong, i.e., any one of the masses in the above component definition regardless of its spacing from adjacent refracting surfaces that may be present in the lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:

355, for lenses constructed of materials that transmit ultraviolet and infrared light.

724, for lenses with annular zonal correcting elements.

741, for lenses with multipart elements or components.

786, for a three component multiple component lens wherein the first component contains multiple elements.

787, for a three component multiple component lens wherein the second component contains multiple elements.

788, for a three component multiple component lens wherein the third component contains multiple elements.

796, for a lens having a single component with multiple elements.

797, for a lens having a single component with three or more elements.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclasses 37+ for processes of securing lens elements together.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 159.01+ for opthalmic lenses or blanks.

428, Stock Material or Miscellaneous Articles, subclasses 415, 417, and 426+ for a nonstructural stock material product in the form of a composite web or sheet embodying a layer of glass or quartz next to another layer of material which may also be quartz or glass (subclasses 427 and 428).

777 Infinite radius:

This subclass is indented under subclass 776. Subject matter wherein at least one mass of refractive material has at least one flat surface perpendicular to an optical axis.

778 Having a biconvex single element component:

Subject matter under 776 wherein at least one element consists of a single mass of refracting material having a curved or rounded outward surface at the entrance and exit ends.

SEE OR SEARCH THIS CLASS, SUBCLASS:

789, for a three component lens having a first biconvex component in the + - + component arrangement.

790, for a three component lens having a third biconvex component in the + - + component arrangement.

779 + + - + Arrangement:

This subclass is indented under subclass 772. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the left-most sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the

lens is the same as the reading arrangement of the subclass title.

780 **+ + + - Arrangement:**
This subclass is indented under subclass 772. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

781 **First component negative:**
This subclass is indented under subclass 771. Subject matter wherein the first component at the entrant face of the lens, i.e., the first component hit by the light as the light begins travelling through the lens, is divergent.

SEE OR SEARCH THIS CLASS, SUBCLASS:

761+, for a multiple component lens having six components wherein the first component is negative.

770, for a multiple component lens having five components wherein the first component is negative.

782 **- + + - Arrangement:**
This subclass is indented under subclass 781. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

783 **- + + + Arrangement:**
This subclass is indented under subclass 781. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

784 **Three components:**
This subclass is indented under subclass 754. Subject matter wherein the lens comprises three sections (i.e., components), each containing two refractive surfaces, arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a “component” comprising a single mass or the two axially extreme refracting surfaces of a “component” comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass “component” or the axially extreme surfaces of the “component” grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the

lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

645, for eyepieces having three components.

651, for projection type field curvature shaping lenses having less than four components.

661, for microscope objective having less than four components.

682, for variable magnification reverse telephoto having seven or less components.

716, for nonspherical lens system having three components.

735, for three component multiple component lenses with a reflecting element.

748, for a telephoto lens having less than four components.

753, for wide angle lenses having five or less components.

754, for multiple component lens systems generally.

785 +-+ Arrangement:

This subclass is indented under subclass 784. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

786 With multiple element first component:

This subclass is indented under subclass 785. Subject matter wherein the first convergent component contains multiple masses of refractive material; each mass having two opposed refracting surfaces disposed transversely of the optical axis of the lens and spaced therealong.

SEE OR SEARCH THIS CLASS, SUBCLASS:

741, for lenses with multipart elements or components.

776, for a four component multiple component lens wherein the first + component contains multiple elements.

787, for a three component multiple component lens wherein the second component contains multiple elements.

788, for a three component multiple component lens wherein the third component contains multiple elements.

796, for a lens having a single component with multiple elements.

797, for a lens having a single component with three or more elements.

787 With multiple element second component:

This subclass is indented under subclass 785. Subject matter wherein the second divergent component contains multiple masses of refractive material; each mass having two opposed refracting surfaces disposed transversely of the optical axis of the lens and spaced therealong.

SEE OR SEARCH THIS CLASS, SUBCLASS:

741, for lenses with multipart elements or components.

776, for a four component multiple component lens wherein the first + component contains multiple elements.

786, for a three component multiple component lens wherein the first component contains multiple elements.

788, for a three component multiple component lens wherein the third component contains multiple elements.

796, for a lens having a single component with multiple elements.

797, for a lens having a single component with three or more elements.

788 With multiple element third component:

This subclass is indented under subclass 785. Subject matter wherein the third convergent component contains multiple masses of refractive material; each mass having two opposed refracting surfaces disposed transversely of the optical axis of the lens and spaced therealong.

SEE OR SEARCH THIS CLASS, SUBCLASS:

741, for lenses with multipart elements or components.

776, for a four component multiple component lens wherein the first + component contains multiple elements.
786, for a three component multiple component lens wherein the first component contains multiple elements.
787, for a three component multiple component lens wherein the second component contains multiple elements.
796, for a lens having a single component with multiple elements.
797, for a lens having a single component with three or more elements.

789 With first component biconvex:
This subclass is indented under subclass 785. Subject matter wherein the first convergent component has a curved or rounded outward surface at the entrance and exit ends.

SEE OR SEARCH THIS CLASS, SUBCLASS:
778, for a four component lens having a single biconvex element in the + - - + component arrangement.
790, for a three component lens having a third biconvex component in the + - + component arrangement.

790 With third component biconvex:
This subclass is indented under subclass 785. Subject matter wherein the third convergent component has a curved or rounded outward surface at the entrance and exit ends.

SEE OR SEARCH THIS CLASS, SUBCLASS:
778, for a four component lens having a single biconvex element in the + - - + component arrangement.
789, for a three component lens having a first biconvex component in the + - + component arrangement.

791 ++- Arrangement:
This subclass is indented under subclass 784. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

792 +++ Arrangement:
This subclass is indented under subclass 784. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the leftmost sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

793 Two components:
This subclass is indented under subclass 754. Subject matter wherein the lens comprises two sections (i.e., components), each containing two refractive surfaces, arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(1) Note. The term “component” as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(2) Note. The two refractive surfaces of a “component” comprising a single mass or the two axially extreme refracting surfaces of a “component” comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(3) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

SEE OR SEARCH THIS CLASS, SUBCLASS:

646, for eyepieces having two components.
651, for projection type field curvature shaping lenses having less than four components.
661, for microscope objective having less than four components.
682, for variable magnification reverse telephoto having seven or less components.
717, for nonspherical lens system having two components.
736, for two component multiple component lenses with a reflecting element.
748, for a telephoto lens having less than four components.
753, for wide angle lenses having five or less components.
754, for multiple component lens systems generally.

794 ++ Arrangement:

This subclass is indented under subclass 793. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the left-most sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

795 +- Arrangement:

This subclass is indented under subclass 793. Subject matter wherein the plus and minus signs indicate convergent and divergent lens components, respectively.

(1) Note. The arrangement along the optical axis of the lens is identified by the left-most sign representing the component at the entrant face of the lens, i.e., the direction of light travelling through the lens is the same as the reading arrangement of the subclass title.

796 Single component with multiple elements:

This subclass is indented under subclass 642. Subject matter wherein the lens comprises a single section (i.e., component) having a plurality of optical pieces (i.e., elements) arranged in laminated series along the light path or optical axis of the lens with their adjacent refracting surfaces either in full overall contact or so closely spaced that such spacing does not enter into the lens computations.

(1) Note. Each "component" contains two refractive surfaces, arranged in series along the optical axis of the lens with their optical centers in alignment thereon, their planes perpendicular to such axis, and their axially extreme refracting surfaces so spaced along the optical axis that parallel light rays upon entering and passing through all of such components are refracted to a focus no more than one time.

(2) Note. The term "component" as applied to a lens designates either (1) a single transparent mass of refractive material having two opposed refracting surfaces or (2) a grouped plurality of such masses arranged in series along the optical axis of the lens with their adjacent refracting surfaces either in full overall contact or in spaced parallel relation with the spacing being of such small magnitude that it does not enter into the lens computations.

(3) Note. The two refractive surfaces of a "component" comprising a single mass or the two axially extreme refracting surfaces of a "component" comprising a plurality of masses have at least a portion thereof axially air-spaced from all other adjacent refracting surfaces that may be present in the lens.

(4) Note. The axial dimension of the air-spacing between either the opposed surfaces of the single mass "component" or the axially extreme surfaces of the "component" grouped plurality of masses, and the other adjacent refracting surfaces that may be present in the lens must be of sufficient magnitude to enter into the lens computations in order to limit the axial extent of the lens component.

(5) Note. The term "element" as applied to a lens designates any single transparent mass of refractive material having two opposed refracting surfaces, which surfaces are disposed transversely of the optical axis of the lens and spaced therealong, i.e., any one of the masses in the above component definition regardless of its spacing from adjacent refracting surfaces that may be present in the lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:

355, for lenses constructed of materials that transmit ultraviolet and infrared light.

647, for eyepieces having one component.

651, for projection type field curvature shaping lenses having less than four components.

661, for microscope objective having less than four components.

682, for variable magnification reverse telephoto having seven or less components.

718, for nonspherical lens system having one component.

724, for lenses with annular zonal correcting elements.

741, for lenses with multipart elements or components.

748, for a telephoto lens having less than four components.

753, for wide angle lenses having five or less components.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclass 387 for processes of forming an optical fiber directly connected to a lens; subclasses 37+ for processes of securing glass lens elements together.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 159.01+ for opthalmic lenses or blanks.

428, Stock Material or Miscellaneous Articles, subclasses 415, 417, and 426+ for a nonstructural stock material product in the form of a composite web or sheet embodying a layer of glass or quartz next to another layer of material which may also be quartz or glass (subclasses 427 and 428).

797 Three or more elements:

This subclass is indented under subclass 796. Subject matter wherein the single component of the lens is made up of three or more masses of refractive material; each having two opposed refracting surfaces, which surfaces are disposed transversely of the optical axis of the lens and spaced therealong.

798 With viewed object or viewed field illumination:

This subclass is indented under subclass 642. Subject matter including a light source for illuminating the area viewed through or covered by the lens, or including structure such as a reflector or a prism for directing natural or artificial light on the area viewed, or wherein the lens is adapted to collect and direct natural or artificial light on the area viewed or covered.

(1) Note. A mere transparent or exposed portion is not sufficient for classification here. A light source or light directing or guiding means is necessary.

SEE OR SEARCH THIS CLASS, SUBCLASS:

385+, for compound lens system spacing means with object illumination.

591+, for natural light directing systems.

SEE OR SEARCH CLASS:

362, Illumination, subclass 253 for lights combined with structure not otherwise classifiable; and subclasses 257-311, especially subclasses 268 and 311.01-311.15, for projectors which may include focusing lenses in the light path.

799 Illuminating beam coaxial with lens axis:
This subclass is indented under subclass 798. Subject matter wherein the axis of the illuminating beam is parallel with the optical axis of the lens over at least a part of these axes.

(1) Note. The beam may pass through the lens or the beam may have an annular cross section and surround the lens; however, the beam axis and lens axis are coincident. Most of the art in this subclass relates to a microscope objective and the illuminating structure for the viewed object.

SEE OR SEARCH THIS CLASS, SUBCLASS:
385+, for microscope stages with substage illumination, the beam usually being coaxial with the barrel.

800 Illumination through lens:
This subclass is indented under subclass 798. Subject matter wherein at least part of the illumination passes through at least part of the lens or through at least one component of a multiple component lens.

801 With viewed object support:
This subclass is indented under subclass 798. Subject matter wherein an object which is being viewed through the lens is supported by a device which is connected to the lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:
811, for lenses combined with supports for viewed objects generally.

802 Magnifier:
This subclass is indented under subclass 798. Subject matter wherein the lens makes an enlarged image of a viewed object.

803 Hand held:
This subclass is indented under subclass 802. Subject matter wherein the device is held in a human hand while in use.

804 With viewed object support:
This subclass is indented under subclass 642. Subject matter including structure for supporting an object to be viewed in the optical path of the lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:
801, for lenses combined with viewed object supports and including illumination of the viewed object.
811+, for lens supports generally.

SEE OR SEARCH CLASS:
40, Card, Picture, or Sign Exhibiting, appropriate subclasses for lenses broadly combined with supports for cards, pictures, or signs. See also (1) Note under subclass 806.

805 On lens supporting handle:
This subclass is indented under subclass 804. Subject matter including a lens supporting handle which also functions as a support for the object being viewed or which supports structure which in turn supports the object being viewed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
803, and 812, for lenses with handles generally.

806 Relatively movable informatory sheet and lens (e.g., reading machine, etc.):
This subclass is indented under subclass 804. Subject matter including structure for supporting a sheet or tape of printed, pictorial, or other informatory matter together with structure for moving or guiding movement of the sheet or tape horizontally relative to the lens, or of the lens horizontally relative to the sheet or tape for viewing different portions of the sheet or tape.

(1) Note. Class 40, Card, Picture, or Sign Exhibiting, provides for the combination of a lens broadly together with structure for supporting a card, picture, or sign relative to the lens for viewing therethrough. However, where the claims recite any optical limitations such as lens shape or forcing (as by an adjustable lens

support) together with a sheet or tape support as defined above classification is in this subclass (806). Where the supporting structure presents only a portion of a line of printed matter or an entire line or limited number of lines together with provision for moving additional lines or line portions into lens view, the lens being only broadly claimed as in optical reading machines classification is in this subclass (806). Where the lens broadly claimed is only utilized to examine or view a portion of the exhibit, there being relative movement between the lens and the exhibit classification is here in this subclass (806). Class 40 provides generally for viewing the entire single exhibit (or the entire framed portion of an exhibit which is presented for viewing as in map holders) of the card, sign or picture through the lens, with provision for changing the entire exhibit as in subclasses 446+ thereunder. Magnifiers adapted for attachment to a sheet for viewing a portion thereof are classified under subclass 804 of this class or in this subclass (806), if relative motion is provided, regardless whether the lens is claimed broadly or specifically.

SEE OR SEARCH THIS CLASS, SUBCLASS:

466+, for stereoscopic viewers.

801, for lenses relatively movable with respect to sheets and tapes together with illumination of the sheet or tape.

813, for lenses movable in the lens plane.

823, for lens mountings with axial adjustment as for focusing.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, especially subclasses 446+ for changeable exhibitors. See also (1) Note above. See subclasses 341 and 342+ for a copy holder wherein the copy is movable relative to a viewing locus.

807 Flat opaque document or picture:

This subclass is indented under subclass 804. Subject matter wherein the viewed document is flat and viewed by reflected light.

808 With lens casing:

This subclass is indented under subclass 642. Subject matter including structure substantially surrounding the lens as for protection purposes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

503, for tubes and barrels for compound lens systems.

581, for lenses with coatings for some optical effect.

809, for lenses combined with cases which encase devices other than the lens.

811, for lenses with supports.

809 Combined with diverse art tool, instrument or machine:

This subclass is indented under subclass 642. Subject matter wherein the lens is claimed in combination with a tool, instrument or machine, each of which is nonoptical in nature, and which combination is not classifiable with the tool, instrument, or machine.

(1) Note. For classification in this subclass, the tool, instrument, or machine must be at least nominally claimed. However, if the lens constitutes a perfecting feature of the tool, instrument or machine, the claiming of significant structure of the tool, instrument or machine is sufficient to classify the combination with the art to which the tool, instruments, or machines relates. Examples of tools, instruments, or machines combined with lenses and classified here are rulers, compasses, dividers, tweezers, thermometers, pencils, and sewing machines. Where the lens is claimed in combination with a support which is in turn disclosed as being attachable to an unclaimed tool, instrument, or machine, classification is with the lens and support in subclasses 811+ below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

440+, for lenses combined with structure including a scale or indicator.

448, 581, 726+, 737, and 738, for lenses combined with other optical structure such as prisms, mirrors, and light valves.

798+, for lenses combined with viewed object illuminating structure.
811, for lenses with supports. See also (1) Note above.

810 Operation viewed through lens:
This subclass is indented under subclass 809. Subject matter wherein the lens is so positioned with respect to the tool, instrument, or machine that the operation or functioning of the tool, instrument, or machine may be viewed through the lens.

811 With support:
This subclass is indented under subclass 642. Subject matter including structure to maintain the lens in space or in relation to some other object such as a barrel or tube in either a fixed position or in a fixed path of movement or in a limited area of movement.

(1) Note. Subject matter classifiable here must include the lens at least broadly in combination with the support, or a lens support alone which is peculiarly adapted to lens mounting without general utility, as in the lens mounting subclasses of 819+. Class 248, Supports, provides for supports generally even though disclosed with a lens, but not peculiar thereto.

SEE OR SEARCH THIS CLASS, SUBCLASS:
391+, for object stages or carriers.
503+, for lens spacing structure with supports therefor.
803, for lenses with support for the viewed object.
808, for lenses with casing or protection means.
809+, for lenses claimed with diverse art tools, instruments or machines which may also be supports.
812, for lenses with handles.
892, for optical filters with supports.

SEE OR SEARCH CLASS:
248, Supports, subclasses 127+ for stands and subclasses 200+ for brackets.

812 With additional handle:
This subclass is indented under subclass 811. Subject matter including a support for the lens together with an additional handle for moving the lens to and from its support position.

SEE OR SEARCH THIS CLASS, SUBCLASS:
409+, for opera glass handles.
805, for lenses with a viewed object support on the lens supporting, handle.

SEE OR SEARCH CLASS:
16, Miscellaneous Hardware (e.g., Bushing, Carpet Fastener, Caster, Door Closer, Panel Hanger, Attachable or Adjunct Handle, Hinge, Window Sash Balance, etc.), subclasses 110.1 through 430 for handles generally.

813 Lens movable in its plane:
This subclass is indented under subclass 811. Subject matter wherein the support includes relatively movable portions such as a track or slide to permit movement of the lens in its plane (which is perpendicular to its lens axis), while restricting other movements of the lens.

(1) Note. Other structure separate from the above defined relatively movable portions may be included even in the support to provide for nonplanar movement and yet not preclude classification here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
441+, for lens combined with scales, the lens being movable over the scale.
806, for lenses combined with a relatively movable informatory sheet.

814 Electromagnetic motive power:
This subclass is indented under subclass 813. Subject matter wherein the lens is moved by a source of power driven by an electric or magnetic device.

815 Body or apparel attached or carried:
This subclass is indented under subclass 811. Subject matter wherein the support is shaped or otherwise adapted to engage portions of the body or apparel thereof to position the lens with respect to the body of the user.

SEE OR SEARCH THIS CLASS, SUBCLASS:

362+, for body or apparel carried compound lens spaced means.

812, for lenses with handles.

816 Monocular loupe type:

This subclass is indented under subclass 815. Subject matter wherein the support is shaped to position the lens before the eye so that the lens moves with the head of the user.

(1) Note. The support may be adapted to engage the head directly or to be attached to spectacle frames.

SEE OR SEARCH THIS CLASS, SUBCLASS:

481, for binocular type loupes.

SEE OR SEARCH CLASS:

351, Optics: Eye Examining, Vision Testing and Correcting, subclass 158 for loupes combined with eyeglasses and subclasses 159.01+ for ophthalmic lenses and blanks.

817 Foldable or collapsible:

This subclass is indented under subclass 811. Subject matter wherein one part of the supporting structure may be folded with respect to another part or wherein the supporting structure may be folded with respect to the lens to reduce the space occupied by the lens and its support.

SEE OR SEARCH THIS CLASS, SUBCLASS:

406, for collapsible periscopes.

408, for collapsible or foldable binoculars.

474, for collapsible stereoscopic viewers.

818 With clamp or grip:

This subclass is indented under subclass 811. Subject matter wherein the support includes opposing surfaces for detachably engaging therebetween the supporting object for maintaining the support positioned with respect to the object.

(1) Note. The engaging surfaces may be spring or screw actuated. These surfaces do not engage the lens as in subclasses 819+ below, but rather the structure to which the support may be attached.

SEE OR SEARCH THIS CLASS, SUBCLASS:

804+, for lenses including a support for the object being viewed.

809+, for lens and their supports attached to diverse art tools, instruments, or machines by a clamp or grip.

819+, for lens mountings wherein the support engages the lens.

819 Lens mounts:

This subclass is indented under subclass 811. Subject matter including structure engaging the rim portion around substantially the entire circumference or rim of the lens or its components to secure the lens to supporting structure or to secure the components in proper spaced relation without obstructing the optical axis.

(1) Note. More commonly the structure here classified is a ring gripping the periphery of the lens with a thread for screwing into a barrel or wall of some optical instrument, such as a telescope, microscope, or camera. A plurality of these rings gripping respective lens components together with the ring supporting structure to maintain the components in proper spaced relationship is classified here. The mount must engage the lens over substantially the entire rim. A mere screw or clamp engaging a portion of the lens rim is not classified here, but in subclass 811 above. The mere inclusion of the telescope, microscope, or camera barrel broadly in the claim does not preclude classification here.

(2) Note. Class 396, Photography, appropriate subclasses for a lens mounting in combination with significant camera structure. Examples of such significant terms are film track, film plane, film holder, camera casing, camera housing, camera body with recess, camera cone, camera chamber, shutter, etc. The mere recitation of a camera wall or mounting plate or focal plane is not sufficient to remove lens mounting structure from this subclass (819).

(3) Note. Class 362, Illumination, in subclasses 455+ provide for illuminating lens mounts. For classification there, significant illuminating structure would be claimed or the indicated use of the mounted lens would be for illuminating purposes as opposed to the general optical use in this subclass (819). Class 353, Optics: Image Projectors, in subclasses 24, 96, and 100+ provide for lens mounts in projectors, and for classification where significant projector structure is recited such as slide holder, illuminating source, or projector housing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

507+, for lens mounts with moisture or dust sealing.
892, for filter mountings.

SEE OR SEARCH CLASS:

285, Pipe Joints or Couplings, subclasses 405+ for flanged pipe joints.
352, Optics: Motion Pictures, appropriate subclasses for lens holders and supports together with motion picture structure as required by Class 352.
353, Optics: Image Projectors, subclasses 24, 96, and 100+ for a lens mount in an image projector. See (3) Note above.
362, Illumination, subclasses 455+ for illuminating lens holders and supports. See also (3) Note above.
396, Photography, appropriate subclasses for camera structure with lens mounting structure and see (2) Note above.

820 With temperature compensation or control:

This subclass is indented under subclass 819. Subject matter wherein the mounting includes or is combined with structure to offset or minimize the effect of temperature change.

(1) Note. The structure classified here may be lens supporting material whose dimensions remain unchanged over a range of temperature change or heating structure for offsetting temperature changes otherwise occurring or for reducing moisture accumulation or heat insulating structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

362+, for compound lens systems with desiccating means.
507+, for mirrors with moisture prevention.
554+, for mirrors with distortion prevention.
823, for lens mountings with axial adjustment.

SEE OR SEARCH CLASS:

219, Electric Heating, subclass 521 for electrical heaters including a support for the material to be heated.
396, Photography, subclasses 7+ for aerial cameras.

821 Plural lenses in common carrier selectively operable (e.g., turret type, etc.):

This subclass is indented under subclass 819. Subject matter including mounting structure for a plurality of lenses and which permits any one of the lenses to be moved in and out of the optical path, together with structure for moving the lenses in and out of the optical path.

(1) Note. Usually the lenses are mounted on a common carrier and operated as a unit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

381, and 421, for compound lens systems with selective power obtained by a common carrier having a plurality of lenses selectively operable.
672+, for lenses of selective focal length by exchangeable lens components or by the addition of such component. See also (1) Note under this subclass.

822 Adjustable:

This subclass is indented under subclass 819. Subject matter wherein a parameter of the lens (e.g., focal length, etc.) is selectively varied.

823 With axial adjustment (e.g., adjustable focus, etc.):

This subclass is indented under subclass 819. Subject matter including structure for moving or permitting motion of the lens along its optical axis or for moving or permitting motion along the optical axis of at least two of the lens components relative to one another.

SEE OR SEARCH THIS CLASS, SUBCLASS:

694+, for adjusting mechanisms for variable focal length lenses.

813, for supports for movement of the lens in its plane.

820, for lens mountings permitting axial movement of the lens in response to temperature change.

SEE OR SEARCH CLASS:

396, Photography, subclasses 89+ for focusing lens structure in cameras. See (2) Note under subclass 819 above for lines between this class and Class 396 relating to camera lens mount.

824 Electromagnetic or piezoelectric drive:

This subclass is indented under subclass 823. Subject matter wherein the structure for moving or permitting motion of the lens along its optical axis or for moving or permitting motion along the optical axis of at least two of the lens components relative to one another includes a source of mechanical motive power which is driven by electrical means.

825 Focusing ring:

This subclass is indented under subclass 823. Subject matter wherein there is a circular band for adjusting the position of a point at which light rays converge.

826 Sliding barrels:

This subclass is indented under subclass 823. Subject matter wherein there are at least two cylindrical tubes, one of which fits and slides in an axial direction partially inside other.

(1) Note. Excluded from this subclass are barrels which are threaded.

827 Detachably attached (e.g., plate, barrel, etc.):

This subclass is indented under subclass 819. Subject matter wherein the mounting or plate or barrel to which the mounting is to be secured includes structure such as a snap connection, bayonet joint, screw threads, or like interengaging parts which permit ready securing and removal of the mounting from the plate or barrel.

(1) Note. The mounting here is often one of several interchangeable camera lens mounts while the plate is the camera wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:

821, for plural lenses selectively operable in a common carrier.

SEE OR SEARCH CLASS:

285, Pipe Joints or Couplings, subclass 189 for pipe to side or plate joints.

828 Bayonet coupling:

This subclass is indented under subclass 827. Subject matter wherein the mounting is a quick coupling device comprising pins on the sides of a male connector portion to engage corresponding slots in a socket where connection is accomplished by rotating two parts under pressure.

829 With threads:

This subclass is indented under subclass 819. Subject matter having a projecting helical rib.

830 With ring:

This subclass is indented under subclass 819. Subject matter having a circular band for holding, connecting, packing, sealing, etc.

831 PRISM (INCLUDING MOUNT):

This subclass is indented under the class definition. Subject matter including a transparent optical element having at least two plane surfaces inclined relative to each other, from which light is reflected or through which light is refracted.

(1) Note. A prism may be employed for refracting or reflecting light. Prism reflections are considered to be internal reflections; that is, the light is inside the prism body both before and immediately after the reflection.

(2) Note. A prism mount structure engaging the prism to secure it to other structure such as a barrel without obstructing the optical axis is included in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

290+, for prisms with means to change the refractive index.
431, for compound lens systems with prisms for telescopes.
592+, for refracting elements employed in natural light directing systems.
606, for prismoidal anti-glare mirrors.
615, for prisms which disperse light.
618+, for plural path optical systems which divide or combine light paths.
737, for lenses with prisms.
819+, for lens mountings.

SEE OR SEARCH CLASS:

356, Optics: Measuring and Testing, subclasses 51+ for optical test devices having prisms used in the infrared or ultraviolet range alone or in combination with visible light.

832 Fluid filled:

This subclass is indented under subclass 831. Subject matter wherein the prism contains a liquid, vapor, or gas.

833 With reflecting surface:

This subclass is indented under subclass 831. Subject matter wherein at least one surface reflects light.

SEE OR SEARCH THIS CLASS, SUBCLASS:

838+, for mirrors, per se.

834 Plural reflecting surfaces:

This subclass is indented under subclass 833. Subject matter comprising two or more reflecting surfaces.

835 For binocular or porro-prism:

This subclass is indented under subclass 834. Subject matter wherein a prism is made up of two right angle prisms placed at right angles to each other that can be used in a binocular.

SEE OR SEARCH THIS CLASS, SUBCLASS:

375, for a binocular microscope using a compound lens systems.
407+, for binocular telescope.
480+, for binocular devices.

836 Roof or roof-angle:

This subclass is indented under subclass 834. Subject matter comprising surfaces that revert and invert the image and, at the same time, will deviate the line of sight through a 90° angle.

837 With refracting surface:

This subclass is indented under subclass 831. Subject matter wherein at least one surface refracts light.

838 MIRROR:

This subclass is indented under the class definition. Subject matter including a structure which reflects a substantial portion of the light incident thereon in a regular pattern.

(1) Note. A nominal mirror claimed in combination with other structure is classified with the other structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

212.1 through 215.1, for light deflection by a periodically moving reflective element.
223+, for reflectors specifically designed for changing the direction of reflected beams.
515+, for light beam reflectors used for signalling (e.g., retroreflectors).
603+, for antiglare means for mirrors.
629+, for reflectors used in light dividing or combining systems.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 502.1 for a flexible mirror moving mechanism.
126, Stoves and Furnaces, subclasses 684+ for working fluid solar collectors with concentrating reflectors.
248, Supports, subclasses 466+ for mirror type supports or supports wherein a mirror is only nominally recited.
362, Illumination, subclasses 296.01 through 296.1 and 317-361 for light sources combined with reflectors.
472, Amusement Devices, particularly subclass 63 for an illusion caused by a mirror and see the Search Notes thereunder.

839 With a transmitting property:
This subclass is indented under subclass 838. Subject matter including a mirror area which partially transmits and partially reflects light rays or including a plurality of light transmitting and light reflecting areas interspersed.

(1) Note. Included here are one-way mirrors.

SEE OR SEARCH THIS CLASS, SUBCLASS:
630+, for a transparent reflector used for light dividing or combining purposes.
633, for a transparent reflector with successive reflectors.

SEE OR SEARCH CLASS:
472, Amusement Devices, subclass 58 for a stage or illusion device using a transparent reflector.

840 Back to back:
This subclass is indented under subclass 838. Subject matter comprising two immediately adjacent and oppositely directed mirrors which are rigidly connected.

(1) Note. This type of mirror is often referred to as a double mirror.

841 Retractable vehicle mirror:
This subclass is indented under subclass 838. Subject matter including a mirror mounted on a vehicle and movable from an in-use position to a stored position or to a position closely adjacent the vehicle.

SEE OR SEARCH THIS CLASS, SUBCLASS:
872+, for a mirror movable relative to a support, in general.

842 Mounted on vehicle having handlebars (e.g., bicycle, motorcycle, etc.):
This subclass is indented under subclass 838. Subject matter wherein the mirror is mounted on a vehicle which has handlebars for steering and a frame with a seat supporting the operator.

(1) Note. The mirror may be mounted on the handlebar or the vehicle frame.

SEE OR SEARCH THIS CLASS, SUBCLASS:
871+, for a mirror with support, in general.

843 Automatically adjustable in response to vehicle position, control, or indicator:
This subclass is indented under subclass 838. Subject matter wherein a mirror mounted on a vehicle changes position by movement of the vehicle, or condition of a vehicle or indicator control mechanism, or indicator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
872+, for a mirror movable relative to a support in general.

844 On adjustable diverse vehicle portion or accessory:
This subclass is indented under subclass 838. Subject matter comprising a mirror mounted on a vehicle attachment which is movable relative to the vehicle.

(1) Note. An example of such a vehicular attachment is a sun visor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
875, for a mirror controlled by a rigid handle extending to or near the mirror pivot.

845 Fluid cooled mirror:
This subclass is indented under subclass 838. Subject matter including a fluid to absorb heat that would otherwise cause thermal distortion of the reflective surface.

SEE OR SEARCH CLASS:
165, Heat Exchange, appropriate subclasses for generic thermal energy removal by circulating fluid.

846 Including specified control or retention of the shape of a mirror surface:
This subclass is indented under subclass 838. Subject matter including structure for maintaining a precise shape of a reflective surface or for reversibly changing the shape of a reflective surface.

847 Membrane mirror in mechanical contact only at its edge:
This subclass is indented under subclass 846. Subject matter including a very thin flexible reflective structure that is supported only at its periphery.

848 With structure to minimize internal mirror stress:
This subclass is indented under subclass 846. Subject matter including supporting a mirror so as to minimize internal mirror stress which might otherwise distort the shape of the reflective surface.

(1) Note. This subclass includes light weight mirror structures designed to minimize sagging stress.

SEE OR SEARCH THIS CLASS, SUBCLASS:
845, for thermal mirror stress reduction by circulating fluid.
883, for laminated or layered mirror support structure in general.

849 Including a plurality of adjustable mirror supports:
This subclass is indented under subclass 846. Subject matter including multiple mirror supports adjustable to change the shape of a reflective surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:
847, for an adjustable membrane mirror.
872+, for a mirror movable relative to a support.

850 Plural mirrors or reflecting surfaces:
This subclass is indented under subclass 838. Subject matter comprising multiple mirrors or mirror surfaces.

SEE OR SEARCH THIS CLASS, SUBCLASS:
839, for plural mirrors in series wherein at least one of the mirrors has a transmitting property.

851 Composite or echelon mirrors or light concentrating array:
This subclass is indented under subclass 850. Subject matter comprising a plurality of mirrors or mirror surfaces cooperating to form a unified image or to concentrate light in a focal area or along a focal line or comprising several substantially identical mirrors for concentrating light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
868+, for mirrors with one continuous reflecting surface of varied radius.

852 With a line focus:
This subclass is indented under subclass 851. Subject matter including a plurality of mirrors or mirror surfaces which concentrate light in a linear pattern.

SEE OR SEARCH THIS CLASS, SUBCLASS:
867, for a single mirror providing a line focus.
869, for a concave mirror of varied radius.

853 Light concentrating (e.g., heliostat, etc.), con-cave, or paraboloidal structure:
This subclass is indented under subclass 851. Subject matter which forms incident radiation into a convergent beam, has a concave configuration, or has a cross section forming a parabola in at least one direction.

854 Identical side mirrors adjustable with respect to a central mirror:
This subclass is indented under subclass 850. Subject matter including adjustable identical mirrors on opposite sides of a central mirror.

SEE OR SEARCH THIS CLASS, SUBCLASS:
872+, for a single mirror adjustable relative to a support.

855 Identical adjacent mirrors identically supported:
This subclass is indented under subclass 850. Subject matter including plural identical mirrors located close together and having substantially identical support structure.

856 With successive reflections:
This subclass is indented under subclass 855. Subject matter wherein a substantial portion of the light is reflected at least two times in series.

(1) Note. Included here is a folded optical path.

SEE OR SEARCH THIS CLASS, SUBCLASS:
857+, for mirrors with reflections in series not involving a transmitting property nor identical adjacent mirrors identically supported.

857 With successive reflections:
This subclass is indented under subclass 850. Subject matter wherein a substantial portion of the light is reflected at least two times in series.

(1) Note. Included here is a folded optical path.

SEE OR SEARCH THIS CLASS, SUBCLASS:
633, for serial reflections in a head-up type system where visual information is superimposed on an observer's field of view.
856, for identical adjacent mirrors identically supported with reflections in series.

858 Including curved mirror surfaces in series:
This subclass is indented under subclass 857. Subject matter comprising a curved mirror surface which receives the light from itself or another curved mirror surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:
365+, for compound lens systems with curved mirrors in series.

859 With concave and convex mirrors in series:
This subclass is indented under subclass 858. Subject matter including a concave mirror and a convex mirror cooperating to sequentially reflect the light.

SEE OR SEARCH THIS CLASS, SUBCLASS:
366, for compound lens systems with concave and convex mirrors in series.
731, for a lens with concave and convex reflectors in series.

860 To view observer:
This subclass is indented under subclass 857. Subject matter wherein the plural reflections are arranged to provide a view of a portion of the observer.

861 With three or more successive reflections:
This subclass is indented under subclass 857. Subject matter wherein a substantial portion of the light is reflected at least three times in series.

862 Including an adjustable mirror:
This subclass is indented under subclass 857. Subject matter including structure for varying the position of at least one mirror.

863 Including a curved mirror:
This subclass is indented under subclass 862. Subject matter including a mirror with a smooth nonplanar reflective surface.

864 Including adjacent plane and curved mirrors:
This subclass is indented under subclass 850. Subject matter including a flat mirror and a smooth nonflat mirror close together.

SEE OR SEARCH THIS CLASS, SUBCLASS:
866, for segmented mirrors for wide angle coverage.
868, for mirror surfaces of varying curvature.

865 Relatively adjustable:
This subclass is indented under subclass 850. Subject matter having structure to vary the position of one mirror relative to another mirror.

866 Wide angle segmented mirrors:
This subclass is indented under subclass 850. Subject matter including plural angled mirrors or mirror surfaces with the intersection of the

surfaces or their extensions forming discontinuities to provide a wide field of view.

867 Concave cylindrical or providing a line focus:
This subclass is indented under subclass 838. Subject matter including a cylindrically concave reflecting surface or structure for providing a linear focus.

SEE OR SEARCH THIS CLASS, SUBCLASS:
852, for composite or echelon mirrors providing a line focus.

868 With mirror surface of varied radius:
This subclass is indented under subclass 838. Subject matter including a nonspherical continuously curved reflecting surface.

(1) Note. The mirror surface may be parabolically or elliptically shaped.

SEE OR SEARCH THIS CLASS, SUBCLASS:
846+, for mirror surfaces of varied radii with means for controlling the shape of such surfaces.
857+, for mirror surfaces of varied radii with successive reflections.
858+, for curved mirrors in series, one of which may include a mirror surface of varied radius.

869 Concave:
This subclass is indented under subclass 868. Subject matter wherein a nonspherical continuously curved reflecting surface includes a smooth surface indented away from the direction of an incident light beam.

SEE OR SEARCH THIS CLASS, SUBCLASS:
852, for composite or echelon mirrors providing a line focus.
867, for a concave cylindrical mirror providing a line focus.

870 Fracture resistant (e.g., shatterproof, etc.):
This subclass is indented under subclass 838. Subject matter including structure to retain mirror pieces in position upon breakage.

(1) Note. Included herein are mirrors with an adhesive or film preventing movement of the broken elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:
846+, for shape retention or control of a mirror surface.

871 With support:
This subclass is indented under subclass 838. Subject matter including structure for supporting a mirror.

SEE OR SEARCH CLASS:
248, Supports, subclasses 466+ for mirror type support structures or supports wherein a mirror is only nominally recited.

872 Mirror movable relative to support:
This subclass is indented under subclass 871. Subject matter including structure for moving a mirror relative to a support structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
843, for mirrors automatically adjustable with vehicle position.
844, for mirrors on a relatively movable vehicle portion or accessory.
854, for identical side mirrors adjustable with respect to a central mirror.
862, for plural mirrors with successive reflections including an adjustable mirror.
865, for relative adjustable plural mirrors.

873 With rotary to linear motion converting mirror adjustment:
This subclass is indented under subclass 872. Subject matter including conversion of rotary motion into linear motion to thereby move a mirror.

874 With rotation of mirror about perpendicular axes:
This subclass is indented under subclass 873. Subject matter including structure for rotating a mirror about axes that are at right angles to each other.

(1) Note. The axes need not be axes of symmetry.

SEE OR SEARCH THIS CLASS, SUBCLASS:

876, for mirrors with structure for rotation about perpendicular axes not involving rotary to linear motion conversion.

875 With a rigid handle extending to or near a mirror pivot:

This subclass is indented under subclass 872. Subject matter including a rigid handle extending to a mirror pivot or to an intermediate pivot with a short linkage extending in turn to a mirror to provide short range operation.

(1) Note. This subclass includes a rigid handle which extends through a vehicle wall to provide direct pivotal movement to mirrors.

SEE OR SEARCH THIS CLASS, SUBCLASS:

844, for mirror controls extending through a vehicle door.

876 With rotation of mirror about perpendicular axes:

This subclass is indented under subclass 872. Subject matter including structure for rotating a mirror about axes that are at right angles to each other.

(1) Note. The axes need not be axes of symmetry.

SEE OR SEARCH THIS CLASS, SUBCLASS:

874, for mirrors with rotary to linear motion converting mirror adjustment for rotation about perpendicular axes.

877 With switch or motor controlling mirror movement:

This subclass is indented under subclass 872. Subject matter including a switch or motor which is activated to provide power to move a mirror.

SEE OR SEARCH THIS CLASS, SUBCLASS:

873+, and 876, for mirror supports with rotary to linear mirror adjusting structure or structure permitting rotation about perpendicular axes, respectively.

878 Fluid pressure actuated:

This subclass is indented under subclass 877. Subject matter including an element applying an adjusting force to the mirror which is actuated by a force applying gas or liquid.

SEE OR SEARCH CLASS:

137, Fluid Handling, appropriate subclasses for generic devices actuated by fluid pressure.

879 Body or apparel mirror support:

This subclass is indented under subclass 872. Subject matter which includes structure for supporting the mirror on a body portion or the clothing or accessories worn or carried by a person.

880 Having support or apparel engaging head or neck:

This subclass is indented under subclass 879. Subject matter including structure to support a mirror from the head or neck portion of the body of the operator or clothing engaged therewith.

SEE OR SEARCH CLASS:

128, Surgery, subclasses 21+ for surgical diagnostic testing reflectors.

351, Optics: Eye Examining, Vision Testing and Correcting, subclass 50 for eyeglasses combined with a rear-view reflector.

881 With mirror supporting column or sliding adjustment:

This subclass is indented under subclass 872. Subject matter including a supporting shaft or structure for providing relative sliding movement between a mirror and support structure therefor.

882 With handle:
This subclass is indented under subclass 871. Subject matter including a rigid, solid extension connected to the mirror, support, or enclosure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
875, for a mirror with rigid handle extending to a mirror pivot.

883 Laminated or layered mirror support:
This subclass is indented under subclass 871. Subject matter including a plurality of laminations or layers backing the mirror to support the mirror.

(1) Note. Laminated or layered mirror supports specifically designed to minimize internal mirror stress are classified in this class, subclass 848.

SEE OR SEARCH CLASS:
428, Stock Material or Miscellaneous Articles, appropriate subclasses for structurally defined laminates in general.

884 With selective absorption or transparent over-coating:
This subclass is indented under subclass 838. Subject matter including a mirror which absorbs particular visible wavelengths or includes an overcoating without absorbing properties.

SEE OR SEARCH THIS CLASS, SUBCLASS:
577+, for interference coatings or lamina.
839, for a mirror having a transmitting property.
885+, for absorption filters.

885 ABSORPTION FILTER:
This subclass is indented under the class definition. Subject matter which absorbs a portion of the incident ray energy and transmits the remainder.

(1) Note. For classification here, some structure other than a material having filtering properties is required. For example, a plurality of superimposed filtering layers which cooperate to give some desired optical effect would be sufficient for classification here. See Class 252, Compositions, subclasses 299.01+ for liquid crystal containing filter compositions and subclasses 582+ for other filter compositions and Class 428, Stock Material or Miscellaneous Articles, for filter stock material.

(2) Note. Included here are not only those devices which may be selective with regard to the visible spectrum (i.e., colored), but also those devices which may be nonselective in the absorption of light energy (i.e., neutral density type).

SEE OR SEARCH THIS CLASS, SUBCLASS:
350+, for filter which operates significantly in the ultraviolet or infrared spectrum; particularly, subclass 358 for fluid filter and subclasses 359+ for multilayer filter.
491.01, for polarizers combined with color filter means.
577+, for dichroic or interference filter, particularly, subclass 588 for filter having four or more layers and subclass 590 for combining with another filter.
601, for glare reducing means which may include filter means.
722+, for lens having selective wavelength transmitting or blocking properties and subclass 723 for a lens combined with a separate selective element.
884, for mirrors having selective light reflecting properties or combined with elements having such properties.

SEE OR SEARCH CLASS:
2, Apparel, subclasses 12+ for eye shades which may include a filter.
250, Radiant Energy, subclasses 503.1+ for an invisible radiation modifying member generally.
252, Compositions, subclasses 299.01+ for liquid-crystal compositions and subclasses 582+ for other optical filter compositions and for optical articles defined only in terms of the composition of which they are composed.

313, Electric Lamp and Discharge Devices, subclass 112 for electric lamps and electronic tubes which have a light filter structurally combined therewith.

333, Wave Transmission Lines and Networks, subclass 167 for electrical filters generally.

343, Communications: Radio Wave Antennas, subclasses 909+ for radio wave filters, per se.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 44+ for spectacles or spectacle type goggles with filtering lenses, and subclasses 159.6 through 159.65 for ophthalmic lenses or blanks with light filtering means.

356, Optics: Measuring and Testing, particularly subclasses 402+ for shade or color filter devices which use one or more color filters additively or sequentially or at the same time particularly subclasses 234+ and 416+ for photometers of the light absorbing type for neutral filters of the sequentially additive or of the continuously variable type.

362, Illumination, for illuminating devices in combination with a filter, subclasses 1+ for daylight lamps; subclasses 3+ for photographic safe light lanterns; subclasses 166+ for signal lanterns with color screens and for hand lanterns with color screens; and subclass 293 for light projectors having a colored light screen.

378, X-Ray or Gamma Ray Systems or Devices, subclasses 156+ for X-ray filters.

380, Cryptography, subclass 54 for this subject matter used in a device for revealing concealed information.

396, Photography, subclasses 544+ for camera attachments which may include a filter.

424, Drug, Bio-Affecting and Body Treating Compositions, subclasses 59+ for a sun or radiation screening or sun tanning composition intented for topical application to a living body.

427, Coating Processes, subclasses 162+ for coating processes, per se, wherein the product is an optical element.

428, Stock Material or Miscellaneous Articles, appropriate subclasses for a single or plural layer web or sheet which may inherently possess light filtering properties due to the material thereof; coated filters comprising plural layers and defined only by the compositions of the layers are found in Class 428, subclasses 411.1+ and especially subclasses 426+ wherein one layer is glass.

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 507 and 510+ for filter.

886 Fluid:

This subclass is indented under subclass 885. Subject matter wherein the filtering material is in gas, liquid, or vapor form.

SEE OR SEARCH THIS CLASS, SUBCLASS:

665+, for fluid type lenses.

832, for fluid filled prisms.

887 Sequentially additive:

This subclass is indented under subclass 885. Subject matter comprising two or more surfaces of different selectivity which are intended to sequentially affect a sensing element (which may be the human eye) at such a rate that their effects are combined in an optically additive way.

SEE OR SEARCH CLASS:

348, Television, subclasses 571 through 721 and 725-738 for similar subject matter combined with generators or displays for television, and subclass 743 for video display color sequential with moving color filters.

352, Optics: Motion Pictures, subclasses 45 and 66+ for similar subject matter used in the motion picture art.

888 Neutral or graded density:

This subclass is indented under subclass 885. Subject matter wherein the filter or a portion thereof absorbs ray energy independently of wavelength and the corresponding transmittance may be uniform or variable.

(1) Note. Where the density differences of various areas are incidentally due to the fact that the areas are of different colors, the subject matter is not classified here but in some other appropriate filter subclass.

889 Movable in or out of optical path:
This subclass is indented under subclass 885. Subject matter wherein one or more filters may be selectively moved into and out of an optical path.

SEE OR SEARCH THIS CLASS, SUBCLASS:
887, for filter movable in and out of an optical path in a predetermined pattern resulting in the sequential addition of colors.
888, for such subject matter where the filter is of the neutral density type or has graded optical densities.

890 Superimposed or series:
This subclass is indented under subclass 885. Subject matter wherein two or more filters are disposed so that ray energy may pass through all the filters in series.

891 Filters in optical parallel (e.g., colors side-by-side, etc.):
This subclass is indented under subclass 885. Subject matter having a plurality of differently colored filters arranged in such a fashion that ray energy passing through one filter does not pass through any other filter and the resultant filtered rays are uniformly equidistant.

SEE OR SEARCH THIS CLASS, SUBCLASS:
618+, for similar subject matter used with light dividing and combining systems.
887, where colored ray energies are sequentially additive.

SEE OR SEARCH CLASS:
352, Optics: Motion Pictures, subclasses 45 and 66+ for similar subject matter used in the motion picture art.
396, Photography, subclasses 305+ for similar camera color image forming using monochrome film.

892 With support or frame:
This subclass is indented under subclass 885. Subject matter comprising means for mounting a filter.

(1) Note. See search class notes below for supports of general application, and for frame structure in terms of a panel, closure, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
611+, for barrel end shades which may have filters therein.
811+, for support means for lenses.
819+, for lens mounting means.
831, for mounting means for prisms.

SEE OR SEARCH CLASS:
52, Static Structures (e.g., Buildings), particularly subclasses 474+, 633+, and 782+ for rigid panel structure and frames therefore.
160, Flexible or Portable Closure, Partition, or Panel, subclasses 371+ for frames for flexible panels or closures.
248, Supports, for supports of general application.

893 SCREEN (E.G., HALFTONE SCREEN, ETC.):
This subclass is indented under the class definition. Subject matter having at least a plate with a multiplicity of apertures, opaque dots, patterns, or crossed lines which are intended to break up imaging light.

SEE OR SEARCH CLASS:
355, Photocopying, subclass 80 for light diffusing in localized areas.
396, Photography, subclass 545 for light diffusing and masking provided for by that class.
430, Radiation Imagery Chemistry: Process, Composition, of Product Thereof, subclasses 6+ for chemically defined screens and the process for making the same and subclasses 396+ for process of using the same.

894 OPTICAL APERTURE OR TUBE, OR TRANSPARENT CLOSURE:

This subclass is indented under the class definition. Subject matter wherein a structure transmits light energy where all transmitted rays travel in essentially straight lines (i.e., without intentional deviation as, for example, by reflection, refraction or diffraction) and without significant attenuation (i.e., without being filtered).

(1) Note. This subclass includes certain specialized viewing devices which involve no intentional deviation of light rays such as, for example, certain underwater viewing devices. It also includes apertures, transparent closures, etc., with no significant optical element classifiable in the preceding subclasses, but some optical feature going beyond, for example, windshields in Class 296, subclasses 84.1+. This might be, for example, means to compensate for the offsetting of ray energy in passing through a transparent closure.

(2) Note. This definition does not exclude subject matter where certain rays are transmitted and certain other rays are completely blocked.

SEE OR SEARCH THIS CLASS, SUBCLASS:

227+, for movable apertured plates which control light.

480+, for binocular viewing devices.

SEE OR SEARCH CLASS:

385, Optical Waveguides, appropriate subclasses for optical wave-guides which utilize total internal reflection.

895 Submerged object viewer:

This subclass is indented under subclass 894. Subject matter wherein an optical tube permits clear viewing of an under-water article.

896 MISCELLANEOUS:

This subclass is indented under the class definition. Subject matter not provided for in any preceding subclass.

CROSS-REFERENCE ART COLLECTIONS

900 METHODS:

Cross-reference art collection of optical methods.

SEE OR SEARCH THIS CLASS, SUBCLASS:

819+, for lens mountings.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclasses 37+ for lens making involving the working or treating of glass.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 99+ for optically transparent glass lens sandwich making, which may include a grinding step.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 1.1+ for optical article shaping or treating such as molding.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 159.73 through 159.81 for methods of making ophthalmic lenses or blanks not otherwise classifiable and subclass 178 for methods of securing these lenses in their mountings.

451, Abrading, subclasses 42+ for a lens grinding method. See the reference to Class 156 below.

901 ACOUSTIC HOLOGRAPHY:

Cross-reference art collection of patents having to do with holographic techniques using sound vibrations.

902 HOLOGRAPHIC INTERFEROMETER:

Cross-reference art collection of patents having to do with using holography in instruments that use light interference phenomena for precise determinations of wavelength, spectral line structure, very small displacements, and indices of refraction.

903 WITH MAGNET:

Cross-reference art collection of patents wherein the optical element has a magnet for temporarily attaching it to any object containing ferrous material.

(1) Note. This would include an optical element mounted on a magnet for place-

ment on a refrigerator door wherein the sole purpose is for ornamental use.

904 MICRO MIRROR:
This subclass is indented under the class definition. Cross-reference art collection containing patents having optical systems or elements relating to micro mirrors.

(1) Note. This subclass contains XR documents only.

FOREIGN ART COLLECTIONS

The definitions below correspond to abolished subclasses from which these collections were formed. See the Foreign Art Collection schedule of this class for specific correspondences. [Note: The titles and definitions for *indented* art collections include all the details of the one(s) that are hierarchically superior.]

FOR 100 DEFLECTION USING A MOVING ELEMENT OR MEDIUM (OFFSETTING OR CHANGING AT LEAST A PORTION OF THE BEAM):
Foreign art collection comprising structure for offsetting or changing the direction of at least a portion of the incident light by moving a light reflecting or transmitting element or medium into or out of the light beam or by changing the position of a reflecting or transmitting element or medium in the light beam.

(1) Note. A prism may be employed for refracting or reflecting light. Prism reflections are considered to be internal reflections; that is, the light is inside the prism body before and immediately after reflection. Light beam deflection by a movable prism is included in this subclass.

(2) Note. Lenses or curved surface mirrors movable for focusing are classified elsewhere in this class.

FOR 101 Using a periodically moving element (periodic change of optically reflecting, refracting or diffracting element):
Foreign art collection including an optically reflecting, refracting, or diffracting element as the scanning element whose orientation is changed in a periodic manner.

(1) Note. The motion of reflectors resulting from vehicle vibration, the motion of vehicle wheels, the action of wind, etc., is considered to be of an irregular nature and not periodic within the meaning of this definition.

FOR 102 Particular mount or driver for element:
Foreign art collection wherein details of the structure for supporting the moving element or for moving it are claimed.

FOR 103 Particular oscillating driver:
Foreign art collection wherein a specific device imparting back and forth motion to the element is recited.

FOR 104 Bearing or shaft for rotary driver:
Foreign art collection wherein a specific rod transmitting rotational motion from a driver or the supporting device within which the rod turns is recited.

FOR 105 Plural moving scanning elements:
Foreign art collection wherein deflection is achieved by multiple optical elements which are not stationary.

FOR 106 X-Y scanner:
Foreign art collection wherein the multiple elements cause a deflection of light in two mutually perpendicular directions.

FOR 107 Having a common axis of rotation:
Foreign art collection wherein the multiple elements revolve around the same line.

FOR 108 Utilizing plural light beams:
Foreign art collection wherein the periodically moving element deflects or scans more than a single light beam simultaneously.

FOR 109 Having particular focusing element to receive scanned light:
Foreign art collection wherein a specific optical element gathers light from the actual scanning element.

FOR 110 High distortion lens (e.g., fQ lens, etc.):
Foreign art collection including a lens which forms an image which is not in proportion to a respective image source.

FOR 111 Anamorphic element:
Foreign art collection including an element (usually a lens) for producing magnification in a first plane which differs from that in a plane perpendicular thereto.

FOR 112 Concave reflector:
Foreign art collection wherein a mirror-like element indented away from incident light receives the scanned light.

FOR 113 Including transmissive type moving element:
Foreign art collection wherein the medium of the scanning element permits the passage of light rays.

FOR 114 Having moving lens:
Foreign art collection including opposed shaped and spaced refracting surfaces either of a (1) single transparent mass or (2) plurality of such masses arranged in series along an optical axis to produce a single output image from an object, which are both external to the mass or masses, from the object light rays passing therethrough.

FOR 115 Having moving prism:
Foreign art collection including one or more transparent bodies bounded in part by two plane surfaces which are angularly related (i.e., not parallel), at least one of these surfaces being internally reflecting or refracting to impinging incident light.

(1) Note. A prism may be employed for refracting or reflecting light. Prism reflections are considered to be internal reflections; that is, the light is inside the prism body both before and immediately after the reflection.

FOR 116 Including reflective type moving element:
Foreign art collection wherein a light wave that strikes the medium of the moving element is returned to the original medium with the angles of incidence and reflection equal and lying in the same plane.

FOR 117 Having oscillating element:
Foreign art collection wherein the reflecting element has oscillating or vibrating motion.

FOR 118 Single plane mirror element:
Foreign art collection wherein the element is unitary, flat and reflecting.

FOR 119 With imaging lens:
Foreign art collection having a lens typically referred to as an imaging lens.

FOR 120 Having multifaceted rotating element:
Foreign art collection wherein the reflecting element has plural sides or faces.

FOR 121 With facets parallel to rotation axis:
Foreign art collection wherein the faces or sides of the reflective element are parallel to the axis of rotation.

FOR 122 Having six, seven, or eight facets:
Foreign art collection wherein the element has more than five facets and less than nine facets.

FOR 123 Having five or fewer facets:
Foreign art collection wherein the element has less than six facets.

FOR 124 Having planar rotating reflector with transverse rotation axis:
Foreign art collection wherein the faces of the rotating reflector are not curved and the faces are tilted with respect to the rotation axis.

FOR 125 Having planar rotating reflector with rotation axis in its plane:
Foreign art collection wherein the faces of the rotating reflector are not curved and the faces are parallel to the axis of rotation.

FOR 126 By frustrated total internal reflection:
Foreign art collection wherein a light transparent element has a surface adjacent a second element or medium which is movable into and out of optical contact with the surface.

(1) Note. A light beam incident on the surface undergoes total internal reflection. By bringing the second element or medium into proximity with the surface of the transparent element, total internal reflection becomes frustrated and the light beam is no longer totally internally

reflected, but instead, is passed into the second element or medium.

FOR 127 By moving a reflective element:
Foreign art collection wherein the direction of at least a portion of an incident light beam is offset or changed by moving a light-reflecting element into or out of the light beam or by changing the orientation of the reflecting element in the light beam.

FOR 128 Reflective element moved by deformable support:
Foreign art collection wherein a support element is extended or contracted to modify the position of the reflecting element.

FOR 129 Pivoting or moving in circular arc:
Foreign art collection wherein the motion of the moving element traces out a portion of a complete revolution.

FOR 130 Rotating:
Foreign art collection wherein the reflective element revolves completely around an axis.

FOR 131 POLARIZATION WITHOUT MODULATION (359/483):
This foreign art collection is indented under the class definition. Foreign art collection wherein the polarization of an incoming light beam is modified in a time invariant fashion as a result of passing through some optical device.

(1) Note. Where both a polarizing device and a composition are claimed, the patent is classified here and cross-referenced to Class 252, subclass 585.

(2) Note. Where a method of making the polarizing device is claimed as well as the polarizing device, the patent is classified here and cross-referenced to any other class providing for the method.

(3) Note. The nominal recitation of a polarizing area in the form of a design, image, etc., is sufficient to include this subject matter in this subclass.

FOR 132 Time invariant electric, magnetic or electromagnetic field responsive (e.g., electro-optical, magneto-optical) (359/484):
This foreign art collection is indented under FOR 131. Foreign art collection wherein an electrical, magnetic, or electromagnetic field, which is unchanging in time, is applied to the device producing the polarization.

(1) Note. This would include optical isolators and circulators.

FOR 133 Light polarization without any external input (359/485):
This foreign art collection is indented under FOR 131. Foreign art collection wherein an optical device causes optical energy to vibrate in accordance with a regular pattern that differs from the input without the application of any supplemental energy.

FOR 134 By grid or dipoles (359/486):
This foreign art collection is indented under FOR 133. Foreign art collection wherein electrical conductors in the form of a grid (i.e., each grid opening forms a half wavelength of the applied light) or half wavelength dipoles embedded in the medium produce polarization of the applied light.

FOR 135 By reflection or refraction (e.g., Brewster angle) (359/487):
This foreign art collection is indented under FOR 133. Foreign art collection wherein a light beam is polarized as a result of either (1) striking a surface and returning into the originating medium or (2) redirection as it passes through media of differing optical densities.

FOR 136 With particular medium (359/488):
This foreign art collection is indented under FOR 135. Foreign art collection wherein details of the reflecting or refracting medium are recited (e.g., physical composition, structure, specific indexes of refraction, or thickness of layers).

(1) Note. Physical shape (other than layered mediums) or arrangement of elements or mediums is not considered a particular medium for this subclass.

FOR 137 Polarization (direction or magnitude) varies over surface of the medium (e.g., vectograph) (359/489):

This foreign art collection is indented under FOR 133. Foreign art collection comprising a surface which transmits or reflects light and whose ability to polarize light is not uniform across the surface.

(1) Note. This variation in polarizing ability may be continuous or discontinuous and may form any type of pattern. For example, the different areas of a surface may form an image or design as in a "vectograph".

FOR 138 By dichroic medium (359/490):
This foreign art collection is indented under FOR 133. Foreign art collection including an optical element which effects the degree of polarization dependent upon the relative absorption therein of the two components or vectors of light.

(1) Note. A dichroic element will transmit light of one color and reflect light of the complementary color with little light being absorbed. These elements are composed of superimposed strata of dielectric material, which are classified in subclass 580.

(2) Note. Included here are elements where the medium comprises a lamination or a coating on a supporting structure and where the supporting structure is significant or the means to form the lamination or coating is significant.

FOR 139 Stain or dye: (359/491)
This foreign art collection is indented under FOR 138. Foreign art collection wherein a coloring agent is absorbed by the polarization medium to affect the polarization of the applied light beam.

FOR 140 Oriented particles (359/492):
This foreign art collection is indented under FOR 138. Foreign art collection wherein the polarization of the applied light is dependent upon the spatial positioning of microscopic particles embedded in the dichroic medium.

FOR 141 Glare prevention by discriminating against polarized light (359/493):
This foreign art collection is indented under FOR 133. Foreign art collection wherein unwanted glare-producing light, having a particular polarization, is eliminated by a polarizing structure.

FOR 142 By birefringent element (359/494):
This foreign art collection is indented under FOR 133. Foreign art collection including an element having the property of dividing a ray or beam of energy into two polarized rays or beams (known as the ordinary and extraordinary rays), the directions of polarization being at right angles to each other.

(1) Note. A birefringent material which has been treated with a dichroic dye to absorb the ordinary or extraordinary ray is no longer considered to be birefringent within the meaning of this definition. A birefringent element in the form of a Nicol prism where the unwanted ray is deflected is classified here.

FOR 143 For beam deflection or splitting (359/495):
This foreign art collection is indented under FOR 142. Foreign art collection wherein the entire beam or a portion of the beam is caused to change direction for positioning purpose or wherein the beam is split into two or more portions.

FOR 144 Prisms (359/496):
This foreign art collection is indented under FOR 142. Foreign art collection wherein the birefringent element is formed into a structure bound in part by two plane faces that are not parallel and combinations of the structure.

FOR 145 Using plural elements (359/497):
This foreign art collection is indented under FOR 142. Foreign art collection wherein beam polarization is achieved by multiple birefringent elements.

FOR 146 Frequency filter or interference effects (359/498):
This foreign art collection is indented under FOR 145. Foreign art collection wherein plural elements act to pass a particular frequency or band of frequencies, or wherein interference effects are used to produce effects such as color or an interference pattern.

FOR 147 Using compensation techniques (359/499):

This foreign art collection is indented under FOR 145. Foreign art collection wherein at least one of the elements corrects for unwanted effects, such as those due to temperature.

FOR 148 With particular material or mounting structure (359/500):

This foreign art collection is indented under FOR 142. Foreign art collection wherein details of the birefringent material, such as the type, size, shape, crystal cut, or treatment thereof or detailed structures for mounting the material are recited.

FOR 149 By relatively adjustable superimposed or in series polarizers (359/501):

This foreign art collection is indented under FOR 133. Foreign art collection wherein the polarizers are positioned one on top of another or arranged in a row and their positions are adjustable.

FOR 150 With color filter (359/502):

This foreign art collection is indented under FOR 133. Foreign art collection where a polarizing structure is combined with structure to selectively absorb or transmit specific light wavelengths.

END