

## **CLASS 356, OPTICS: MEASURING AND TESTING**

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

A. This class includes methods and apparatus (a) for analyzing light to measure or test its characteristics, such as intensity, color and polarization; (b) for determining the optical or nonoptical properties of materials or articles by noting, as by inspection, measurement, or test the effect produced by the materials or articles on light associated therewith; and (c) for measuring the dimensions of structures or the spatial relationships such as distances or angle bearings of spaced points by comparison of the respective properties (usually direction or spatial position) of the light from these points or by comparison of the properties of these lights with some scale or standard. The light analyzing includes or is for spectroscopy, interference, polarization, beam direction or pattern, focal position of a light source, shade or color, and photometers. The material or article properties determined are or involve crystal or gem examination, material strain analysis, blood analysis, optical pyrometers, egg candling, cutting blade sharpness, oil testing, document verification, flatness, lens or reflector testing, refraction testing, monitoring moving webs or fabrics, light transmission or absorption, light reflection, inspection for flaws or imperfections in materials, and thread counting.

The dimensioning and spatial relationship determination includes triangulation by a light beam, contour plotting, range or height finders, motion stopping, velocity or velocity/height measuring, sighting where the optical element or reticle moves with the sighted object, particle size determination, particle light scattering, electrophoresis, angle measuring or axial alignment, mensuration or configuration comparison, alignment in a lateral direction, and fiducial instruments.

B. Included also are apparatus and methods to facilitate the viewing of structure as for flaws and imperfections. The structure is usually optically significant such as transparent sheets or bottles or semi-transparent cloth; or the structure is inaccessible as a bore requiring a bore scope. Included also are methods and structure for preparing the sample for an optical test, and optical test standards.

C. Included also are apparatus and methods involving a plurality of measurements or tests each within the scope of this class; and also included are a measurement or test within the scope of this class together with a measurement or test or other art structure provided, per se, else-

where, but where no provision for the combination is made elsewhere.

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

#### **A. OPTICAL MEASURING OR TESTING CLASSIFIED ELSEWHERE**

Class 33 provides for optical measurements of the light ray type within the scope of this class. See "Geometrical Instruments in This Class and in Class 33," section C, below, for the subject matter placed in Class 33 and Class 356. Class 73 includes optical measuring and testing within the scope of its subclasses. See "Measuring and Testing in This Class and Class 73," section D, below, for the line between Class 73 and Class 356. Signal and indicating apparatus which may involve optics are classified elsewhere. See, for example, temperature, radiant energy, smoke, or gas indicators. Surgical diagnostic instruments which may involve optical measuring or testing on or in the body are elsewhere. Television systems for measuring and testing which may include optical elements are classified elsewhere. Photocells and associated circuitry together with optical structure which may involve measuring or testing are classified elsewhere. However, this Class 356 includes optical testing with a photoelectric light detector and usually claiming either an indicator or structure to support or contain the specimen or sample under test. Lamp and discharge device testing is classified elsewhere. Eye examining and testing instruments which may include optical measuring or testing are elsewhere. (See Subclass References to the Current Class and References to Other Classes, below, for subclass references of subject matter above.)

#### **B. TESTING AND MEASURING SUBCOMBINATIONS PROVIDED FOR ELSEWHERE**

Optical elements which may be used in measuring and testing apparatus are classified elsewhere as are the conventional optical elements such as lenses, prisms, and mirrors. Subclasses relating to scale or indicia reading should be particularly noted. Photocell circuits and apparatus are elsewhere. Photo-sensitive discharge devices are classified elsewhere. Mechanical scales and gauges which may be part of optical measuring systems are elsewhere. Mechanical indicators which may be part of optical measuring systems classified elsewhere. Electrical indicating and measuring devices which may be part of optical measuring systems are classified else-

where. (See References to Other Classes, below, for class/subclass references to these art areas.)

- (1) Note. Telemetric signaling means useful in transmitting a measured quantity, not limited to any particular measuring instrument provided for in other classes, is classified elsewhere, while Class 356 takes such telemetric signaling means in combination with a particular measuring means of the type provided for in Class 356. (See References to Other Classes, below.)

#### C. GEOMETRICAL INSTRUMENTS IN THIS CLASS AND IN CLASS 33

This class (356) provides for measuring devices which are used for determining spatial relationships, and which involve the establishment of an optical axis between the observer's station and a remote point and which include significant optical structure. This includes certain types of range-finders, angle or azimuth measuring instruments and velocity measuring devices as qualified below. In this subject matter the recitation of specific optical details such as lens, prism, or mirror details is sufficient for classification in this class (356). Exceptions which remain in Class 33 are bomb sights with specific optical line sighting instruments with a telescope or microscope recited even in some detail, and as a viewing aid to but not a part of the sighting instrument. Also where a plurality of optical functions are recited as, for example, plural reflections of a line of sight, classification is in this Class 356. Where optic is only recited broadly as, for example, "an optical axis," a "telescope," or a "deflection of the line of sight," the subject matter is generally classified in Class 33, as opposed to Class 356.

Also included in this Class 356 are instruments for visual sighting which in addition to having a field of view, perform an aiming or alignment function or establish a line of sight by means of an artificial reference and which include significant optical structure.

The geometrical instruments of this Class 356 usually either involve the determination of the direction of a point remote from an observer with respect to some reference direction where the two directions may be viewed and compared simultaneously; or

the determination of the relative direction of two points remote from an observer where the two directions may be viewed and compared simultaneously. Optical structure is usually provided to facilitate this simultaneous viewing. The subject matter of Class 33 relates more to the direction determination by aiming an instrument on a point and later noting the direction of the aimed instrument with respect to some reference such as a level, compass, or other point. A mere single deflection of a line of sight as by a mirror or lens to facilitate the viewing is not precluded from Class 33. In the mensuration or figure comparison, the patents in this class (356) include structure to facilitate the viewing (usually simultaneously) of the specimens, or configurations to be compared with other specimens or configurations or with scales, masters, or patterns.

A single sight line optical instrument such as a transit with structure for indicating the direction is classified in Class 33. However where such an instrument includes a sighting mark or scale at an optically critical position such as in the focal plane classification is in Class 356.

Comparison instruments which merge the rays from diverse directions for common viewing as in a split image range finder are classified in Class 356. However plural sighting instruments which merely aim on angularly separated points (even simultaneously) with mechanical reading of the directions are classified in Class 33. Space measuring instruments whose operation is essentially optical such as optical interferometers are classified in Class 356 as opposed to Class 33. Reticles and cross hairs generally are classified in Class 33. However, optical reticles which reflect or refract light are classified in Class 356.

#### D. MEASURING AND TESTING IN THIS CLASS AND CLASS 73

This class (356) provides for optical measuring and testing as defined above. Class 73 provides for measuring and testing which may include optical measuring and testing as defined, combined with some nonoptical limitations beyond the scope of this class (356) and specifically provided for in Class 73. Specific provision exists in Class 73 when the measurement or test is of

the type provided for by the subclasses of Class 73 definitions. For example, Class 73 provides for gas chromatography involving color determination of the Class 356 type together with some manipulation of the gas beyond the scope of Class 356. Again Class 73 provides for engine testing involving optical tests of the Class 356 type together with some mechanical manipulation of the parts beyond the scope of Class 356. In general Class 73 provides for measuring and testing of the type indicated by its subclass titles and definitions which may include optical steps together with other mechanical measuring and testing steps beyond the scope of Class 356. There are some patents presently in Class 73 which relate to measuring and testing as there provided, but which claim only optical subject matter within the scope of Class 356. Combinations of optical measuring or testing with other structure or methods is classified in Class 356 if no provision for such combinations exists elsewhere. (See References to Other Classes, below.)

An exception to the above involves cutting blade sharpness testing where Class 356 provides for the optical type with the remainder in Class 73. Another exception involves stress analysis where Class 356 provides for the optical type absent intentional loading of the specimen. The remainder is classified in Class 73, particularly for optical stress analysis with intentional loading of the specimen. (See Subclass References to the Current Class and References to Other Classes, below.)

#### E. NONVISIBLE RADIATION

This class is restricted to measuring and testing involving visible light. However where the measuring or testing involves infrared or ultraviolet radiation with apparatus optical in nature and nothing peculiar to such infra red and ultra violet radiation, classification is in this class. For example, optical equipment where the radiation was claimed as ultraviolet or infra red would be classified in this class, especially methods and apparatus for the inspection of solid or liquids by charged particles and invisible radiation responsive electric signalling methods and apparatus. See also THERMOCOUPLES AND BOLOMETERS,

below. (See Subclass References to the Current Class, below.)

#### F. FLUORESCENCE AND PHOSPHORESCENCE TESTING

The examination of fluorescent and phosphorescent material or organisms to determine their fluorescent or phosphorescent properties or the examination of invisible energy including ultraviolet light by subjecting fluorescent or phosphorescent material to invisible radiation is classified elsewhere even though the fluorescent or phosphorescent radiation is in the visible light range and the intensity and the frequency of the fluorescent or phosphorescent light is examined. Methods of determining oil presence, contamination or concentration, methods and apparatus using luminophor test material or a luminophor detector in combination with an electric signalling device responsive to the light emitted by the luminophor, methods and apparatus to irradiate a luminophor and luminescent devices, per se, are classified elsewhere. (See References to Other Classes, below.)

Fluorescent or phosphorescent apparatus used as a visible light standard and claimed as part of a visible light testing apparatus as of a comparator type and which is basic subject matter of Class 356 is classified in Class 356. The examination of the visible light, per se, emitted by fluorescent or phosphorescent materials would be classified in Class 356 when the fluorescent or phosphorescent materials or source producing the visible light is not included in the claims.

#### G. LASERS AND RESONANCE RADIATION

The testing with optical apparatus of a laser beam for the intensity or frequency of the visible light, per se, emitted by the laser is in Class 356 (see Subclass References to the Current Class, below). However, lasers and similar devices when they function as an amplifier of light in the visible range and laser modulator, per se, are classified elsewhere. For optical elements which control light intensity or direction on a molecular level, see classification elsewhere; for modulation involving polarized light and for light control by altering an optical medium

or surface see elsewhere. Coherent light generators, per se, are classified elsewhere.

#### H. THERMOCOUPLES AND BOLOMETERS

Where the intensity or the frequency of invisible radiation is determined by means of a thermal detector, classification is elsewhere. Where the intensity or the frequency of visible light radiation is determined by means of a thermal detector, classification is in Class 356. Where the total energy or power in a beam of radiation is measured by a thermal detector classification is elsewhere; and where thermally emitted radiation is measured to determine the temperature of the emitting source, classification is also elsewhere, except where the radiation is limited to light, where the classification is in Class 356. (See Subclass References to the Current Class and References to Other Classes, below.)

#### I. BURNING

Although the burning of a combustible material is a chemical reaction, the combination of the burning of combustible material for visible light examination purposes with visible light analyzing structures of this class is in this Class 356. See References to Other Classes, below for "Combustion" and for all combustion reactions not provided for elsewhere. See also Subclass References to the Current Class, below. (See References to Other Classes, below.)

#### J. COUNTING

Claims to the counting of discrete particles such as blood particles, bacteria colonies, or dust particles, one at a time by numerical counting apparatus which registers the counts corresponding to the respective particles will be found elsewhere. However, the visual counting with a scale or spacer to aid the eye is classified in this Class (356). Claims to the sizing and counting of particles such as blood particles, bacteria colonies, or dust particles, one at a time by numerical counting apparatus will be found elsewhere. The counting of undulations by means of visible light or indeterminate length material such as a web of fabric or threads, per se, for testing the weave of the web for evenness, or the thread for unevenness, or for flaws, or for optical properties

or physical dimensions where the measurement is affected only by the variations of the light caused by the web or thread will be in Class 356 rather than elsewhere. The counting of particles with visible light by statistical analysis procedures instead of a one by one numerical particle count as elsewhere will be in Class 356. The sizing and counting of particles with visible light by statistical analysis procedures instead of a one by one numerical particle count as elsewhere will be in Class 356. The counting or the sizing and counting of particles with visible light by statistical methods in Class 356 involves for example, polarized light, light scattering, color testing, and reflective diffusion of light. Where a microscope is utilized to count particles, one by one, such as blood particles or bacteria colonies, see elsewhere. Where an optical element such as a lens for magnification is used in combination with a support for counting bacteria colonies, or particles such as dust see classification elsewhere for one by one counting. Where no optical element is utilized and only a support is used see this Class (356). Where a microscope having a graticule rather than a cross hair or a reticle is used to count particles one by one see this class (356). See this class (356) for supports for bacteria counters where only a light and a support for the one by one count is involved. (See Subclass References to the Current Class and References to Other Classes, below.)

#### K. READING AND RECORDING

The combination of an optical test of this class with a qualitative or quantitative marker or recorder is in this class. Class 356 provides for the reading visually of the information or data cards where not elsewhere provided.

Pattern or character recognition of a document or a record is classified elsewhere. Where the document analysis or verification is limited to the intrinsic properties of the record, classification is in Class 356. Systems controlled by a record and code record sensors, respectfully, are classified elsewhere. Apparatus to check hole type cards for errors in the punching or in the sorting of cards where the error check equipment is not part of a business machine is classified elsewhere. (See Subclass Ref-

ferences to the Current Class and References to Other Classes, below.)

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

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

- 3+, 28, 139.01+, 141.1+, 152.1+, 218, and 442 for optical testing with a photoelectric light detector and usually claiming either an indicator or structure to support or contain the specimen or sample under test.
- 32+, for stress analysis where Class 356 provides for the optical type absent intentional loading of the specimen.
- 43+, where radiation is limited to light, classification is here; where thermally emitted radiation is measured to determine the temperature of the emitting source, classification is elsewhere.
- 51, where measuring or testing involves infrared or ultraviolet radiation with apparatus optical in nature and nothing peculiar to infra red and ultra violet radiation.
- 69, for cutting blade sharpness testing where Class 356 provides for the optical type.
- 71, where document analysis or verification is limited to the intrinsic properties of the record.
- 213, and 402+ for testing with optical apparatus of a laser beam for the intensity or frequency of the visible light, per se, emitted by the laser.
- 244, for supports for bacteria counters where only a light and a support for the one by one count is involved.
- 306, for methods and apparatus for the inspection of solid or liquids by charged particles.
- 315, see Search Class and the notes in reference to a flame producer whose flame heats or burns a sample to cause the emission of radiation to be analyzed. (See Lines With Other Classes, "Burning", above.)
- 335+, for the sizing and counting of particles with visible light by statistical analysis procedures instead of a one by one numerical particle count.
- 336, for invisible radiation responsive electric signalling methods and apparatus.
- 438+, and 441+ for the counting of particles with visible light by statistical analysis procedures.

### SECTION IV - REFERENCES TO OTHER CLASSES

#### SEE OR SEARCH CLASS:

- 15, Brushing, Scrubbing, and General Cleaning, subclass 3.1 for machines to clean eggs, or machines to clean and assort or screen eggs.
- 26, Textiles: Cloth Finishing, subclass 70 for devices facilitating the inspection of cloth.
- 33, Geometrical Instruments, subclass 1 for planimeter type calculators such as moment of inertia of areas, subclasses 18.1+, for scribes, subclass 121, for area integrators, subclass 125, for distance measuring, subclasses 501+, for gauges of the fixed or adjustable type, and subclass 227, for means and methods utilizing nonreflected light rays and direct sighting for determining the characteristics and mutual relationships of points, lines, angles, etc.
- 33, Geometrical Instruments, provides for mechanical scales and gauges which may be part of optical measuring systems. (See Lines With Other Classes, B, "Testing and Measuring Subcombinations Provided for Elsewhere.")
- 33, Geometrical Instruments, provides in subclass 227 for optical measurements of the light ray type within the scope of this class. (See Lines With Other Classes, A, "Optical Measuring or Testing Classified Elsewhere.")
- 40, Card, Picture, or Sign Exhibiting, subclasses 446+ for changeable exhibitors, and subclasses 361+ for transparent film viewers.
- 53, Package Making, subclass 52 for automatic or triggered control of a package making machine in response to a test which may be optical, and subclasses 507+ for visual inspection means combined with package making machines.
- 65, Glass Manufacturing, subclasses 377+ for processes of glass making with a step of visually, chemically or physically determining a chemical or physical property, subclass 38 for the process of forming a lens with a fusion bonding step, and subclass 158 for inspection means which may be optical.
- 72, Metal Deforming, subclass 37 for metal deforming with use of optical or transparent (e.g., viewing) means.
- 73, Measuring and Testing, subclass 23.1 for the examination of the effluent of a mixture of gases which has contacted a solvent or sorbent which separates the mixture into fractional components and for gas chromatography involving color determination of the Class 356 type together with some manipulation of the gas beyond the scope of Class 356, subclass 28 for analysis of solid matter in gases, subclass

- 29 for analysis of moisture content or vapor pressure by physical means, subclass 30 for density tests by physical means, subclass 32 for specific gravity or density testing of liquids or solids, subclass 37 for fluid pressure tests, subclasses 53.01+ for the testing of liquids or a liquid suspension of solids including sediment or foreign content, subclass 73 for determining moisture content or absorption characteristics of material, subclass 78 for hardness testing, subclasses 760+ for stress or strain testing of material generally, particularly subclass 800 for optical stress analysis with intentional loading of the specimen, subclass 104 for surface and cutting edge testing generally, subclass 114.08 for using an optical measurement for determining irregular combustion (e.g., misfire), and subclass 114.29 for using microwave energy to determine piston position in combination with a rotational position sensor in an internal combustion engine, subclass 156 for statistical record verifying, subclass 157 for record strip sprocket hole testing, subclasses 861+ for volume or rate of flow meters, subclass 290 for liquid level or depth gauges, subclass 488 for speed or acceleration testing generally, subclasses 700+ for fluid pressures gauges, and subclass 421 for samplers and tollers. (See Lines With Other Classes, sections A and D, above.)
- 73, Measuring and Testing, subclass 156 for apparatus to check hole type cards for errors in the punching or in the sorting of cards where the error check equipment is not part of a business machine. (See Lines With Other Classes, K, "Reading and Recording.")
- 74, Machine Element or Mechanism, subclass 20 for mechanical movement apparatus, subclass 640 for gearing arrangements, subclass 469 for control lever and linkage systems, and subclass 567 for machine elements, per se.
- 91, Motors: Expansible Chamber Type, subclass 1 for signals, indicators or inspection means including visual inspection devices whereby the motor operation or the condition of some part may be ascertained.
- 92, Expansible Chamber Devices, subclass 5 for signals, indicators, or inspection means whereby the expansible chamber operation or the condition of some part of the device may be ascertained.
- 95, Gas Separation: Processes, subclasses 1+ for processes of gas separation with control responsive to sensed condition which may involve an optical test and subclasses 82+ for processes of gas separation using chromatography.
- 96, Gas Separation: Apparatus, subclasses 101+ for chromatography type apparatus for gas separation, subclass 413 for gas separation apparatus having sampling means, and subclasses 417+ for gas separation apparatus having signals, indicators, measuring, or testing means.
- 100, Presses, subclass 99 for alarm, signal, indicator, or test means which may be of an optical character.
- 101, Printing, subclass 2 for printing devices combined with sorting devices which may utilize an optical test.
- 116, Signals and Indicators, for mechanical signals and indicators, particularly subclasses 200+ for mechanical indicators which may be part of optical measuring systems and subclass 137 for compressional wave generators. (See Lines With Other Classes, B, "Testing and Measuring Subcombinations Provided for Elsewhere.")
- 116, Signals and Indicators, for signal and indicating apparatus which may involve optics. (See Lines With Other Classes, A, "Optical Measuring or Testing Classified Elsewhere.")
- 118, Coating Apparatus, subclasses 663+ for automatic control of coating apparatus which may include an optical test, subclasses 712+ for testing, inspecting or measuring which may involve visual inspection or an optical test device, and subclasses 712+ for signals and indicators responsive to a condition.
- 119, Animal Husbandry, subclass 6.8 for egg candling methods and apparatus combined with the treating of fertilized eggs, and subclass 311 for incubators which include candling operations.
- 125, Stone Working, subclass 30 for working precious stones.
- 131, Tobacco, subclasses 280+ for cigar and cigarette making machinery which include light testing devices to control the operation of the machinery.
- 134, Cleaning and Liquid Contact With Solids, subclass 113 for such apparatus with an alarm, signal, indicating, inspecting, illuminating, or display means.
- 136, Batteries: Thermoelectric and Photoelectric, subclasses 243+ for photoelectric primary batteries.
- 137, Fluid Handling, subclass 2 for processes of flow control by a condition or characteristic of a fluid which may be of an optical nature, and

- subclass 93 for self-proportioning or correlating systems responsive to an optical property, and subclass 551 for indicators, registers, recorders, alarms, or inspection means including visual inspection means.
- 141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclass 83 for testing or weighing receiver content, and subclass 94 for signals, indicators, recorders, inspection means, and exhibitors permitting inspection of the material handling means.
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 64 for methods with measuring, testing or inspecting, subclass 378 for apparatus with testing, measuring alone or in combination with indicating means involving the properties, dimensions, or a condition of the work or apparatus, and subclass 379 for inspecting with or without illuminating means for observing normally nonvisible machine or work parts.
- 162, Paper Making and Fiber Liberation, subclass 198 for processes involving measuring, inspecting alone or in combination with testing or visual inspection of the product, and subclass 263 for apparatus to detect some condition of the machine or the material including inspection of the material undergoing treatment for some chemical or physical characteristic.
- 165, Heat Exchange, subclasses 11.1+ for exchange apparatus having an alarm, indicator, signal, register, recorder, test or inspection means.
- 166, Wells, subclasses 250.01+ for processes including indicating, testing, measuring, locating, or recording a well condition, and subclass 64 for well apparatus including time, distance, temperature, or counting apparatus.
- 171, Unearthing Plants or Buried Objects, subclass 15 for apparatus including separation by size, subclass 18 for apparatus for separating buried objects based upon physical differences, and subclass 20 including visual inspection of the buried object.
- 173, Tool Driving or Impacting, subclass 20 for apparatus including means to indicate or signal a condition including position or movement of the driving or impacting tool.
- 174, Electricity: Conductors and Insulators, subclass 11 for electrical apparatus including a fluid or vacuum with structure to signal or indicate some condition of the fluid or vacuum.
- 175, Boring or Penetrating the Earth, subclass 40 for apparatus with signalling, indicating, testing or measuring including invisible radiation examination in subclass 41 and visual inspection means in subclass 49.
- 177, Weighing Scales, appropriate subclasses for balances, per se, and automatic weighing devices, particularly subclass 45 for apparatus including alarms or signals in addition to the weight indicator, and subclass 50 for apparatus for performing an additional test including size gauging not provided for elsewhere.
- 193, Conveyors, Chutes, Skids, Guides, and Ways, appropriate subclasses for nonpowered type material transporting apparatus including subclass 2 for chutes and subclass 35 for rollerways.
- 194, Check-Actuated Control Mechanisms, subclass 207 including apparatus for the testing of paper currency for genuineness and other anomalous checks in automatic dispensing machines and including apparatus in subclasses 224 and 304+ for coin in circuit operated switches, subclasses 219+, 230+, and 239+ for coin operated switches, and subclasses 302+ for fraud preventive devices.
- 198, Conveyors: Power-Driven, subclass 502 for a conveyor having signalling or indicating means or means for measuring the conveyed load, subclasses 504+ for a conveyor having load weighing means, and appropriate subclasses for different types of conveyors or systems of conveyors having operation control means using a photo-optics system.
- 200, Electricity: Circuit Makers and Breakers, subclass 61.02 for light actuated switches.
- 204, Chemistry: Electrical and Wave Energy, subclasses 450+ and 600+ for processes and apparatus, respectively, dealing with electrophoresis and electro-osmosis; subclasses 400+ for electrolytic analysis and testing apparatus; and subclasses 242+ for electrolytic cells, in general.
- 209, Classifying, Separating, and Assorting Solids, particularly subclasses 510+ for the combination of a candling operation with a weighing operation of the sorting type; subclasses 556+ for diverse condition responsive testing means; subclasses 525 and 586 for light-type gauging apparatus; subclasses 580+ for apparatus for sorting on the basis of an optical property of a material including the color and polarization effects of the material; subclasses 512+, 592+, and 645 for automatic weighers; and subclasses 702+ and 939 for manual candling and assorting apparatus.
- 210, Liquid Purification or Separation, subclass 635 and 656+ for processes involving chromatogra-

- phy, and subclass 85 for apparatus including alarms, indicators, registers, recorders, signals or inspection means including sight glasses.
- 211, Supports: Racks, appropriate subclasses for supports for plural articles particularly subclass 10 for racks to facilitate the sorting of articles by hand, and subclass 14 for racks designed to support eggs.
- 221, Article Dispensing, subclass 2 for apparatus including recorders, registers, indicators, signals or exhibitors for noting a condition or position of a dispenser part, and subclass 155 for apparatus with transparent inspecting or viewing means.
- 225, Severing by Tearing or Breaking, subclass 41 for manual severing devices which have a housing for the work supply with an inspection window or transparent panel.
- 226, Advancing Material of Indeterminate Length, subclass 100 for apparatus with an alarm, signal, or indicator to sense a condition in the movement of indefinite length material.
- 228, Metal Fusion Bonding, subclass 56.5 for apparatus to note the physical state or location of the work, flux, filler, or product.
- 235, Registers, subclasses 419+ for record controlled electromechanical calculators, subclass 61 for mechanical digital and analogue calculators.
- 235, Registers, subclasses 375+ and 435+ for systems controlled by a record and code record sensors, respectfully. (See Lines With Other Classes, K, "Reading and Recording.")
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 71 for apparatus having means to indicate a condition, indicate the extent of motion or position of a part, or perform a quantity measurement or an inspection to determine flow conditions.
- 242, Winding, Tensioning, or Guiding, subclasses 357, 472.9+, 479.9+, 484.8, 484.9, 534+, 563+ for detector or stop for controlling various winding or unwinding operations, and subclass 912 for an alarm or indicator.
- 246, Railway Switches and Signals, subclass 20 for block signal systems, subclass 111 for grade crossing track protection, subclass 120 for the detection of defects in the roadway, subclass 122 for train position indicating apparatus, subclass 125 for electric automatic highway signal apparatus, and subclass 169 for train defect indicating apparatus including infrared hot box detectors.
- 248, Supports, appropriate subclasses for single article supports in general.
- 249, Static Molds, subclass 53 for apparatus including static gauges, levels, plumbs or scale markings on molding apparatus.
- 250, Radiant Energy, subclass 200 for photoelectric circuits to control the illumination falling upon the photocell or to follow a pattern or to follow a point, and for apparatus, subclass 206 for photoelectric controlled circuits, particularly subclass 216 for optical or prephotocell systems which includes in subclass 221 for system controlled by articles, persons or animals, in subclass 225 polarizing optical system, in subclass 226 optical systems including visible light filters, prisms, and diffraction gratings and in subclass 229 the control of light by optical shutters and attenuators, and subclasses 250 to 422 for methods and apparatus dealing with the production of invisible radiant energy, its detection or utilization. (See Lines With Other Classes, B, "Testing and Measuring Subcombinations Provided for Elsewhere.")
- 250, Radiant Energy, subclass 200 provides for photocells and associated circuitry together with optical structure which may involve measuring or testing. (See Lines With Other Classes, A, "Optical Measuring or Testing Classified Elsewhere.")
- 250, Radiant Energy, subclass 301 for methods of determining oil presence, contamination or concentration, subclass 361 for methods and apparatus using luminophor test material or a luminophor detector in combination with an electric signalling device responsive to the light emitted by the luminophor, subclasses 458.1+ for methods and apparatus to irradiate a luminophor and subclasses 453.11+ for luminescent devices, per se. The examination of fluorescent and phosphorescent material or organisms to determine their fluorescent or phosphorescent properties or the examination of invisible energy including ultraviolet light by subjecting fluorescent or phosphorescent material to invisible radiation is in Class 250 even though the fluorescent or phosphorescent radiation is in the visible light range and the intensity and the frequency of the fluorescent or phosphorescent light is examined. (See Lines With Other Classes, F, "Fluorescence And Phosphorescence Testing.")
- 250, Radiant Energy, where the intensity or the frequency of invisible radiation is determined by means of a thermal detector. (See Lines With



- Other Classes, H, "Thermocouples And Bolometers.")
- 252, Compositions, subclass 62.3 for barrier layer device compositions, subclass 501.1 for light sensitive emissive or conductive compositions, subclass 299 for liquid crystal containing optical filter compositions and subclasses 582+ for other optical filter compositions, and subclasses 301.16 through 301.6 for fluorescent or phosphorescent compositions.
- 264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 1.1+ for methods for forming articles producing optical effects including light polarization, and subclass 40 for methods with measuring, testing, or inspecting some variable condition in the shaped article, the mold, the molded material or shaping surface.
- 269, Work Holders, subclass 8 for magnetic work holders, subclass 11 for holders provided with illuminating means, and subclass 19 for holders provided with gage means such as vertical or horizontal position indicators for the work or the holder.
- 313, Electric Lamp and Discharge Devices, subclass 94 for photo-sensitive discharge devices. (See Lines With Other Classes, B, "Testing and Measuring Subcombinations Provided for Elsewhere.")
- 318, Electricity: Motive Power Systems, subclass 18 for follow-up systems of motor control, particularly subclass 28 for self-balancing network controls, subclass 480 for apparatus which includes the radiant energy control of a motor, and subclass 490 for motor systems with signals, meters, recorders and testing devices.
- 324, Electricity: Measuring and Testing, appropriate subclasses for the measurement or the testing of electric properties, particularly subclasses 300+ for measurements or tests relating to nuclear or electronic induction, subclasses 403+ for the testing of lamps, vacuum tubes, and discharge devices, subclass 200 for tests which rely on magnetic phenomenon, subclasses 600+ for the measurement of impedance, admittance, inductance, resistance, conductance, and susceptance, subclasses 76.11+ for measuring or testing electricity, per se, including subclass 96 for tests utilizing optical principles to determine electrical quantities, and subclass 121 for cathode-ray type indicators. (See Lines With Other Classes, A, "Optical Measuring or Testing Classified Elsewhere.")
- 324, Electricity: Measuring and Testing, for electrical indicating and measuring devices which may be part of optical measuring systems. (See Lines With Other Classes, B, "Testing and Measuring Subcombinations Provided for Elsewhere.")
- 329, Demodulators, appropriate subclasses for a demodulator of signals of less than infrared frequency which may contain an optical device (e.g., an optical isolator).
- 330, Amplifiers, subclass 4.3 for lasers and similar devices when they function as an amplifier of light in the visible range and laser modulator, per se. (See Lines With Other Classes, G, "Lasers and Resonance Radiation.")
- 338, Electrical Resistors, subclass 15 for photoconductive resistors responsive to infrared, ultraviolet or visible light.
- 340, Communications: Electrical, subclass 146.2 for digital comparator systems, subclasses 5.1-5.92 for intelligence comparison of information, subclasses 870.01-870.44 for telemetric sig means useful in transmitting a measured quantity, not limited to any particular measuring instrument provided for in other classes, and also 870.01-870.44 for quantitative telemetering systems including subclasses 870.28-870.29 whereby the telemetering is transmitted by means of radiant energy, subclasses 870.16-870.17 wherein the telemetering system is responsive to a condition, subclasses 500-892 for condition responsive indicating systems, particularly subclasses 577-579 for a flame indicator; subclasses 603-634 for a fluent material indicator; subclass 670 for a velocity indicator; subclass 675 for a web, film, or strip indicator; subclass 678 for a geometri gauge indicator, and subclass 265 for geogage type responsive systems. (See Lines With Other Classes, B, "Testing and Measuring Subcombinations Provided for Elsewhere," (1) Note.)
- 340, Communications: Electrical, for electrical indicating and measuring devices which may be part of optical measuring systems. (See Lines With Other Classes, B, "Testing and Measuring Subcombinations Provided for Elsewhere.")
- 340, Communications: Electrical, for signal and indicating apparatus which may involve optics. See, for example, subclasses 584+, 600, 630, and 632, for temperature, radiant energy, smoke, or gas indicators, respectively. (see Lines With Other Classes, A, "Optical Measuring or Testing Classified Elsewhere.")

- 342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 1 through 205 for radar systems involving electromagnetic radiation in the radio wave frequency.
- 345, Computer Graphics Processing and Selective Visual Display Systems, subclasses 418 through 475 for computer graphics processing and subclasses 326 through 358 for computer operator interface.
- 346, Recorders, for the generic class of recording the movements of machines or making a record of any phenomenon, particularly subclass 33 for recorders combined with external recorder operating means, subclasses 150.1+ for electric recording including spark and electrochemical, subclasses 107.1+ for light or beam recording.
- 347, Incremental Printing of Symbolic Information, subclasses 112+ for electrostatic marking, particularly subclasses 129+ for photo scanning; subclasses 224+ for light or beam marking processes or apparatus.
- 348, Television, subclasses 135+ for television systems utilized to effect a measurement and subclasses 180+ for measuring and testing devices utilized in television systems which may include optical elements.
- 348, Television, subclasses 135+ and 180+ for television systems for measuring and testing which may include optical elements. (See Lines With Other Classes, A, "Optical Measuring or Testing Classified Elsewhere.")
- 351, Optics: Eye Examining, Vision Testing and Correcting, subclass 204 for interpupillary distance measuring and lens positioning examination instruments, and subclasses 239+ for test charts and targets for the subjective testing of vision for astigmatism and chromaticity.
- 351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 200+ for eye examining and testing instruments which may include optical measuring or testing. (See Lines With Other Classes, A, "Optical Measuring or Testing Classified Elsewhere.")
- 352, Optics: Motion Pictures, appropriate subclasses for methods and apparatus dealing with cameras for taking of pictures and projectors which show the motion pictures, especially subclass 39 for methods of utilizing motion pictures for time and motion studies or for other uses other than the creation of the illusion of motion.
- 353, Optics: Image Projectors, appropriate subclasses for projection apparatus which may be used to facilitate optical measuring and testing.
- 358, Facsimile and Static Presentation Processing, subclasses 1.1 through 1.18 for data processing for static presentation on fixed medium (e.g., for printer).
- 359, Optical: Systems and Elements, subclasses 350+ for optical elements usable in the infrared or ultraviolet range, subclasses 362+ for compound lens systems including telescopes, microscopes, or periscopes, subclasses 396+ for microscope slides, subclasses 436+ for scale or indicia reading, subclasses 483+ for polarization type devices, subclasses 290+ for light control systems which after an optical medium surface, or interface, subclasses 566+ for diffractions gratings subclasses 557+ for light interference systems, subclass 615 for light dispersion systems, subclasses 645+ lenses, particularly subclass 801 for lenses combined with illumination and a viewed object support, subclasses 227+ for light control systems using an opaque element or medium movable in or through the light path, subclasses 831+ for prioms and their mounts, subclasses 838+ for reflectors, and subclasses 885+ for optical filters. (See Lines With Other Classes, B, "Testing and Measuring Subcombinations Provided for Elsewhere.")
- 359, Optical: Systems and Elements, for optical elements which may be used in measuring and testing apparatus. The conventional optical elements such as lenses, prisms, and mirrors are there. (See Lines With Other Classes, B, "Testing and Measuring Subcombinations Provided for Elsewhere.")
- 359, Optical: Systems and Elements, for optical elements which control light intensity or direction on a molecular level, subclasses 246+, 281+, and 301+ for modulation involving polarized light, and subclasses 290+ for light control by altering an optical medium or surface. (See Lines With Other Classes, G, "Lasers and Resonance Radiation.")
- 359, Optical: Systems and Elements, for utilizing a microscope to count particles, one by one, such as blood particles or bacteria colonies, and for where an optical element such as a lens for magnification is used in combination with a support for counting bacteria colonies, or particles such as dust; see Class 359 for one by one counting. (See Lines With Other Classes, J, "Counting.")

- 361, Electricity: Electrical Systems and Devices, subclasses 173+ and 211 for electric circuits for relays and electromagnets controlled by a photosensitive device.
- 362, Illumination, appropriate subclasses for general purpose lighting devices, particularly subclasses 3+ for photographic lights, subclasses 138+ for inspection lamps, and subclass 293 for signal lanterns.
- 365, Static Information Storage and Retrieval, appropriate subclass for static information storage and retrieval systems, per se. Static storage systems which include testing or measuring are excluded from this class.
- 372, Coherent Light Generators, for coherent light generators, per se. (See Lines With Other Classes, G, "Lasers and Resonance Radiation.")
- 374, Thermal Measuring and Testing, subclass 32 for thermal measurement of total energy or power radiated from a source; and subclasses 121+ for emitted radiation, in general.
- 374, Thermal Measuring and Testing, subclass 32 where the total energy or power in a beam of radiation is measured by a thermal detector; and subclasses 121+ where thermally emitted radiation is measured to determine the temperature of the emitting source, except where the radiation is limited to light, where the classification is in Class 356. (See Lines With Other Classes, H., "Thermocouples And Bolometers.")
- 376, Induced Nuclear Reactions: Processes, Systems, and Elements, subclasses 245+ for the testing, sensing, measuring, monitoring or detecting of a reactor condition including control of the reactor as a result of the testing or sensing.
- 377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 6 for article counters of the electrical type.
- 377, Electrical Pulse Counters, Pulse Dividers or Shift Registers: Circuits and Systems, subclass 10 for counting of discrete particles such as blood particles, bacteria colonies, or dust particles, one at a time by numerical counting apparatus which registers the counts corresponding to the respective particles. (See Lines With Other Classes, J, "Counting.")
- 382, Image Analysis, appropriate subclasses for the application of image analysis or pattern recognition systems.
- 382, Image Analysis, for pattern or character recognition of a document or a record. (See Lines With Other Classes, K, "Reading and Recording.")
- 385, Optical Waveguides, appropriate subclasses for fiber optics, per se.
- 396, Photography, subclass 563 for a sensitometer which may produce an optical wedge having varying light transmission characteristics by the controlled exposure of a photographic medium to light.
- 399, Electrophotography, subclasses 9+ for diagnostics of electrophotographic devices.
- 414, Material or Article Handling, appropriate subclasses for the generic class of article handling, particularly subclasses 431+ for engaging an article between its ends for rotation and advancement, and subclass 433 for article rotators, roller type.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for analytical and analytical-control apparatus involving an optical test; subclass 44 for viable blood-treating apparatus; and subclass 99 for laboratory apparatus. An alternative electronic search of U.S. patents based upon a modification of the European Patent Office Classification (ECLA) System for certain subject matter in this subclass may also be found in Class 422 Cross-Reference Art Collections 908-948. (There are no definitions associated with these Cross-Reference Art Collections. The most available disclosure as to the types of documents contained herein is given in any notes associated with the titles.)
- 423, Chemistry of Inorganic Compounds, for all combustion reactions not provided for elsewhere. (See Lines With Other Classes, I, "Burning.")
- 424, Drug, Bio-Affecting and Body Treating Compositions, subclasses 9.1+ for compositions and methods of diagnosing a body condition by an in vivo test.
- 427, Coating Processes, subclass 162 for processes of coating, per se, wherein the product is an optical element.
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a stock material product in the form of a single or plural layer web or sheet which may possess a critical light transmissive or reflective property; and especially subclass 426 for nonstructural composite web or sheet embodying a layer of glass.

- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclass 24 for radiation imagery chemistry process involving control feature responsive to a test or measurement.
- 431, Combustion, subclass 13 for gas burners with signal, alarm or indicator for controlling the combustion ingredients or any other function relating to the burning of the gas, and subclass 355 for laboratory type burners including those used in sample excitations dealing with spectroscopy and flame photometers of Class 356.
- 431, Combustion, subclass 4 for feeding a substance to the flame additional to the normal fuel and oxidizing material to act as a protective agent or to give the flame some special characteristic, subclass 126 for apparatus with ornamental forms, surface ornamentation or an additive or additive means producing flame coloration, and subclass 355 for apparatus comprising a vertical tube of constant cross section with a fuel gas feed means and an opening for air admission at its lower end, the fuel being fed upwardly and vertically into the tube, mixing air, and discharging from the upper end to burn thereabove. (See Lines With Other Classes, I, "Burning.")
- 433, Dentistry, subclass 6 for the visual comparison of tooth forms with the shape or coloring of a person's face or teeth.
- 434, Education and Demonstration, subclasses 298 and 303 for apparatus and processes relating to chemistry and physics which could include light testing devices, subclasses 98+ for color comparison charts which are used for display and instruction purposes, and subclasses 322+ for examination devices and methods which may include as a part thereof reflection and transmission tests similar to those found in Class 356.
- 435, Chemistry: Molecular Biology and Microbiology, subclasses 4+ for the quantitative or qualitative testing of fermentation processes.
- 436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for analytical and analytical control methods which could involve an optical test.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 4 and 64 for methods and apparatus for adjusting electrodes by means of optical operations.
- 451, Abrading, subclasses 42+ for a lens grinding process which may include optical tests as part of the grinding process and subclass 325 for a stationary tool type of lens grinder.
- 505, Superconductor Technology: Apparatus, Material, Process, subclasses 150+ for high temperature ( $T_c > 30$  K) superconducting devices, and particularly subclasses 160+ for measuring or testing system or device.
- 600, Surgery, subclasses 310+ for surgical diagnostic instruments which may involve optical measuring or testing on or in the body, including in vivo light examination of a body process, including metabolism, spirometers, and endoscopes. (See Lines With Other Classes, A, "Optical Measuring or Testing Classified Elsewhere.")
- 604, Surgery, subclasses 20+ for subject matter relating to administration or removal of material from the body by means responsive to optical diagnostic means.
- 606, Surgery, subclasses 2+ for subject matter relating to surgical instruments, or their use, for applying light to the body.
- 607, Surgery: Light, Thermal, and Electrical Application, subclasses 1+ for therapeutic instruments which utilize light.
- 700, Data Processing: Generic Control Systems or Specific Applications, subclasses 90 through 306 for particular application of data processing systems or calculating computers.
- 706, Data Processing, Artificial Intelligence, appropriate subclasses for artificial intelligence processing.
- 709, Electrical Computers and Digital Processing Systems: Multicomputer Data Transferring, appropriate subclasses for multicomputer data transferring.

## SECTION V - GLOSSARY

### DIFFRACTION

The bending of a light ray in passing the edge formed by contiguous opaque and transparent edges.

### DIFFUSE

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

### ELECTROPHORESIS

The effect in which charged particles suspended in a liq-

uid are moved under the influence of an electrostatic field.

#### FIDUCIAL

A reference direction formed as by a light ray, level, compass, or scale from which another direction is measured or compared.

#### 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 in these definitions refers to radiation in the above mentioned range, and when qualified by the terms ultraviolet and infrared refers to the corresponding radiation ranges adjacent the visible range.

#### MEASURING-TESTING

Measuring usually involves a more precise and quantitative determination of the characteristic or property in question. Testing may be a mere indication of the presence or absence of the characteristic or property, and may involve only a mere inspection or viewing of the phenomenon or specimen. It should be recognized that the two terms overlap to some extent in meaning.

#### MENSURATION

Measurement of lengths, areas, or volumes.

#### MONOCHROMATOR

An instrument for producing a narrow band of the spectrum by dispersing a radiation beam into its components or colors, and isolating the narrow band desired as by passing the components or colors through a narrow slit.

#### OPTICAL ELEMENT

A structure which performs a basic optical function. See Class 359 for a more specific definition.

#### OPTICAL SYSTEM

A combination of two or more similar or diverse optical elements which are optically related, or an optical element combined with nonoptical structure where the overall function performed is optical in nature. The optical systems in this class are for measuring or testing purposes.

#### OPTICS, OPTICAL

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

#### REFLECTION

The return of light striking a surface back into the medium from which it came.

#### REFRACTION

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

#### SPECTRUM

The band of colors produced by separating white light into its component frequencies. The term also denotes radiation arrayed over a frequency range where the frequency of the radiation continuously increases or decreases over the range.

#### SUBCLASSES

#### 2 CONTOUR PLOTTING:

This subclass is indented under the class definition. Subject matter including structure responsive to two stereoscopic images as photographed or otherwise viewed at spaced points over a surface (usually of the earth) and furnishing a contour plot of the surface based on the distinctions in these images.

- (1) Note. The subject matter of this subclass usually involves a photodetecting apparatus such as a photocell system which scans or otherwise responds to the stereoscopic images or records, together with apparatus to compare the photocell outputs to operate some form of indicator such as a recorder. If the indication is by a scribe, classification is in Class 33; and if the output is an error signal as for alignment purposes classification is in Class 250, especially subclass 558.

SEE OR SEARCH THIS CLASS, SUBCLASS:

138, for general alignment inspection.

**SEE OR SEARCH CLASS:**

- 33, Geometrical Instruments, subclasses 20.1+ for sight line controlled geometrical scribers.
- 250, Radiant Energy, subclass 220 for photocell systems with plural photocells responsive to plural related images where the measuring is lacking.
- 348, Television, subclass 26 for television systems including means to generate contours based on features in the scene viewed.
- 353, Optics: Image Projectors, subclass 5 for projection involving mapping or aerial photograph rectifying.
- 359, Optical: Systems and Elements, subclass 470 for stereoviewers with compensation for camera positions, as of the plotting or mapping type.

**3 RANGE OR REMOTE DISTANCE FINDING:**

This subclass is indented under the class definition. Subject matter comprising instruments to measure the distance between an observer and a remote point or to measure the distance between two points remote from the observer.

- (1) Note. Height is a distance that may be measured.

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

- 496, for interferometric dimensional measurement of small structure or spaces.

**SEE OR SEARCH CLASS:**

- 235, Registers, subclass 414 for means to calculate the range of a target and not employing a particular sighting means.
- 348, Television, subclasses 135+ for television systems utilized to determine range.
- 396, Photography, subclasses 89+ for range finders which operate in conjunction with camera structure.

**3.01 Triangulation ranging to a point with one projected beam:**

This subclass is indented under subclass 3. Subject matter including the following: (a) the distance to any single remote target point is

determined in accordance with the principles of triangulation; (b) the target may include several points requiring more than one beamed measurement; and (c) a light beam or its reflection from the target point is oriented and projected to form at least one side of a triangle.

- (1) Note. Triangulation involves, for example, establishing a triangle where one side (i.e., the base) and the angles, which the two other sides form with the base, are determined.
- (2) Note. This subclass does not necessarily require the use of a photodetector, but requires a projected beam.
- (3) Note. This subclass includes, for example, apparatus that utilizes together a nonfixed axial source and a nonfixed axial line of sight for the sensing that is not found elsewhere, but that still requires only a single source for each point.

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

- 3.09, where scanning is required to achieve angular measurement to a single point.
- 3.12, for photodetection remote from at least two source locations that are transmitting beams to be received by a photodetector.
- 9+, for triangulation with no projected beam and no photodetection.
- 625, for distance measurement to define the dimensions of an adjacent, as opposed to remote, article that may involve triangulation to any one point.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclass 201.6 for triangulation used to establish distance-related focus of the source onto a triangulating photodetector.
- 342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), for the use of similar circuitry not requiring the same wavelength or radiation distinctions.

367, Communications, Electrical: Acoustic Wave Systems and Devices, for the use of similar circuitry not requiring the same wavelength or radiation distinctions.

396, Photography, subclasses 89+ where triangulation may be employed in the focus of a separate photographic camera.

**3.02 Using photodetection with a fixed axial line of sight:**

This subclass is indented under subclass 3.01. Subject matter that determines an angle of the triangle with respect to a known base line by establishing a fixed viewing direction and field of view for a photodetector to generate an electrical signal upon the coincidence of the target along a photodetector's line of sight.

(1) Note. This subclass would include apparatus that utilizes a moving detector with respect to a fixed optical viewing axis to determine the direction of light from a targeted source.

**3.03 Using a source beam with a fixed axial direction or plane:**

This subclass is indented under subclass 3.01. Subject matter that includes a beam or plane of light from the target that has a fixed angular orientation with respect to a baseline to establish an angle of the triangle.

(1) Note. The use of a photodetector is not required for this subclass, but the use of a vidicon-type detector is found here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.05, for a system that includes a moving optical axis in the receiver optics and a fixed detector.

**3.04 With a single staring photodetector having one element:**

This subclass is indented under subclass 3.03. Subject matter wherein a detector produces an electrical signal related to the angular position of the source based on the instantaneous output of or differential output across a single detecting element that is not subdivided for its operation.

(1) Note. A one-element photodetector may consist of a lateral effect or photoresistive element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.03, for vidicon-type detection.

3.06+, for use of detectors that define the position of incidence of received light by the difference in the outputs of more than two detector elements (e.g., at least three separate photodetectors).

**3.05 Having moving receiver optics:**

This subclass is indented under subclass 3.04. Subject matter wherein an image of the source is moved with respect to the detector's axial line of sight to achieve an effective movement of the photodetector's angular field of view across the source.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.02, for systems that may include a moving detector element with respect to a fixed optical line of sight.

**3.06 With a single photodetector having multiple elements:**

This subclass is indented under subclass 3.03. Subject matter wherein a detector produces an electrical signal related to the angular position of the source based on the output of a particularly positioned one of an array of at least three subelements in the focused field of view of a single detector structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.03, for vidicon-type detection.

3.07, for CCD-type multi-element detectors that are electronically scanned.

3.08, for two separated detectors that are paired.

**3.07 Having electronic scanning of the photodetector:**

This subclass is indented under subclass 3.06. Subject matter that includes electronic regular sampling through time of the elements of the detector array in order to determine the position or angle associated with a particular element illuminated by the target.

- (1) Note. This subclass includes, for example, CCD-type detectors.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.03, for vidicon-type detection.

**3.08 With at least one paired set of staring photo-detectors:**

This subclass is indented under subclass 3.03. Subject matter wherein any two separated detectors produce electrical signals related to two angular positions detected from the single source.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.06, for a single detector subdivided into at least three subelements.

**3.09 Requiring scanning of a source beam:**

This subclass is indented under subclass 3.01. Subject matter wherein the source comprises a beam of light that is moved at some angular rate that can be detected and associated with any one target's angular position.

- (1) Note. The target may be at the source position or reflected by the source, but scanning is required to generate the angular information.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.02, for moved but not necessarily spatially scanned sources that define a target with respect to a fixed axial line of sight of a photodetector.

**3.1 Triangulation ranging to a point with two or more projected beams:**

This subclass is indented under subclass 3. Subject matter wherein a target distance is determined in accordance with the principles of triangulation, and two light beams, separated by a known baseline distance, are oriented and projected to define the other two legs of the triangle.

- (1) Note. The two beams may be scanned over angularly related time across the target or moved at least once to orient their coincidence on the target.

- (2) Note. Triangulation involves, for example, establishing a triangle where one side (i.e., the base) and the angles, which the two other sides form with the base, are determined.

- (3) Note. This subclass does not necessarily require the use of a photodetector, but requires projected beams.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.09, where scanning is required to achieve angular measurement to a single point.

3.12+, for photodetection remote from at least two source locations transmitting beams to be received by a photodetector.

9+, for triangulation with no projected beam and no photodetection.

625, for distance measurement to define the dimensions of an adjacent, as opposed to remote, article that may involve triangulation to any one point.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 201.6 for triangulation used to establish distance-related focus of the source onto a triangulating photodetector.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation) for the use of similar circuitry not requiring the same wavelength or radiation distinctions.

367, Communications, Electrical: Acoustic Wave Systems and Devices, for the use of similar circuitry not requiring the same wavelength or radiation distinctions.

396, Photography, subclasses 89+ where triangulation may be employed in the focus of a separate photographic camera.

**3.11 Using photodetection at the source station(s):**

This subclass is indented under subclass 3.1. Subject matter wherein an electrical signal is generated based on the reflection of the two beams from the target back to the plane, plat-



form, or station(s) that supports the beams and the photodetector.

**3.12 Using photodetection remote from the source station(s):**

This subclass is indented under subclass 3.1. Subject matter wherein an electrical signal is generated based on the incidence of the two sources onto a photodetector that is not located on the same plane, platform, or station(s) as the two sources.

- (1) Note. The detector may be located at the target to receive direct unreflected directional beams of illumination from the sources.

**3.13 Triangulation ranging with photodetection, but with no projected beam:**

This subclass is indented under subclass 3. Subject matter wherein the distance to any single remote target point is determined in accordance with the principles of triangulation, wherein at least one passive image of a target point (which may be formed by arbitrary target point illumination) forms at least one side of a triangle.

- (1) Note. Triangulation involves, for example, establishing a triangle where one side (i.e., the base) and the angles, which the two other sides form with the base, are determined.
- (2) Note. The target point may be an active omnidirectional beacon source or may be actively illuminated where the active beam does not form one side of the triangle measured.
- (3) Note. Sequential views of a moving target with a known speed may comprise the target.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3.12, for photodetection remote from at least two source locations transmitting directed beams to be received by a photodetector.
- 9+, for triangulation with no projected beam and no photodetection.
- 372+, for distance measurement to define the dimensions of an adjacent, as

opposed to remote, article that may involve triangulation to any one point.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 201.6 for triangulation used to establish distance-related focus of the source onto a triangulating photodetector.
- 342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), for the use of similar circuitry not requiring the same wavelength or radiation distinctions.
- 367, Communications, Electrical: Acoustic Wave Systems and Devices, for the use of similar circuitry not requiring the same wavelength or radiation distinctions.
- 396, Photography, subclasses 89+ where triangulation may be employed in the focus of a separate photographic camera.

**3.14 Using at least a pair of viewing axes:**

This subclass is indented under subclass 3.13. Subject matter which includes two optical axes relating to the target directed to at least two photodetectors or detector arrays in the generation of a pair of electrical signals related to the triangle that defines the distance to the target.

- (1) Note. The detector(s) may be mono- or multi-element, and further scanned or staring.
- (2) Note. This subclass includes passive image correlation of two images from a single target source in establishing two angles to the target.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3.08, for a pair of staring mono- or multi-element detectors used where a single source maintains a fixed axial direction.
- 3.15, for image correlation where a photodetector views images of a target and where one of the images is established along a fixed line of sight.
- 4.04, for split-image separation detection of "focus" quality where there is no baseline separation between the sepa-

rate image viewing axes as here in subclass 3.14.

**SEE OR SEARCH CLASS:**

348, Television, subclass 139 for triangulation of range derived from two or more picture images generated and compared based on their baseline separation.

**3.15 With one viewing axis fixed:**

This subclass is indented under subclass 3.14. Subject matter wherein one optical axis that views the target is fixed relative to the other one of the pair of viewing axes.

**3.16 With moving optical elements in all viewing axes:**

This subclass is indented under subclass 3.14. Subject matter that includes movement of each viewing axis in order to achieve measurement of the target point.

**4.01 With photodetection:**

This subclass is indented under subclass 3. Subject matter that includes the generation of an electrical signal in response to light associated with the distance being measured.

- (1) Note. This subclass includes first any apparatus or method that includes a generic capability applicable to any one of pulse, phase, or frequency ranging systems.

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

3.01+, for a system that involves triangulation, even though that term is not mentioned, but is evidenced by a baseline or trigonometric technique and contains either photodetection and/or the use of a projected light beam.

9+, for a system that uses neither a projected beam nor photodetection.

625, for distance measurement to define the dimensions of an adjacent, as opposed to remote, article that may involve similar ranging techniques to any one point.

**SEE OR SEARCH CLASS:**

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), for the use of similar circuitry not requiring the same wavelength or radiation distinctions.

367, Communications, Electrical: Acoustic Wave Systems and Devices, for the use of similar circuitry not requiring the same wavelength or radiation distinctions.

**4.02 Of a simulation or test:**

This subclass is indented under subclass 4.01. Subject matter that includes a predefined range path for the light used to measure range in order to calibrate or test a range finder.

- (1) Note. The simulation in this subclass is not considered the same as the alternate reference path used in subclasses 5.12 and 5.13 used during the regular operation of those range finders.

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

72+, for other optical tests not specifically dedicated to range or distance finders.

**4.03 Of focused image size or dimensions:**

This subclass is indented under subclass 4.01. Subject matter that includes a determination of the distance of or to an observed object by the relative focused size of the object or dimensional spread of reference points on the focal plane of the photodetector with respect to a calibrated size and corresponding distance.

- (1) Note. The image size must be derived from a focused image as opposed to a blur circle size.

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

4.04, for blur circle size or edge detection.

21, for the same, but without photodetection.

**SEE OR SEARCH CLASS:**

348, Television, subclass 140 where a picture image signal is analyzed for size.

**4.04 Of degree of defocus:**

This subclass is indented under subclass 4.01. Subject matter that includes a determination of the distance of a remote point or observed object by the degree of image focus through relative characteristics of in-and-out-of-focus intensity, blur circle size, lateral split image displacement, etc., of an image generated at some fixed location from focusing optics along its optical axis relative to the same characteristic under a focused condition at the same location along the optical axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3.14, for split images of a single object directed to two detectors separated by a baseline, unlike split-image focus detection here in subclass 4.04 where there is no baseline separation.
- 4.03, for a focused image feature measurement(s).
- 4.05, for mechanically searching for the focal point based on the same or other characteristics as in subclass 4.04.
- 22, for split images without photodetection.

**4.05 Of focal point search:**

This subclass is indented under subclass 4.01. Subject matter that includes a way to mechanically, or otherwise, sample the "image" along the optical axis of a fixed focus lens or scan the focus of a transmitted beam to determine the point of maximum focus of the image or reflection of the source which is proportional to the distance to the targeted remote point.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 4.04, for determining range based on the focus characteristics of an image at some fixed point from the focusing lens.

**4.06 Of differential amplitude at two source or detector distances:**

This subclass is indented under subclass 4.01. Subject matter that includes either two sources at different distances from a target alternately illuminating the target at the remote point that a fixed detector views or includes two detectors at different distances receiving focused images

of the target illuminated by a single source from which distance is determined based on the relative intensities detected.

**4.07 Of intensity proportional to distance:**

This subclass is indented under subclass 4.01. Subject matter that includes a measure of the relative intensity of the received focused target image from which distance may be determined by the fact that intensity varies by the inverse square of the distance or the like.

**4.08 Of height relative to a light plane:**

This subclass is indented under subclass 4.01. Subject matter that includes some apparatus between two remote points being measured that defines the height between the ground and a detector or reflector moved to intersect a light beam or beam plane that may be scanned or fanned.

- (1) Note. The apparatus may define a path for the light beam to traverse from the mirror intersecting the plane to the ground.

**4.09 Of light interference fringes:**

This subclass is indented under subclass 4.01. Subject matter wherein the photodetection is in response to an interference pattern formed by the interaction of coherent light waves which relate to range by a fringe pattern or fringe count.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 5.09, for a system that detects frequency of modulation to determine range where the beat frequency of a mixed or compared beam is not directly related to a coherent interference fringe count.
- 5.11, for phase change counting between known frequencies of modulation that are unrelated to coherent carrier mixing in the production of fringes.
- 5.15, for a system that demodulates a return beam by coherent or incoherent mixing in order to shift the return to a different IF operating frequency unrelated to counting of fringes.
- 28.5, for a system where frequency is detected from the mixing of coherent waves that produce a moving, inter-

ference pattern or just a difference frequency, which is related to velocity.

**4.1 Having different frequency sources:**

This subclass is indented under subclass 4.09. Subject matter that includes at least two light beams from the same or different sources, but which have different frequencies.

**5.01 Of pulse transit time:**

This subclass is indented under subclass 4.01. Subject matter including means for measuring the time delay of a discrete light pulse in its time of flight (transit time) from an observing station to a remote point and back to the observing station.

**5.02 Having return coincide with swept display or detector:**

This subclass is indented under subclass 5.01. Subject matter wherein the return pulse's reception time is related to transit time by reference to where it appears in time on a calibrated sweep of a display screen, detector, or film which begins a sweep at the instant of transmission.

**5.03 Having one or more return pulse gates or windows:**

This subclass is indented under subclass 5.01. Subject matter including means at the receiver for accepting return signals to be processed if they occur during specified (gate or window) periods after the transmission of a light pulse.

**5.04 Including a displayed image:**

This subclass is indented under subclass 5.03. Subject matter wherein the return pulse includes image data of a reflecting object at the remote point and is displayed as at least a two-dimensional image that does not include reflection signals outside the gate period.

SEE OR SEARCH CLASS:

348, Television, subclass 31 for backscatter reduction of an image that may involve range gating, but does not involve range indicating.

**5.05 Having pulse transmission trigger significance:**

This subclass is indented under subclass 5.01. Subject matter including details of the manner in which the transmitted pulse instant is deter-

mined for measuring the transit time of the light pulse.

**5.06 Including optical pick-off of transmission start:**

This subclass is indented under subclass 5.05. Subject matter wherein the instant of pulse transmission is determined by optically detecting the transmission pulse in order to begin measuring the transit time.

**5.07 With specific counter type timing of returns:**

This subclass is indented under subclass 5.06. Subject matter including an electronic element that counts timing pulses associated with travel of the optical pulse to and from the target.

**5.08 Including specific counter type timing of returns:**

This subclass is indented under subclass 5.05. Subject matter including an electronic element that counts timing pulses associated with travel of the optical pulse to and from the target.

(1) Note. This subclass includes electrical initiation of the counter controlled independently of the optical pulse itself.

**5.09 Of frequency difference:**

This subclass is indented under subclass 4.01. Subject matter that either sends a defined frequency beam or frequency modulates an outgoing pulse or continuous wave optical beam in order to compare the detected return frequency to the transmitted frequency for determining range calibrated frequency differences.

SEE OR SEARCH THIS CLASS, SUBCLASS:

4.09+, where frequency is detected from the mixing of coherent waves that produce an interference pattern, which includes moving or static fringes which are counted.

5.15, where optical demodulation by heterodyning or homodyning is used to reduce the processed signal frequency.

28.5, where frequency is detected from the mixing of coherent waves that produce a moving interference pattern or just a difference frequency, which is related to velocity.

**5.1 Of CW phase delay:**

This subclass is indented under subclass 4.01. Subject matter that incorporates a continuous wave (CW) of modulated or unmodulated optical signal that is transmitted to and reflected from a target, such that the relative phase position of the returned wave is compared to the phase of the transmitted wave in order to determine the distance-proportional transit time to and from the target.

- (1) Note. Phase nulling techniques are included in this subclass.

**5.11 Having multiple carrier or modulation frequencies:**

This subclass is indented under subclass 5.1. Subject matter including more than one frequency of modulation or carrier frequency for the transmitted optical signal to further define the distance-proportional phases comparison.

**5.12 Including an alternating reference path:**

This subclass is indented under subclass 5.11. Subject matter that incorporates a path of known distance through which the transmitted signal is alternately sent in order to phase calibrate the receiver circuitry for the received measuring signal from the target.

**5.13 Having an alternating reference path:**

This subclass is indented under subclass 5.1. Subject matter that incorporates a path of known distance through which the transmitted signal is alternately sent in order to phase calibrate the receiver circuitry for the received measuring signal from the target.

**5.14 Having polarization discrimination:**

This subclass is indented under subclass 5.1. Subject matter that incorporates polarized optical elements in the optical path.

**5.15 Having specific IF mixing of returns:**

This subclass is indented under subclass 5.1. Subject matter that incorporates demodulation by optically or electrically heterodyning the received signals to an intermediate frequency (IF) for further processing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

4.09+, for systems that mix the return with another beam to produce a fringe pattern to be counted and frequency analyzed as a direct measurement of range.

5.09, for systems that detect frequency of modulation to determine range where the beat frequency of a mixed or compared beam is not directly related to a coherent interference fringe count or to CW phase delay.

**6 Instrument condition testing or indicating:**

This subclass is indented under subclass 3. Subject matter comprising means for testing or indicating the condition of the range or height finder with regard to its adjustment, alignment, or calibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

124, for lens or reflective image former testing generally.

**7 Periscope or offset type:**

This subclass is indented under subclass 3. Subject matter wherein the instrument has two axis which are offset from each other in a direction perpendicular to the base line so that the device may function as a periscope.

SEE OR SEARCH CLASS:

359, Optical: Systems and Elements, subclasses 540+ for periscopes, per se.

**8 With view finder:**

This subclass is indented under subclass 3. Subject matter wherein the range or height finder is combined with a view finder.

- (1) Note. Where the operation of the range finder is coordinated with the operation of some other element of the camera (usually the objective lens) classification is not here but in Class 396, subclasses 148+.

SEE OR SEARCH CLASS:

396, Photography, subclasses 148+ for camera structure combined with a

rangefinder and viewfinder; see also  
(1) Note above.

**9 Base line instrument (i.e., base is a part of instrument):**

This subclass is indented under subclass 3. Subject matter wherein the range or height finder includes a base line as a part of the instrument with plural lines of sight directed from the extremities of the base line to the point whose range is to be measured, at least one of the lines of sight being deviated.

**10 With filter or light valve:**

This subclass is indented under subclass 9. Subject matter wherein filters or light valves are employed to aid the eye as in determining coincidence of the right and left images.

**SEE OR SEARCH CLASS:**

359, Optical: Systems and Elements, subclasses 227+ for diaphragms and shutters, and subclasses 885+ for filters of the color and neutral density type.

**11 Range finder combined with height finder:**

This subclass is indented under subclass 9. Subject matter wherein the range finder is combined with means to determine the height of the object whose range has been determined.

**12 Stereoscopic:**

This subclass is indented under subclass 9. Subject matter wherein the observer sees the field of view in three dimensions, the range being determined by comparing the depth of the object whose range is to be measured with the apparent depth of a mark or marks superimposed upon the field of view.

**SEE OR SEARCH CLASS:**

359, Optical: Systems and Elements, subclasses 462+ for stereoscopic systems generally.

**13 Ortho-pseudo type:**

This subclass is indented under subclass 12. Subject matter where the observer sees an image in true perspective and also one in reverse perspective.

**14 Stationary measuring marks:**

This subclass is indented under subclass 12. Subject matter where the measuring mark or marks are stationary.

**15 Length of base line variable:**

This subclass is indented under subclass 9. Subject matter wherein the range measurement is made by varying the length of the base line.

**16 Image displaced by moving refracting element:**

This subclass is indented under subclass 9. Subject matter wherein the range measurement is made by deviating one of the lines of sight by means of an adjustable refracting element.

**17 Image displaced by rotating reflecting element:**

This subclass is indented under subclass 9. Subject matter wherein the range measurement is made by deviating one of lines of sight by means of the rotation of a reflecting element.

**18 With mounting, supporting, adjusting, or folding structure:**

This subclass is indented under subclass 9. Subject matter comprising structural details including means for mounting, supporting or adjusting the range finder or its components.

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

6, for testing the alignment or calibration of the instrument.

**19 Prism structure for determining coincidence:**

This subclass is indented under subclass 9. Subject matter including prism structure for displacing relative to each other the two images of a coincidence type range finder.

(1) Note. Such prism structure is appropriately classified here as a pertinent sub-combination even though no other range finder structure is recited.

**20 External basis type:**

This subclass is indented under subclass 3. Subject matter wherein the complete measurement requires the knowledge of some distance

or interval external to the measuring instrument.

**SEE OR SEARCH CLASS:**

33, Geometrical Instruments, appropriate subclasses, particularly subclasses 262, 276, and 284, for similar subject matter with no significant optical feature.

**21 Object size or distance known:**  
This subclass is indented under subclass 20. Subject matter where there is an interval of known size (e.g., height of an object) at a remote point, the distance to which point is to be determined; or where the distance to a remote point is known and the size of some interval at the remote point is to be determined.

**22 With displaced images:**  
This subclass is indented under subclass 21. Subject matter where the instrument provides two displaced images of the same object for viewing by the observer.

**23 MOTION STOPPING (E.G., STROBOSCOPES):**  
This subclass is indented under the class definition. Subject matter comprising means whereby the relationship between periodic changes in light intensity or direction and the motion of a body are utilized in observing the body or performing some measurement with regard to the body or some means controlling the light source.

(1) Note. Where a specific test is provided for in another class, classification is in that class even though the subject matter may include a stroboscope. See Search Class notes below.

**SEE OR SEARCH CLASS:**

73, Measuring and Testing, subclass 1.56 for timing apparatus for watches, camera shutters and the like which may utilize stroboscopic principles.  
315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses for electric lamp and discharge device systems in general.  
324, Electricity: Measuring and Testing, subclass 75 for calibration of electric meters using stroboscopic principles,

and subclasses 76.11+ for measuring electric properties using stroboscopes.

**24 Periodically moving light interrupting element:**

This subclass is indented under subclass 23. Subject matter including reflecting or refracting means which are moved periodically to vary the direction of a light beam.

**SEE OR SEARCH CLASS:**

359, Optical: Systems and Elements, subclasses 196.1 through 226.3 for scanning means in general which use a periodically moving reflecting or refracting element.

**25 Vibrating or oscillating element:**  
This subclass is indented under subclass 23. Subject matter wherein the periodic motion of an element containing alternate opaque and transparent areas is used to interrupt a light source.

**SEE OR SEARCH CLASS:**

359, Optical: Systems and Elements, subclasses 227+ for light valves utilizing an opaque element movable through a light path.

**26 Vibrating or oscillating element:**  
This subclass is indented under subclass 25. Subject matter where the opaque element vibrates or oscillates.

**27 VELOCITY OR VELOCITY/HEIGHT MEASURING:**

This subclass is indented under the class definition. Subject matter including means to measure the velocity or the velocity to altitude ratio of a vehicle by sighting from the vehicle on a remote object, or including means to measure the velocity or the velocity to altitude ratio of a moving object remote from an observer by sighting on the object.

(1) Note. The vehicle may be a surface vehicle or an aircraft. The term "sighting" includes aiming an optical instrument with a photocell. This subject matter includes timing the passage of a sighted object over grids.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

459, for interferometric measurement of angular velocity.

SEE OR SEARCH CLASS:

235, Registers, subclass 413 for means to calculate the velocity of an object and not employing a particular sighting means.

**28 With light detector (e.g., photocell):**

This subclass is indented under subclass 27. Subject matter wherein the measuring system includes means responsive to the received light.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

3+, for range or height finders with light detectors.

139.01+, for devices measuring the angle with respect to a remote point having specified applications with photodetection.

141.1+, for devices measuring the apex of an angle at a photodetection station with respect to a remote point.

152.1+, for devices measuring the apex of an angle at a point remote from a photodetection station.

SEE OR SEARCH CLASS:

343, Communications: Radio Wave Antennas, subclass 8 for systems for measuring velocity by means of reflected radio wave energy.

**28.5 Of light interference (e.g., interferometer):**

This subclass is indented under subclass 28. Subject matter wherein the detection means is responsive to an interference pattern formed by the interaction of coherent light waves.

(1) Note. This subclass includes heterodyne interferometers which measure a doppler-shifted beam reflected from a moving object.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

4.09, and 4.1, for light interference measurement of displacement or distance over large distances.

35.5, for material strain analysis by light interference measurement.

450, for light interference measuring and testing, per se.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclass 71.3 for vibration sensing with a light beam indicator.

**29 OPTICAL ELEMENT OR RETICLE RESPONDS TO RELATIVE VELOCITY OF REMOTE OBJECT:**

This subclass is indented under the class definition. Subject matter comprising means whereby a device for determining a line of sight relative to a remote point includes an optical element or reticle which is moved relative to the device in accordance with the relative velocities of the device and remote point.

(1) Note. This subclass includes in general sighting devices containing optical elements which move relative to the device as a whole for the purpose of tracking a relatively moving object and also optical elements or reticles which are moved in accordance with information obtained by tracking the object by means of moving the sighting device as a unit.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

27, for optical devices which actually measure velocity.

**30 CRYSTAL OR GEM EXAMINATION:**

This subclass is indented under the class definition. Subject matter including a support for a crystal or gem for examination by visible light, a light source passing light through or reflecting light from the crystal or gem and usually structure to view, mark, or locate the light patterns correlated to some condition of the crystal or gem.

(1) Note. Included in this subclass are apparatus and method claims which include



nominal cutting or etching structure or steps to prepare the crystal for examination in addition to the claimed test.

- (2) Note. The optical testing of piezoelectric and semiconductor crystals are included in this subclass.

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

- 36, for sample preparation wherein the novelty is in the preparation of the sample for an optical test and not provided for elsewhere.
- 72, for an optical test combined with another are device and not provided for elsewhere.

**SEE OR SEARCH CLASS:**

- 29, Metal Working, subclass 25.35 for piezoelectric device making methods, which include cutting and etching steps.
- 125, Stone Working, subclasses 12 and 13.01 for apparatus and methods for cutting crystals which include the step of first examining optically and marking the crystal for axis orientation. Also, see subclass 35 for work supports for cutting the crystal.
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 625+ for methods including a chemical etching step.
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 73+ for methods and apparatus for X-ray analysis of crystals which may include a support for the crystal.

**31 Axes determination:**

This subclass is indented under subclass 30. Subject matter wherein the properties of crystals or gems are examined for one of the three principle axis of the crystal, the left or right handedness of the crystal, the polarity or the crystal faces, or twinning, if present, in the crystal.

**SEE OR SEARCH CLASS:**

- 216, Etching a Substrate: Processes, for the etching of a crystal or gem.

**32 MATERIAL STRAIN ANALYSIS:**

This subclass is indented under the class definition. Subject matter for examining an article or material by noting the effect of the strain in the stressed article on light associated with the article or material.

- (1) Note. The light may be passed through or reflected from the article or material, or may be modified by changes in the contour or the position of markings thereon. The modification of the light may be in intensity, direction, polarization, color, or interference patterns produced thereby.
- (2) Note. Stress strain measuring generally is provided for elsewhere (see the Search Class notes below). However, where the changes in the material tested operate to modify the characteristics of the light associated with the test, absent intentional loading of the specimen, classification is in this class (356).

**SEE OR SEARCH CLASS:**

- 33, Geometrical Instruments, subclass 125 for extensimeters. See the (2) note of this subclass.
- 73, Measuring and Testing, subclasses 763+ for testing the stress or strain of material, particularly subclass 800 for optical stress analysis with intentional loading of the specimen, and subclasses 862+ for dynamometers which are not provided for elsewhere and which do not involve the modification of the associated light. See also (2) Note above.

**33 With polarized light:**

This subclass is indented under subclass 32. Subject matter wherein the light utilized in the examination or analysis is polarized light, or is polarized as a result of the examination or analysis.

- (1) Note. Class 359, subclasses 240+ and 483 provides for polarizing structure generally whose light polarizing properties are modified by mechanical stress; while the subject matter of this subclass is restricted to the measuring or analyz-

ing of the strain in the stressed article or material from the effect of the strain on polarized light or from the polarizing effect of light.

- (2) Note. This class (356) provides for stress-strain determinations in articles or materials where the light is directly or indirectly associated with the article or material stressed as by direct reflection from or transmission through the articles or materials, and for transmissions of the light through detectors attached to articles or materials which are naturally or forced by stress to be light birefringent as a result of the strain on the articles or materials; while Class 73, subclasses 760+, provides for stress-strain determinations generally.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 30, for crystal or gem examination wherein polarized light testing may be involved.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 133 and 763+ for stress-strain testing apparatus and dynamometers generally where no polarized light is involved. See also (2) Note above.

#### 34 **Attached detector:**

This subclass is indented under subclass 33. Subject matter wherein the test apparatus utilized in examining articles or materials includes a detector which is naturally birefringent or forced by stress to be birefringent, and means to attach the detector to the articles or materials so that the strain placed on the articles or materials is imparted to the detector so that the modification of the light associated with the detector is indicative of the strain in the stressed article or material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 51, where infrared and ultraviolet light is involved in the test.  
364, for polarized light examination apparatus which produces interference patterns created by the interaction of beams of polarized light.

SEE OR SEARCH CLASS:

- 359, Optical: Systems and Elements, subclasses 483+ for polarizing structure generally. See also (1) Note of subclass 33.

#### 35 **Sheet material:**

This subclass is indented under subclass 33. Subject matter wherein there is means to support transparent sheet material, statically or in motion, which exhibits birefringent properties naturally or when under strain, means to direct polarized light through the sheet material, and generally polarized light analyzing means to examine the sheet material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 429+, for monitoring of webs for optical properties or flaws.

#### 35.5 **By light interference detector (e.g., interferometer):**

This subclass is indented under subclass 32. Subject matter including means responsive to an interference pattern produced by the interaction of coherent light waves with the stressed article or material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 4.5, for light interference measurement of displacement or distance over large distances.  
28.5, for light interference measurement of velocity.  
450, for light interference measurement, per se.

#### 36 **WITH SAMPLE PREPARATION:**

This subclass is indented under the class definition. Subject matter involving preparation or conditioning of an article or substance or a sample of the article or substance to facilitate or enable the later optical test and in combination with such an optical test, wherein the preparation or conditioning is significant and is not provided for in any other class.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, particularly subclass 23 for gas analysis and 53.01+ for the testing of liquid or liq-

- uid suspension of solids, and subclass 421 for samplers and tollers for gases and liquids including closed conduit type samplers.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for analytical control apparatus and apparatus which use sorbents or in which chemical reactions are produced.
- 436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for processes involving analytical control and use of sorbents or chemical reactions.
- 37 Condensation nuclei detector:**  
This subclass is indented under subclass 36. Subject matter wherein moisture or other liquids are deposited on particles to enlarge them or optically modify them (e.g., improve reflection) to facilitate optical study of the particles.
- (1) Note. Generally the apparatus includes pump structure to deliver a gas sample containing particles, expand the sample under a constant volume to obtain a supersaturated condition with respect to the gas, deliver the expanded gas sample to a chamber to optically test the gas with moisture precipitated as a result of the gas expansion on the particles present in the gas, and exhaust the sample from the apparatus.
- (2) Note. The particles examined include ionized particles and molecular types.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 335+, for the determining of the size of particles by optical methods.
- 337+, for particle light scattering generally including the concentration or number of particles by statistical methods.
- 437+, for transmission tests through gases for the determination of the concentration of particles present in the gases generally and visual inspection equipment.
- SEE OR SEARCH CLASS:
- 73, Measuring and Testing, subclass 28 for the determination of the amount of

- solid matter in the analysis of gases generally, subclass 29 for moisture content of gases, and subclass 421 for reciprocating and rotary samplers involving gases and liquids.
- 340, Communications: Electrical, subclasses 227 and 237 for methods and apparatus which may involve the detection of condensation nuclei, per se, or the use of condensation nuclei to detect the dew point of gases.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for analytical apparatus having a condensation nuclei detector.
- 436, Chemistry: Analytical and Immunological Testing, subclasses 1+, for processes involving the testing of condensation nuclei for traces of chemical elements wherein a chemical reaction is precedent to an optical test to determine the presence or amount of the elements present.

- 38 Depositing particles on optical surface:**  
This subclass is indented under subclass 36. Subject matter wherein the means to prepare or condition includes a movable member which serves as a support to receive successively samples of particulate material from a gaseous stream or from a pulverent supply of material, the member supporting the particulate matter for the optical test.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 335, for the determination of the size of particles by optical procedures.
- 337+, for the determination of particle light scattering including polarization effects.
- 429+, for the monitoring of webs generally.
- 438+, for light transmission tests of dust or smoke.
- 625, for the mensuration of substances or articles by light tests generally.

SEE OR SEARCH CLASS:

- 340, Communications: Electrical, subclasses 627+ for the testing of fluent or pulverized material in a gas or liquid wherein an electrical signal is involved.

**39 BLOOD ANALYSIS:**

This subclass is indented under the class definition. Subject matter wherein a specimen of blood or tissue is tested in vitro (i.e., outside the body) for various conditions by means of visible light apparatus, and the blood testing apparatus is not elsewhere classified.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 246, for fluid specimen containers.
- 335+, for the determination of particle size, or particle size and the number of particles for each size when determined by statistical methods.
- 337+, for the determination of the number of particles in a fluid medium by light scattering procedures using statistical methods.
- 441+, for the determination of the number of particles in a fluid medium by light absorption using statistical methods and the determination of turbidity of liquids generally.

SEE OR SEARCH CLASS:

- 377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 10 for particle counters with or without the sizing of the particles counted by arithmetical methods.
- 382, Image Analysis, subclasses 128+, for an image analyzing system designed specifically for, or utilized in microscopic cell analysis or other biomedical applications, where there is significant claim recitation of an image analyzing system and no claim recitation of significant structure to an external art environment.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 44+ for apparatus for testing blood externally of a blooded animal
- 435, Chemistry: Molecular Biology and Microbiology, subclass 2 for processes and compositions for the maintenance of blood (cells) in a physiologically active state or for the in vitro separation or treatment of blood cells; and subclasses 4+ for pro-

cesses measuring or testing involving enzymes or measuring or testing involving enzymes or micro-organisms (e.g., bacteria, protozoa, actinomycetales, cyanobacteria, fungi, animal cells, plant cells, or virus); and subclasses 287+ for claimed or solely disclosed as a Class 435 process.

- 436, Chemistry: Analytical and Immunological Testing, appropriate subclasses for processes and compositions for determining qualitatively or quantitatively the chemical property or composition of a sample and for in vitro antigen-antibody analysis or composition, especially subclasses 66+ for processes or compositions for testing for hemoglobin, myo-globin, or trace blood; subclass 68 for processes or compositions for determining gases in the blood, and subclass 70 for processes and compositions for determining sedimentation rate or hematocrit.
- 600, Surgery, subclasses 310+ for diagnostic medical apparatus which may utilize visible light to test or inspect blood in vivo.

**40 Hemoglobin concentration:**

This subclass is indented under subclass 39. Subject matter which includes visual and photoelectric apparatus to examine the specimen for the percentage of hemoglobin.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 51, for infrared or ultraviolet testing of materials generally where optical methods are utilized.
- 300+, for spectroscopic apparatus.
- 402+, for colorimetric apparatus of the visual and photoelectric type.
- 441+, for liquid turbidity testing generally.
- 445+, for reflective material testing generally.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 53 for testing the settling rate of the liquid suspension of solids.

**41 Oximeters:**

This subclass is indented under subclass 40. Subject matter to determine the percentage of oxyhemoglobin in the specimen which includes a transmissive or reflective optical tests.

SEE OR SEARCH THIS CLASS, SUBCLASS:

42, for standards utilized in a comparison test with a blood sample.

SEE OR SEARCH CLASS:

600, Surgery, subclasses 310+ for diagnostic apparatus and methods including subcombinations, for in vivo, i.e., directly measuring properties of the living body which may include an optical test.

604, Surgery, subclasses 20+ for subject matter relating to administration or removal of material from the body by means responsive to optical diagnostic means.

**42 Standards:**

This subclass is indented under subclass 40. Subject matter wherein there is included generally means to support a light reflective or transmissive standard or a light emissive standard formed as part of the test apparatus whereby the standard is compared simultaneously side by side with the specimen either for equality of shade of color and light intensity or for intensity of light alone.

SEE OR SEARCH THIS CLASS, SUBCLASS:

46, for light standards, per se.

243.1+, for optical standards generally.

403, for the merging of colors or patterns generally.

413, for colorimeters generally of the Duboscq type.

414+, for colorimeters testing colored liquids generally which utilize a solid or liquid transmissive standard, and including standard optical wedges, Nessler tubes and micro-colorimeters.

420, for a colored light source, per se, which may be utilized as standards.

421+, for reflective colored standards which include discs, drums, tapes or plates.

425, for the determination of color generally by light intensity comparison.

SEE OR SEARCH CLASS:

359, Optical: Systems and Elements, subclasses 831+ for prisms which may be used as standards.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, appropriate subclasses, especially subclasses 50+ for laboratory devices or apparatus of quantitative or qualitative analysis involving either a physical or a chemical reaction, not elsewhere provided for.

**43 OPTICAL PYROMETERS:**

This subclass is indented under the class definition. Subject matter for analyzing the light emitted from a body for properties such as intensity or color components as an indication of the temperature of the body.

(1) Note. The body may be heated in turn by another mass which may be either a gas, liquid, or solid; and the purpose here would be to ultimately determine the temperature of such a mass by the determination of its heating effect on the body.

(2) Note. Both temperature devices for metallurgical and photographic use are included herein when the indication is in a unit of temperature.

SEE OR SEARCH THIS CLASS, SUBCLASS:

213, for photometry devices.

300+, for optical test devices which utilize a light dispersing system rather than filters to selectively detect various wavelengths of visible light.

402+, for shade or color optical test devices, and particularly subclass 404 for such test devices involving photography, and subclasses 416+ for such test devices which utilize one or more colored filters.

SEE OR SEARCH CLASS:

219, Electric Heating, subclass 502 for the control of an electric heater by means

- of a light responsive temperature detector.
- 236, Automatic Temperature and Humidity Regulation, subclass 15 for the measurement of the temperature of a furnace for the control of the heating of the furnace.
- 250, Radiant Energy, subclass 226 for radiant energy detectors utilizing filters or dispersing means, and subclass 229 for light modulator detection systems.
- 266, Metallurgical Apparatus, subclasses 78+ and 99+, for metallurgical furnaces combined with temperature determination means.
- 374, Thermal Measuring and Testing, subclass 32 for measuring the total energy emitted from a source; and subclasses 121+ for subject matter similar to that in this subclass where the emitted radiation is not limited to light.
- 44 With sample engaging rod or tube:**  
This subclass is indented under subclass 43. Subject matter wherein there is structure such as a rod or tube to contain and contact a heated solid or fluid or to be immersed into a heated fluid whereby there is a heat exchange from the heated solid or fluid, which causes the structure to emit light or the structure allows the light emitted from a heated solid or fluid to be directly transmitted to a detector which analyzes this light in terms of temperature.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
216, for heat absorbing radiometers of the revolving vane type.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclass 227 for light conducting rods conducting light to a photocell.  
374, Thermal Measuring and Testing, subclass 126 for a rod or tube with a particular radiating surface combined with a radiation thermometer; and subclass 131 for a radiation conducting rod or fiber bundle combined with a radiation thermometer.
- 45 Plural color responsive:**  
This subclass is indented under subclass 43. Subject matter which includes means to selectively detect at least two different bands of visible radiation simultaneously or sequentially from an emission source, and means responsive to the detection means to indicate the color temperature of the emissive source.
- (1) Note. Where the indication of the test is not stated in the claims in terms of temperature, classification is in subclass 404 when photography is involved or in subclass 407 when plural colors are simultaneously tested, or in subclass 408 for sequential comparison tests of a sample and a standard.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
405, for tristimulus test devices.  
406, for shade or color tests involving three colors.  
419, for devices which sequentially utilize plural color filters.
- SEE OR SEARCH CLASS:  
374, Thermal Measuring and Testing, subclass 127, for nonoptical radiation type pyrometers which may be responsive to purals ranges of electromagnetic radiation.
- 46 With incandescent standard:**  
This subclass is indented under subclass 43. Subject matter including a standard incandescent source of radiation together with structure to compare or facilitate the comparison of the unknown light radiation from a hot body or other emissive source with the visible radiation emitted from the incandescent standard.
- (1) Note. Patents claiming electrical circuitry to cause current to flow through electric incandescent lamps which are light standards are placed here, whether the standard lamp is used for a temperature test or a light intensity test.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
218+, for photoelectric photometers.

- 230+, for visual photometers utilizing a light standard.  
 243.1+, for standards generally.

**SEE OR SEARCH CLASS:**

- 313, Electric Lamp and Discharge Devices, subclass 271 for support or spacing structure for incandescent filaments used for light emission, and subclass 315 for incandescent lamps.

**47 Automatic intensity control:**

This subclass is indented under subclass 46. Subject matter which includes means to compare and control automatically the intensity of the illumination of the incandescent standard.

- (1) Note. Systems utilizing radiant energy detectors to balance by means of optical elements the detectors controlled by the intensity of light emitted by plural sources of light are elsewhere. Systems where the intensity of a light source is adjusted by optical means controlled by a radiant energy detector responsive to the light source intensity are also elsewhere classified. See the Search Class notes below.
- (2) Note. A system utilizing a radiant energy detector to control an electrical lamp by electrical means where no significant optical structure is in the path between the light source tested and the radiant energy detector of the system, and no indication relating to the light emitted by the lamp is claimed and the lamp is the ultimate load of the system is elsewhere. See the Search Class notes below.
- (3) Note. The testing of lamps, per se, to determine the lamp characteristics before actual use, including the intensity of light emitted per watt input is classified elsewhere (see the Search Class notes below). However, where the lamp is utilized in a testing environment of use for illumination or where temperature or intensity of light of some unknown source or other optical test is involved which includes a measurement or a sub-combination not elsewhere provided, even though the measurement is of cur-

rent or voltage, classification will be in Class 356.

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

- 130, for refractive tests which utilize a servo-controlled device to adjust the light intensity of a beam of light used in the test.  
 321+, for plural beam absorption spectrophotometers which have structure to adjust the light intensity of one of the beams by automatic means.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclass 204 takes systems utilizing radiant energy detectors to balance by means of optical elements the detectors controlled by the intensity of light emitted by plural sources of light; subclass 205 for systems where the intensity of a light source is adjusted by optical means controlled by a radiant energy detector responsive to the light source intensity. No indicator related to the optical properties of the light included in the claims should be classified there. See also (1) Note above.  
 315, Electric Lamp and Discharge Devices: Systems, subclasses 149+ will take a system utilizing a radiant energy detector to control an electrical lamp by electrical means where no significant optical structure is in the path between the light source tested and the radiant energy detector of the system, and no indication relating to the light emitted by the lamp is claimed and the lamp is the ultimate load of the system. subclass 151 for radiant energy systems responsive to a lamp to control the intensity of light from the lamp by electrical means; also see subclasses 129+. See (2) Note above.  
 318, Electricity: Motive Power Systems, subclasses 18+ for follow-up systems utilizing radiant energy which have as their ultimate purpose the control of an electric motor.  
 324, Electricity: Measuring and Testing, subclasses 403+ will take the testing of lamps, per se, to determine the

lamp characteristics before actual use, including the intensity of light emitted per watt input. See the (3) Note above.

**48 Modulating (e.g., flicker beam):**

This subclass is indented under subclass 46. Subject matter wherein the means to compare or facilitate the comparison of the standard and unknown radiation includes means to modulate mechanically or optically the standard or the unknown radiation.

- (1) Note. The modulated unknown or standard radiation may include portions of other radiation.
- (2) Note. Color discrimination and optical attenuation means may be part of the combination claimed.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 217, for modulation type photometers where temperature is not involved.
- 418, for shade or color tests where color and intensity of light is included and an incandescent standard may be involved but temperature is not involved and modulation of the light takes place.
- 425, for light intensity comparison of shade where temperature is not involved but modulation may be involved.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 232+ for optical modulators or flickering beam photocell circuits of general usage.
- 374, Thermal Measuring and Testing, subclasses 121+ for radiation pyrometers which utilize modulating means.

**49 Telescopic:**

This subclass is indented under subclass 46. Subject matter including a telescope for passing unknown visible radiation and having an objective and ocular lens system, and means to locate, physically or optically, the incandescent standard in the optical path of the lens system so that visible radiation of the standard and the unknown radiation may be viewed simultaneously.

- (1) Note. Herein are those telescopic pyrometers which attenuate the intensity of the light or the color of the unknown source or the standard by optical means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 46, for calibrated light standard systems, per se, used for comparison with unknown visible light for temperature, colorimetry or photometry purposes.
- 230, for photometers which visually compare light intensities by means of an incandescent standard.
- 364+, for tests which utilize polarized light for examination purposes where temperature is not involved.
- 404, for color or shade determination for photographic purposes where color temperature is not involved.
- 416+, for shade or color tests involving optical filters where temperature is not involved.
- 417, for flame detecting photometers not concerned with temperature which utilize color filters rather than dispersing or diffracting elements to separate the radiation into discrete colors.
- 425, for color determination by light intensity comparison where color temperature is not involved.

SEE OR SEARCH CLASS:

- 359, Optical: Systems and Elements, subclass 738 for lens systems having light limiting or controlling means.

**50 Current control:**

This subclass is indented under subclass 49. Subject matter wherein the incandescent standard is an electrically heated filament and means are provided to control the current through the filament.

- (1) Note. These instruments may include optical elements to change the color and intensity of the unknown radiation or the standard radiation.



SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 46, for the electrical circuits, per se, which power the electrical incandescent standard.
- 231, for photometers which utilize an electrical incandescent lamp which includes means to vary filament current.

SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclasses 129+ for electrical circuits supplying current to a lamp, which is not an electrical test standard, which circuit includes an electrical indicator.
- 374, Thermal Measuring and Testing, subclass 129 for radiation pyrometers which include an electrically variable incandescent standard.

**51 INFRARED AND ULTRAVIOLET:**

This subclass is indented under the class definition. Subject matter involving nonvisible radiation such as infrared and ultraviolet radiation not provided for elsewhere.

- (1) Note. The subject matter of this subclass relates to apparatus and methods similar to that provided for in the other subclasses of this class, i.e., subject matter of an optical nature as would be operative with visible radiation. However, in this subclass the operation has been extended to involve the nonvisible spectrum but in an optical manner, such as refraction and reflection in accordance with optical principles, and not provided for elsewhere, e.g., Class 374, subclasses 121+ for radiation thermometers. Class 250, especially in subclasses 336.1+ provides for apparatus with significant nonvisible radiation structure including measuring and testing of invisible radiation. Examples of significant nonvisible radiation structure for classification in Class 250 are a source of invisible radiation such as infrared or ultraviolet, particular material operative only in the invisible radiation range, the application of the measuring or testing to subject matter or specimens responsive only to

invisible radiation to carry out the measurement or test. It is emphasized that as between this Class 356 and Class 250 the general requirements for Class 356 must be also met for classification here. For example, photocell measuring circuits must claim the meter or indicator or the specimen holder for classification here. A lesser combination such as a photocell circuit would be classified in Class 250. See (1) Note under subclass 218.

- (2) Note. Where one claim to measuring and testing uses only visible light in the test and another claim to measuring and testing uses only invisible radiation, the original classification is in Class 356, appropriate subclass and cross-references in Class 250, appropriate subclass.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 336.1+ for methods and apparatus including an electric signalling device for detecting infraviolet radiation and subclasses 472.1+ for nonelectric signalling methods and apparatus responsive to infrared or ultraviolet light. See also the (1) Note to this subclass.
- 374, Thermal Measuring and Testing, subclasses 121+ for the detection of infrared and visible light energy to determine the temperature of a body from which the radiation is thermally emitted.
- 378, X-Ray or Gamma Ray Systems or Devices, appropriate subclasses for measuring and testing using X-rays.

**52 EGG CANDLING:**

This subclass is indented under the class definition. Subject matter which involves light transmission through eggs, which light may be photoelectrically or visually detected to determine the fertility, freshness or other conditions of the eggs.

- (1) Note. Included in this subclass are all hand or bodily held devices used for candling eggs.
- (2) Note. The combination of candling of eggs and the incubation of the eggs is in

Class 119, Animal Husbandry. However the heating of the eggs to perfect a candling operation is in Class 356, subclass 36.

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

432+, for tests involving light transmission tests through translucent and transparent articles.

**SEE OR SEARCH CLASS:**

15, Brushing, Scrubbing, and General Cleaning, subclass 3.11 for machines to clean and sort eggs or screen out dirt from eggs.

53, Package Making, subclass 147 for the group forming of articles and the subsequent packaging of the articles in portable receptacles and subclass 167 for the combination of a visual test of an article and the filling of portable receptacles with the tested articles.

119, Animal Husbandry, subclass 6.8 for methods and apparatus for hatching eggs including the step of candling of eggs, and subclasses 311+ for incubators.

221, Article Dispensing, appropriate subclass for releasing articles one at a time from a supply apparatus.

**53 Photoelectric:**

This subclass is indented under subclass 52. Subject matter which includes a photosensitive detector to receive the light transmitted through the egg, and which may include an optical filter in the visual range to restrict the characteristic of the light transmitted through the egg.

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

36, for sample preparation of the tested egg in addition to the candling step.

51, for infrared, ultraviolet and visible light transmission through the egg.

407, for color tests responsive to plural colors simultaneously.

418, for color tests including rotating filters.

419, for color tests including multicolored filters.

**SEE OR SEARCH CLASS:**

209, Classifying, Separating, and Assorting Solids, subclasses 510+ for automatic egg cdlers and sorters.

250, Radiant Energy, subclasses 336.1+ for egg cdlers utilizing an infrared or ultraviolet responsive electric signalling device.

359, Optical: Systems and Elements, subclasses 350+ for optical elements used in the infrared or ultraviolet portion of the electromagnetic spectrum, and subclasses 885+ for optical filters.

**54 With counting, marking, or weighing:**

This subclass is indented under subclass 52. Subject matter wherein a visual candling apparatus is combined with counting, marking or weighing apparatus which is used in conjunction with the candling operation, when not provided for in any other class.

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

72, for the general combination of a visual optical test and a diverse art device.

**SEE OR SEARCH CLASS:**

101, Printing, subclass 2 for the combination of printing and sorting, subclasses 212+ for rolling contact printing machines and subclass 327 for printing members and inkers.

177, Weighing Scales, subclasses 50+ for the combination of scale with a testing device other than a candling operation and subclass 245 for weighing devices combined with a diverse art device.

209, Classifying, Separating, and Assorting Solids, subclasses 510+ for the combination of visual candling means with an automatic egg weighing and sorting device; and subclass 939 for illuminating means facilitating visual inspection.

235, Registers, subclass 91 for counting of articles mechanically.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits, and Systems Using Pulse Counters, Pulse Divider Systems, subclass 6 for counting articles electrically.

**55 With egg transfer:**

This subclass is indented under subclass 52. Subject matter wherein transporting or conveying means is combined with a visual candling device to move eggs in a predetermined or random manner from one location into, through, or over the visual candling device and beyond the candling device to a second location by the same or a second transfer means.

- (1) Note. The first location may include dispensing means and the second location may include an egg holding container such as a portable receptacle where no provision is made for this combination in another class.
- (2) Note. Egg supply and/or conveying structure may be included to bring eggs to the candling apparatus and receiving apparatus; and additional conveying structure may also be claimed with the candling apparatus where there is no provision for the combination in another class.
- (3) Note. The transfer means may be gravity and motorized conveyors including those of the endless belt and disc type.
- (4) Note. Subcombinations of a photoelectric candling apparatus will be found here when there is no photoelectric circuitry claimed.
- (5) Note. Inverting structure which merely inverts an egg or a group of eggs is not considered to be a transfer apparatus for this group of subclasses unless there is additionally movement of the egg from one location to another. See subclasses 56 and 65 for egg turning or jarring structure.

**56 With egg turning or jarring:**

This subclass is indented under subclass 55. Subject matter wherein structure, which may be hand, motor, or gravity actuated, is included with the egg transfer and candling apparatus to turn or jar the eggs during the candling operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 62, for egg turning and jarring means combined with a light shading candling chamber.
- 65, for egg turning and jarring means combined with a light candling box. Also see (5) Note of subclass 55.

SEE OR SEARCH CLASS:

- 414, Material or Article Handling, subclass 433 for article rotators of the roller type, and subclass 431 for the rotation and a simultaneous advancement of articles which are concurrently engaged at the ends of the articles.

**57 Endless conveyor:**

This subclass is indented under subclass 56. Subject matter wherein there are manually or motor driven endless conveyors which include structure which causes eggs placed sequentially on the conveyor to turn or somehow move while passing through, over, or on the visual candling apparatus.

- (1) Note. Automatic structure to place the eggs on the conveyor from a supply structure and structure to remove the eggs from the conveyor may be included in the claimed combination. See also the Search Notes under subclass 58.

SEE OR SEARCH CLASS:

- 53, Package Making, subclass 167 for the combination of candling, conveying, and the filling of portable receptacles.
- 198, Conveyors: Power-Driven, subclasses 343.1+ and 373+ for an endless conveyor having means for turning or orienting the conveyed load as the conveyor advances, and subclass 631 for an endless conveyor having means to jar the load as the conveyor advances.

**58 Endless conveyor:**

This subclass is indented under subclass 55. Subject matter wherein the transfer means is an endless conveyor of the manually or motor driven type and which includes endless belt and disc type to sequentially bring eggs singu-

larly or in groups, up to, over, or through the candling device; and usually to convey the eggs beyond the candling structure to broad receiving means.

- (1) Note. Inverting structure may be included in the conveying structure.

**SEE OR SEARCH CLASS:**

198, Conveyors: Power-Driven, subclasses 373+, 418+, and 434+ for arranging articles on conveyors including the orienting of articles on or between conveyors; subclasses 606+ for endless conveyors successively conveying a load; subclass 779 for traveling roll type conveyors; and subclasses 688+ and 804+ for endless belt conveyors.

209, Classifying, Separating, and Assorting Solids, subclasses 510+ for egg sorting apparatus; subclasses 702+ for manual sorting apparatus; and subclass 912 for endless feed conveyors having means for holding items separately.

**59 Manual transfer:**

This subclass is indented under subclass 55. Subject matter wherein the transfer means is a hand manipulative support which may contain the eggs in a random or predetermined manner, and which may function separately as a hand held conveyor to move the supported eggs from one location to another and as a complete candling unit with the light source.

- (1) Note. Included herein with the manual transfer supports are the light box candling devices.
- (2) Note. Pivoted egg support trays attached to the candling box for the purpose of inverting the eggs are not considered conveyors and are placed in subclass 64.

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

64, for light candling boxes. See also (2) Note above.

**60 With light shading chamber:**

This subclass is indented under subclass 59. Subject matter wherein the candling device is a light shading chamber, and the hand manipulated transfer device is inserted within the light shading chamber for the candling operation.

- (1) Note. The transfer device may be stationary or manually movable during the candling operation.

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

62, for light shading chambers generally in candling apparatus.

**61 Portable receptacles:**

This subclass is indented under subclass 59. Subject matter including portable receptacles or hand carried trays, per se, which are adapted as by an opening or transparency to pass light to or from the egg and which when used with light box and light shading chamber structure form visual candling devices.

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

244+, for sample, specimen, or standard holders or supports generally.

**SEE OR SEARCH CLASS:**

229, Envelopes, Wrappers, and Paperboard Boxes, subclass 29 for folded blank boxes of the compartment type with a wrapper to completely cover the cells designed to candle or inspect eggs held therein.

294, Handling: Hand and Hoist-Line Implements, subclass 87.12 for multiple egg hand transfer devices with lifters or grapples, and subclass 137 for hand-held article carriers.

**62 With light shading chamber:**

This subclass is indented under subclass 52. Subject matter including an enclosure, adapted to be joined to a light box by an aperture which passes the candling illumination from the box, to darken the viewing field adjacent the eggs.

## SEE OR SEARCH CLASS:

312, Supports: Cabinet Structure, subclass 223.5 for enclosures having illuminating means.

**63 Hood type:**

This subclass is indented under subclass 62. Subject matter wherein the enclosure is a hood which is attached externally to the enclosure to aid in the observation of the candling light.

## SEE OR SEARCH CLASS:

362, Illumination, subclasses 351+ for shades and their supports for preventing the further distribution of light.

**64 With light box:**

This subclass is indented under subclass 52. Subject matter wherein there are enclosures of candling illumination (including natural light directors) which have an aperture or apertures to support or locate exteriorly on the surface of the enclosures an egg or eggs to be candled.

(1) Note. This subclass includes those enclosures which utilize sunlight as the source of candling illumination and which require an additional aperture or apertures on the periphery of the enclosure to allow the illumination transmitted through the egg or eggs to be visually observed exteriorly of the enclosure.

(2) Note. These enclosures include optical elements such as mirrors to direct the illumination radiated through the egg or eggs to the outside of the enclosure through the additional aperture or apertures so that a visual observation can be made.

## SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclasses 564+ for lamp boxes, and subclasses 361+ for transparency viewers.  
211, Supports: Racks, subclasses 14+ for plural egg supports generally.  
248, Supports, subclasses 176+ for article stand type supports where only a singular article is supported and subclass 346 for supporting bases.

**65 With egg turning or jarring:**

This subclass is indented under subclass 64. Subject matter wherein structure is included to move or jar the eggs during the candling operation.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

56, for egg candling with egg transfer including turning or jarring.

## SEE OR SEARCH CLASS:

414, Material or Article Handling, subclass 431 for the rotation and simultaneous advancement of articles which are concurrently engaged at the ends of the articles and subclass 433 for article rotators, roller type.

**66 With particular illumination means:**

This subclass is indented under subclass 64. Subject matter wherein the enclosure internally contains significant illumination means or where the illuminating means is significantly related to the remaining candling structure.

(1) Note. The illumination means may be of the electrical or combustible type which may or may not be of the self contained power type.

## SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 453.11+ for an irradiated object and subclasses 458.1+ for methods and apparatus for irradiating luminescent material generally.

**67 With particular electrical switching:**

This subclass is indented under subclass 66. Subject matter including electrical illumination controlled by a significant electrical switch or switch operating structure to connect the illumination means to a power source, or where the switch and the switch operator are significantly related to the remaining candling structure.

## SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclasses 52+ for switches of special application, particularly subclasses 61.41 and 61.42 where the

motion or presence of an article actuates a mechanical feeler to close an electrical switch and subclass 61.58 for switches actuated concurrently with the operation or use of an art device.

**68 Lamp attachments:**

This subclass is indented under subclass 52. Subject matter including structures attachable to illuminating lamps to convert the illuminating lamps into candling boxes or light shading chambers of the visual type.

- (1) Note. Included are devices to convert portable and other type light sources into egg candling structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 72, for convertible subject matter not classified elsewhere.

SEE OR SEARCH CLASS:

- 313, Electric Lamp and Discharge Devices, subclass 315 for incandescent lamps.  
315, Electric Lamp and Discharge Devices: Systems, particularly subclasses 32+ for incandescent lamps which are structurally combined with a circuit element, and for systems for supplying electrical energy to lamps.  
362, Illumination, subclasses 138+ for inspection lamps, subclasses 157+ for portable electric lamps, and subclasses 257+ for lanterns including light projectors not specifically designed for testing purposes.

**69 CUTTING BLADE SHARPNESS:**

This subclass is indented under the class definition. Subject matter including a light source for shining light on a blade edge together with optical or photoelectric means for determining the reflectivity and thus the sharpness of the blade.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 445+, for reflection testing generally.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 104+ for testing surfaces and cutting edges where not elsewhere classified.  
209, Classifying, Separating, and Assorting Solids, subclasses 511, 524+, 536, and 576+ for testing articles with radiant energy including means to sort the articles.

**70 OIL TESTING (E.G., CONTAMINATION):**

This subclass is indented under the class definition. Subject matter including structure for determining the physical properties of liquid oil by the optical response, such as produced by visible light transmitted through or reflected from the oil.

- (1) Note. The optical response may involve the examination of the oil for color, polarization effects, or for foreign content such as sediment in the oil. Both visual and photoelectric devices are here, and the test may be of oil samples or of oil moving in a closed system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 51, for tests of oil which may involve infrared radiation.  
128+, for refraction test devices which may be applicable for testing of oil.  
364+, for polarization test devices which may be applicable for the testing of oil.  
402+, for color test devices which may be applicable for the testing of oil.  
432+, for transmission test devices particularly for comparison tests, and  
441+, for liquid particle suspension tests.  
445+, for reflection test devices which may be applicable to the testing of oil.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 28 for testing for solid matter entrained in a gas, subclasses 61.41+ for the testing of a liquid for sediment or foreign content where more than a visual or photoelectric test of the color or the amount of visible radiation transmitted through or scattered from the liquid is involved, and subclasses 53.05+

for lubricant testing, subclasses 152.18+ for a fluid analysis in testing a borehole, a casing, or a drill rigging wherein the test is not purely electrical or purely magnetic, in particular subclass 152.42 for determining the relative proportion of fluid constituents by a test which is not purely electrical or purely magnetic.

- 116, Signals and Indicators, subclasses 200+ for visual indicators, per se, where no color or other optical comparison test is involved and for level indicators of the mechanical type.

**71 DOCUMENT PATTERN ANALYSIS OR VERIFICATION:**

This subclass is indented under the class definition. Subject matter for the analysis of intrinsic properties of documents which includes a support for the document to be tested and means to examine and compare visually or to examine photoelectrically the properties of the document by means of visible light for the conformance of any given property with a standard or for the conformance of the pattern or writing generally with a standard pattern or writing as to form or configuration.

- (1) Note. A document for this subclass is a sheetlike article and may be an information document having writing or printing or containing a pattern. A document is, however, excluded from this subclass when any writing, printing, or pattern contained on the document is examined for the information it conveys.
- (2) Note. The analysis of the intrinsic properties of a document by means of radiant energy (nonvisible light), is classified in Class 250, Radiant Energy.
- (3) Note. The analyzing of coded cards, having perforations, magnetic markings and visible markings, one at a time in business machines as well as the cards, per se, are in Class 235, Registers.
- (4) Note. Termatrix Systems (peekaboos) are found in Class 235, Registers, subclass 1; Class 250, Radiant Energy, subclasses 211 and 219. Also see Class 355,

Photocopying, for projectors involving peekaboo systems.

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

- 2, for contour plotting apparatus involving stereoscopic images of topographical maps.
- 389, for mensuration or configuration comparison generally where a photograph is taken of the standard or object to be compared.
- 391, for configuration comparison generally of an article with a standard where light projection is involved.
- 394, for configuration comparison generally of an article with a desired shape.

**SEE OR SEARCH CLASS:**

- 73, Measuring and Testing, subclass 156 for statistical record verifying of punched or marked cards.
- 194, Check-Actuated Control Mechanisms, subclass 207 for the testing of currency for genuineness combined with a check controlled machine.
- 209, Classifying, Separating, and Assorting Solids, subclasses 576+, 603, and 659+ for one or more tests involving documents for length, width, thickness, color, light transmission tests and pattern analysis where a physical separation of a document from other documents is based upon one or more of these tests.
- 235, Registers, subclasses 375+ for systems controlled by a record, subclasses 435+ for the analysis or recognition of a coded document which does not include reading or sensing of alphanumeric characters or pattern recognition.
- 250, Radiant Energy, subclasses 556 and 233 for the light detection of patterns on documents and the light detection units, per se, which involve rotating masks and shutters and subclass 271 for coded record recorders responsive to invisible radiation or invisible radiation modified by the code. See also (4) Note above.

- 340, Communications: Electrical, subclass 146.2 for the comparison electrically of information where not elsewhere classified.
- 382, Image Analysis, subclasses 119+ and 124+ for signature and fingerprint analysis which include information contents.

**72 WITH PLURAL DIVERSE TEST OR ART:**  
This subclass is indented under the class definition. Subject matter wherein the subject matter of this class is combined with the subject matter of another class where not elsewhere provided.

- (1) Note. Included is convertible subject matter involving subject matter of another class not provided for elsewhere which converts an optical test apparatus to a test apparatus of another test class or to another art device.
- (2) Note. Where the subject matter of another class prepares the substance tested for an optical test of this class, see subclass 36.

SEE OR SEARCH THIS CLASS, SUBCLASS:  
68, for structures to convert regular lamps to egg candelers.

**73 PLURAL TEST:**  
This subclass is indented under the class definition. Subject matter which includes optical test apparatus to perform simultaneously or sequentially at least two different optical tests which are both a part of the basic subject matter of this class.

- (1) Note. Two identical optical tests which are part of the subject matter of this class, performed simultaneously or sequentially will be classified here providing each test has its own indicator or manner of determining its test individually rather than both tests collectively operating a single indicator.
- (2) Note. Included here is convertible subject matter which would permit an optical test device which is part of the basic subject matter to be changed into a opti-

cal test device which is also the basic subject matter of this class.

- (3) Note. Light meters which by a change in the galvanometer scale or by addition of a color filter to become a pyrometer or a colored light meter are not considered to be convertible for this subclass. See the section on pyrometers, spectroscopy, or shade or color for proper classification of this subject matter.
- (4) Note. Visual inspection simultaneously or sequentially with a optical test of the class will be classified here.

**73.1 FOR OPTICAL FIBER OR WAVEGUIDE INSPECTION:**

This subclass is indented under the class definition. Subject matter wherein there is means to examine one or more transparent elongated structures (e.g., rods, fibers, or pipes) which are used to transmit light rays from one point to another within the confines of their outer surface, and involving internal reflections or modal transmission.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 384+, for measurement or tests of nonoptical fibers, width or diameter.  
429+, for optical inspection of nonoptical fibers, per se.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 559.01+ for circuits for evaluating a web, strand, or strip; and for detection of defects or flaws in a web, strand, or strip.  
385, Optical Waveguides, appropriate subclasses for optical fibers, per se.

**121 LAMP BEAM DIRECTION OR PATTERN:**

This subclass is indented under the class definition. Subject matter including structure to indicate or otherwise determine the direction the axis of a light beam from a headlight or other light projector; or including structure to determine at selected and fixed points the intensity of a light beam projected from a headlight or other light projector throughout the



space where the light is projected, i.e., the contour pattern of the light beam.

- (1) Note. This class provides for the direct analysis of the beam which is emitted from the light producer, as by determining the direction pattern, or focusing of the beam. Class 33 provides for the mechanical sensing of the direction of a headlight without involving the light beam. However, where the mechanical sensing device involves some optical measuring, classification is in this Class 356. Class 362 provides for lamps where significant lamp structure is claimed in combination with a built-in optical structure. Class 324 provides for testing the electrical operating characteristics of electric lamps alone or in combination with light intensity, direction, pattern, or focusing tests of this Class 356.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3+, for optical range finders in combination with light beam alignment or focusing apparatus.
- 124+, for the testing of a lens or reflective image former where apparatus similar to that used in these subclasses is utilized to determine the quality of the lens or the reflective image former.
- 138+, for determining generally the two dimensional alignment of an axis or line with respect to a plane, and particularly subclasses 141.1+ and 152.1+ for the photoelectric apparatus and subclass 154 for the viewing screen type of apparatus.
- 213+, for photometers generally and particularly subclasses 218 for the photoelectric type, and 229 for the visual comparison type.

SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, appropriate subclasses, particularly subclass 264, for lamp alignment device of the light ray type and subclass 335, for means used in aligning an automobile headlight by establishing its relationship to the horizontal or the vertical.

- 324, Electricity: Measuring and Testing, subclasses 20+ for the combination of optical alignment or focusing test of a lamp with an electrical operating characteristic test of the lamp. See (1) Note above.
- 359, Optical: Systems and Elements, subclasses 443+ for projection screens generally.
- 362, Illumination, subclasses 459+, for significant illumination apparatus for vehicle lighting purposes. Also see (1) Note above.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 4 and 64, for methods and apparatus for the positioning of filaments by optical projection means during the manufacture of lamps and electronic tubes.

#### 122 With lamp focusing:

This subclass is indented under subclass 121. Subject matter including structure to indicate the proper focus of a light source, or the deviation or extent of deviation from proper focus of the light source.

- (1) Note. The proper focus usually exists when the light source is located at the focus of a parabolic reflector or lens. For classification here there must be a distinct disclosure of focusing structure in the specification or claims as opposed to a mere inherent focusing function which is classified in the generic subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 123, for the focusing of a filament with respect to some optical element wherein no light pattern is involved.

SEE OR SEARCH CLASS:

- 362, Illumination, subclasses 285+ for lamps with a built-in sighting device for focusing the filament of the lamp with respect to the optical projection elements of the lamp.

#### 123 FOCAL POSITION OF LIGHT SOURCE:

This subclass is indented under the class definition. Subject matter including structure to establish and determine the proper focal posi-

tion of a concentrated light source with respect to optical elements, such as a parabolic light reflector or a lens; or to indicate the coincidence of a concentrated light source at the focal point of a lens or parabolic reflector; or the deviation from such coincidence.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

122, for head light focusing with direction or pattern determining.

SEE OR SEARCH CLASS:

362, Illumination, subclasses 285+ for lamps with a built-in sighting device for focusing the filament of the lamp with respect to the optical light projection elements of the lamp.

#### 124 LENS OR REFLECTIVE IMAGE FORMER TESTING:

This subclass is indented under the class definition. Subject matter for measuring or otherwise determining the optical properties of a lens or reflective image former.

- (1) Note. Measuring means for establishing lines or points on a lens blank for the purpose of grinding or cutting are not included in this subclass. However, means for determining the optical center or the cylinder axis of a finished lens would be classified here. The former subject matter is classified in Class 33, if the measurement is made mechanically; or in other subclasses of this class particularly subclasses 138+ and 372+, if significant optical features are involved.
- (2) Note. Subject matter for visually inspecting a lens for flaws or imperfections is excluded from this subclass. Such subject matter is classified in subclass 239.
- (3) Note. The subject matter of this subclass involves testing lenses or reflectors having curved surfaces. For flatness testing generally see subclass 371.
- (4) Note. This subclass includes ophthalmic lens testing. However, Class 351 provides for eye testing and examination.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

359, for determining the surface configuration of a lens or reflector by means of light interference.

SEE OR SEARCH CLASS:

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 200+ for instruments for examining eyes or testing vision.

#### 124.5 For optical transfer function:

This subclass is indented under subclass 124. Subject matter including means to determine the ratio of the Fourier spectrum of the lens image to the one of the object.

#### 125 Focal length measuring:

This subclass is indented under subclass 124. Subject matter for measuring the focal length of a lens or reflector.

SEE OR SEARCH CLASS:

359, Optical: Systems and Elements, subclasses 383 and 425+ for focusing means for compound lens systems; and subclasses 676+ and 823+ for lens focusing means.

#### 126 Deflecting or interrupting optical path:

This subclass is indented under subclass 125. Subject matter including means for deflecting or interrupting the optical path between a target and the observer or detector.

#### 127 Optical center, cylinder axis, or prism measuring or determining:

This subclass is indented under subclass 124. Subject matter comprising means for determining the optical center of a lens, the prism or deviation of the optical center from the geometrical center of a lens, or the axis of the cylinder of a lens.

- (1) Note. See (1) Note under subclass 124 with reference to related subject matter.

#### 128 REFRACTION TESTING (E.G., REFRACTOMETERS):

This subclass is indented under the class definition. Subject matter for testing the refraction of a fluid or solid wherein there is generally

means to contain the fluid or support the solid statically or in motion; generally means, which may include a light source and which may be monochromatic light, to cause a diffused or a collimated beam of light to be transmitted through the fluid or solid under test or to be transmitted and reflected internally from the surface of an optically transmissive member contiguous to the fluid or solid under test; and a visual or photoelectric device to note or measure the intensity of the light transmitted through the fluid or solid or the change in angle, direction, or the displacement of the light traversing the fluid or solid as a result of the light being refracted by the fluid or solid tested.

- (1) Note. Comparison tests are included under this and the indented subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 124, for the testing of optical elements such as lenses and prisms, and particularly subclass 127 for prismatic and focal power tests which may include refraction testing.
- 450, for interference tests which may involve the refraction of light.
- 496, for interference tests for determining the thickness of films which may involve refraction test.

SEE OR SEARCH CLASS:

- 359, Optical: Systems and Elements, subclasses 642+ for lenses, and subclasses 831+ for prisms and prism mounts.

### 129 **Schlieren effect:**

This subclass is indented under subclass 128. Subject matter including means blocking the normal light refraction from a fluid or a solid in a fluid, and passing the light bent due to localized changes in the refractive index of the fluid or the solid in a fluid; or including means causing a light pattern to vary as a result of the changes in the refractive index of the fluid or the solid in a fluid.

- (1) Note. The localized changes in the refraction are caused by variations in the density of the fluid caused by the solids in the fluid, temperature changes in the

fluid, or other forces which affect the fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 344, for electrophoresis apparatus which detects a Schlieren pattern.
- 517, for the combination of an interference system with a Schlieren arrangement where a refraction test is involved.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 147 for Schlieren apparatus combined with the testing of objects in wind tunnels.

### 130 **Differential:**

This subclass is indented under subclass 128. Subject matter wherein the support for the testing of substances, usually fluids, includes at least two prismatic containers each containing a similar fluid and each capable of transmitting a collimated beam of light through the container and its contained fluid, the beam of light being transmitted serially through both fluids or passed simultaneously through both fluids.

### 131 **With servo controlled optical member:**

This subclass is indented under subclass 130. Subject matter including an optical member in the path of the light beam, and servo-controlled means responsive to the photoelectric device to control the optical member in response to the light received by the photoelectric device.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 2+ and 93 for processes and apparatus which may control the flow of the fluids handled by means of a refraction test upon the fluid controlled.
- 250, Radiant Energy, subclass 204 for optical elements which are adjusted to balance light brightness in plural paths to a photoelectric servo-system.
- 318, Electricity: Motive Power Systems, subclasses 18+ for motors controlled by servo systems not elsewhere provided, and subclass 480 for motors controlled by radiant energy.

**132 Reflective optical member:**

This subclass is indented under subclass 131. Subject matter wherein the controlled optical member is of the reflective type.

**133 Refractive rod engages specimen:**

This subclass is indented under subclass 128. Subject matter which includes a solid light transmissive member whose periphery touches a fluid under test, which transmits light to the detecting and indicating means, the refractive index of the fluid being directly related to the amount of light received by the detecting and the indicating device.

- (1) Note. The type or refraction test classified herein can be found in Class 73, Measuring and Testing, in subclasses 73 and 705. The difference is that in Class 73 the quantitative meter will register the result of the test in moisture units or pressure units, while in this class (356) the registration is in index of refraction measurements.

**134 Prism forming fluid specimen container:**

This subclass is indented under subclass 128. Subject matter wherein the support or container for the fluid specimen to be tested allows the fluid specimen to assume a prismatic shape for the purpose of testing the specimen for refractive index.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 130, for serially placed fluid prismatic containers wherein the light is serially or simultaneously passed through both fluids.  
246, for fluid containers, per se.

**135 Prism engaging specimen:**

This subclass is indented under subclass 128. Subject matter wherein there is a prism and a solid or fluid medium to be examined for refractive index and forming an interface surface with the prism, this prism being part of the detecting and indicating means, whereby the modification of the light transmitted across or reflected at the interface surface due to the refraction of the medium is shown in the detecting and indicating device.

- (1) Note. Included herein are immersion type refractometers.

SEE OR SEARCH CLASS:

- 203, Distillation: Processes, Separatory, subclass 3 for processes of distilling fluids which may include a refraction test of the fluid.  
359, Optical: Systems and Elements, subclasses 831+ for prisms, per se.

**136 Internally reflecting prism:**

This subclass is indented under subclass 135. Subject matter wherein the visible light used in the test is transmitted through and reflected internally of the prism at its surface forming the interface with the medium tested, and is then passed to the detecting and indicating means.

**137 Plural prisms:**

This subclass is indented under subclass 135. Subject matter wherein there is a second optical member usually a prism associated with the first prism and the fluid or solid medium to be examined, and wherein the light is transmitted through the second optical member to cause the light to be dispersed before it enters the medium and the first prism.

- (1) Note. Included herein are Abbe type refractometers.

**138 ANGLE MEASURING OR ANGULAR AXIAL ALIGNMENT:**

This subclass is indented under the class definition. Subject matter including means to measure an angle by determining the direction of related light; or including means for determining the alignment of two axes by light rays related as by coincidence with such axes.

- (1) Note. Where two objects are laterally aligned by displacing one relative to another and alignment involves no rotation about an axis classification is in subclass 399.  
(2) Note. The axes may be imaginary as, for example, an axis along the length of a vehicle or normal to a surface. Also different parts of a continuous line may be considered as plural axes as, for exam-

ple, in testing the straightness of a rail or a gun barrel.

- (3) Note. Alignment occurs when the two axes form a common axis or are parallel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

399+, for alignment in a lateral direction. See also (1) Note above.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, appropriate subclasses for a light ray type axial alignment device and subclasses 276+, 281, 282+, and 285, for a light ray type angle measuring device, without any significant optical feature.

**139 Plural scales or different portions of same scale simultaneously observable:**

This subclass is indented under subclass 138. Subject matter including means whereby two different angle measuring scales or two different portions of the same angle measuring scale are simultaneously observable.

**139.01 Star/Sun/Satellite position indication with photodetection:**

This subclass is indented under subclass 138. Subject matter including means responsive to light received directly from a star or stars, the sun, or other astronomical objects (including manmade satellites) in order to determine and indicate at least relative angular position with respect to an optical axis of a measuring instrument.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 206.1+ for alternative outputs of measured coordinates that are not displayed, per se, and do not include tracking of the optics; subclasses 203.1+ for tracking of the pre-photodetector system.

**139.02 With reticle or slot:**

This subclass is indented under subclass 139.01. Subject matter including a reticle or aperture slot in an optical path of the photodetector that enables the determination of the angle.

**139.03 Relative attitude indication along three axes with photodetection:**

This subclass is indented under subclass 138. Subject matter wherein the measured angles define and indicate the yaw, pitch, and roll orientation or the like in space of a detected object or of a photodetecting instrument relative to an arbitrarily chosen axis or axes or to geophysical planes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

141.1+, for angle measurement that defines an angle at the detecting station with respect to a beam in terms other than 3 axes of orientation.

152.2+, for angle measurement that defines an angle at the object with respect to a beam in terms other than 3 axes of orientation.

SEE OR SEARCH CLASS:

244, Aeronautics and Astronautics, subclass 171 for attitude sensors that may involve optics.

250, Radiant Energy, subclasses 206.1+ for alternative outputs of measured coordinates that are not displayed, per se.

**139.04 Automatic following or aligning while indicating measurement:**

This subclass is indented under subclass 138. Subject matter including means to maintain an optical axis in register with a movable object or movable photodetecting station, while indicating relative angular position with respect to the optical axis.

(1) Note. For classification in this subclass, there must be claimed some means to indicate angle or relative alignment which is effectively measured as contrasted with Class 250, subclasses 203.1+ where there is no indication required.

(2) Note. The object must be either self-luminous or must reflect ambient light; otherwise, it will be found in subclasses 139.07+.

- (3) Note. Examples of automatic following or aligning found in this subclass, and not below, involve remote missile control, robot control, or table platform alignment of an imaged object with indication of a measurement.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 139.01+, for techniques that may be used in star or sun angle measurements.
- 139.07+, for objects that reflect a unidirectional beam of illumination from which beam angle is determined.
- 139.09+, for techniques that may be used in wheel alignment with photodetection.
- 141.1, for objects that reflect a unidirectional beam of illumination from which an apex of an angle at the detecting station is determined, but where there is no automatic following or aligning.
- 141.2+, for objects that follow or align on a unidirectional beam that is not reflected.
- 152.2+, for objects that reflect a unidirectional beam of illumination from which alignment or the apex of an angle remote from the detecting station is determined and there is no automatic following or aligning.
- 399+, for parallel nonangular alignment of a beam to the detecting station.

SEE OR SEARCH CLASS:

- 244, Aeronautics and Astronautics, subclasses 3.13 and 3.16 for optical angular orientation of a viewed missile with respect to an optical axis.
- 250, Radiant Energy, subclasses 203.1+ for following a self-luminous or remotely illuminated target without any indication of angle or misalignment; subclasses 206.1+ for alternative outputs of measured coordinates that are not displayed, per se.
- 318, Electricity: Motive Power Systems, subclass 640 for photoelectric measuring instrument control of a servo mechanism.
- 398, Optical Communications, subclass 156 for optical communication alignment that does not technically indicate a measurement.

**139.05 With optical elements moving relative to fixed housing to follow or align:**

This subclass is indented under subclass 139.04. Subject matter including optical elements in a housing that reorient the optical axis to follow or align the object independently of the housing.

- (1) Note. Gimballed optical elements which may be in a subhousing that follows or aligns falls within the concept of this subclass.

**139.06 With optical housing moving to follow or align:**

This subclass is indented under subclass 139.04. Subject matter having a housing that contains all of the measuring optics and moves to follow or align the optical axis on the object.

**139.07 With photodetection of reflected beam angle with respect to a unidirectional source beam:**

This subclass is indented under subclass 139.04. Subject matter including a source beam directed along one axis to the object from which its reflected direction, with respect to its projected direction, is indicated and either followed or aligned.

- (1) Note. This subclass may include devices where the reflection plane or the detector apparatus is servoed to follow or align the reflected beam from a fixed source to the detector.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 141.1, for measurement of the apex of the angle made at the detecting station without means to follow or align the received or transmitted beam on the object.
- 152.2+, for measurement of a remote apex angle without means to follow or align the received or transmitted beam on the object.

**139.08 With source beam moving to follow or align:**

This subclass is indented under subclass 139.07. Subject matter under wherein the unidirectional beam moves to follow or align the object.

**139.09 Wheel alignment with photodetection:**

This subclass is indented under subclass 138. Subject matter including apparatus to attach to a wheel or wheels to determine and indicate relative angular direction of their planes of rotation by using photodetection.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 150, for alignment of a wheel running axis which is transverse to the angle of the measuring axis.
- 153, for wheel alignment of subclass 138 without photodetection.

SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, subclasses 203+ and 288 for wheel alignment that does not claim optical detection.
- 250, Radiant Energy, subclasses 206.1+ for alternative outputs of measured coordinates that are not displayed, per se.

**139.1 Photodetection of inclination from level or vertical:**

This subclass is indented under subclass 138. Subject matter that includes the use of photodetection to measure and indicate the angular orientation of a surface with respect to gravity level or vertical reference.

- (1) Note. This subclass includes some reference to gravity level that is used to alter light beam position with respect to a detector to determine and indicate an angle of at least one axis of a plane with respect to level or zenith vertical.

SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, subclass 366.16 for photoelectric detection of attainment of a horizontal level or vertical orientation using a fluid absent significant light modifying structure; subclass 366.23 for photoelectric detection of attainment of a horizontal level or vertical orientation using a solid element absent significant light modifying structure other than gravity responsive structure.
- 250, Radiant Energy, subclasses 206.1+ for alternative outputs of measured

coordinates that are not displayed, per se.

**140 Apex of angle at observing or detecting station:**

This subclass is indented under subclass 138. Subject matter comprising means to furnish a measure of the angle between two optical axes intersecting at a common point at the observing or detecting station and passing through two points remote from this station; or between one such axis and a reference line or plane passing through the station.

- (1) Note. Devices which only determine a level line of sight are classified in subclasses 248+ even though, from one point of view, they might be considered as measuring an angle of zero degrees.

**141.1 With photodetection of reflected beam angle with respect to a unidirectional source beam:**

This subclass is indented under subclass 140. Subject matter including a source beam directed along one axis to an object from which the beam's reflected angular direction with respect to its projected direction is measured and where the apex of the measured angle is at the detecting station.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3.01+, for angle determination during the triangulation of an object's distance.
- 139.01+, for techniques that may be used in star or sun angle measurements.
- 139.09, for techniques that may be used in wheel alignment with photodetection.
- 152.2+, for instances where the apex of the desired angle being measured is not at the detecting station, even though the detecting station apex angle may be involved in some way in the determination.
- 399+, for lateral alignment of a beam that does not follow an angular path to the detecting station.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 201.6 for angle determination during the triangulation of an object; and subclasses 206.1+ for alternative outputs of mea-

- sured coordinates that are not displayed, per se.
- 396, Photography, subclasses 89+ where an angle is determined in the triangulation of an object's distance.

#### 141.2 With photodetection:

This subclass is indented under subclass 140. Subject matter that includes photodetection for measuring and indicating the angle to a luminous object (e.g., beacon, missile, ambiently illuminated object) not found in subclass 141.1 above.

- (1) Note. The luminous radiation from the object is considered to be radial.
- (2) Note. Shaft angle encoding with or without indication claimed or shown is found in Class 250, subclasses 231.13+.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3.01+, for angle determination found in the triangulation of an object's distance.
- 139.01+, for techniques that may be used in star or sun angle measurements.
- 139.03, for measuring attitude characteristics along 3 axes.
- 139.04+, for the same concepts plus automatic following.
- 139.09, for techniques that may be used in wheel alignment with photodetection.
- 139.1, for specifically measuring angle of inclination.
- 152.1, for measuring and indicating any angle other than that at the detecting station.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 231.13+ for shaft angle encoding with or without display; subclass 201.6 for angle determination during the triangulation of an object's distance; subclasses 206.1+ for alternative outputs that do not include any display, per se; subclass 342 for determining the location of an IR (infrared) source that may include angle information.
- 396, Photography, subclasses 89+ for the determination of any angle in the triangulation of an object's distance.

- 398, Optical Communications, subclass 156 for optical communication alignment that does not technically indicate a measurement.

#### 141.3 With unidirectional or planar source beam directed at the photodetecting station:

This subclass is indented under subclass 141.2. Subject matter that includes a unidirectional beam source or a directed plane light source that is remotely located with respect to the observing or detecting station.

- (1) Note. The plane of light may be generated by a scanned beam.

#### 141.4 With optical scanning of light beam or detector:

This subclass is indented under subclass 141.2. Subject matter that includes means for continuously optically moving the photodetecting station field of view to enable the determination and indication of angle apex at the detecting station.

- (1) Note. Subject matter in this subclass does not define a scanning at the source of light.

#### 141.5 With at least two-dimensional sensitivity:

This subclass is indented under subclass 141.2. Subject matter that specifically includes means for measuring at least two spatial coordinates (e.g., x and y coordinates or azimuth and elevation).

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 139.01, for measuring and indicating angle (e.g., declination and hour angle to the sun, stars, or other astronomical objects).
- 139.03, for measuring and indicating yaw, pitch, and roll relative to an arbitrarily chosen axis or to geophysical planes.

#### 142 Scale and remote point simultaneously observable:

This subclass is indented under subclass 140. Subject matter including means whereby the angle measuring scale and the remote target point are simultaneously observable.



- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
139, for means for simultaneously observing plural scales or different portions of the same scale.
- 143 Artificial reference:**  
This subclass is indented under subclass 142. Subject matter including, for the purpose of establishing a reference line or plane from which the angle can be measured, means which tends to maintain its orientation in space irrespective of changes in the orientation of the supporting structure for this means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
148, for angle measuring means in general combined with artificial reference determining means.  
248, for artificial reference determining means in general combined with optical features.
- 144 With plural images:**  
This subclass is indented under subclass 140. Subject matter including means whereby an observer sees plural images of subject matter remote from the observer.
- (1) Note. The images can, for example, be displaced images of the same subject matter or they can be superimposed images of different subject matter such as the horizon and a star.
- 145 Lines of sight relatively adjustable with two degrees of freedom:**  
This subclass is indented under subclass 144. Subject matter where plural lines of sight are adjustable relative to each other with two degrees of freedom.
- 146 Two or more lines of sight deflected:**  
This subclass is indented under subclass 144. Subject matter wherein the lines of sight from at least two objects are each deflected in the viewing instrument.
- 147 Measurement in two planes (e.g., azimuth and elevation; hour angle and declination):**  
This subclass is indented under subclass 140. Subject matter where angles are measured in two different planes.
- 148 Artificial reference:**  
This subclass is indented under subclass 140. Subject matter including, for the purpose of establishing a reference line or plane from which the angle can be measured, means which tends to maintain its orientation in space irrespective of changes in the orientation of the supporting structure for this means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
143, for similar subject matter where a scale and a remote point are simultaneously observable.  
248+, for artificial reference determining means in general combined with optical features.
- 149 Gyroscope or pendulum stabilized optical element:**  
This subclass is indented under subclass 148. Subject matter where an optical element or reticle is stabilized by a gyroscope or pendulum.
- SEE OR SEARCH CLASS:  
74, Machine Element or Mechanism, subclasses 5+ for gyroscopes, per se.
- 150 Sides of angle or axes being aligned transverse to optical axis (e.g., drift meter):**  
This subclass is indented under subclass 138. Subject matter where the axes being aligned or lines determining the angle being measured lie in a plane transverse to the optical axis of the measuring or aligning device.
- (1) Note. One of the lines or axes may be the line generated as the result of the relative motion of a vehicle and an object as, for example, in a drift meter.
- 151 With light pulsing or interrupting means:**  
This subclass is indented under subclass 150. Subject matter including means whereby pulses are produced by alternately interrupting and transmitting a light beam.

**152.1 With photodetection remote from measured angle:**

This subclass is indented under subclass 138. Subject matter including photodetection and indication of the apex of an angle or the degree of angular misalignment formed at a location other than at a detecting station.

- (1) Note. This subclass would include the degree of misalignment or measure with respect to a given axis of the remote angle of a remote self-luminous source, not found in subclasses 152.2 and 152.3, where the angle apex is not at the detecting station and where there is no automatic following or alignment.
- (2) Note. This subclass may include angles at a detecting station which facilitate the measurement of a different remote angle such as in the triangulation of beams or look angles converging on a target.
- (3) Note. This subclass does not include shaft angle encoding found elsewhere (see search notes below).

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3.01+, for angle determination found in the triangulation of an object's distance.  
 139.01+, for techniques that may be used in star or sun angle measurements.  
 139.03, for attitude determination along 3 axes.  
 139.09, for techniques that may be used in wheel alignment with photodetection.  
 139.1, for angular inclination, per se.  
 399+, for parallel alignment of a beam to the detecting station.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 231.13+ for shaft angle encoding with or without display; subclass 201.6 for angle determination during the triangulation of an object's distance.  
 396, Photography, subclasses 89+ for the determination of any angle in the triangulation of an object's distance.

- 398, Optical Communications, subclass 156 for optical communication alignment that does not technically indicate a measurement.

**152.2 With reflection of a unidirectional source beam from a planar or nonretroreflective surface:**

This subclass is indented under subclass 152.1. Subject matter including a planar, spherical, etc., reflecting surface at a remote object from which a source beam directed along one axis will reflect at different angles to be measured along at least one plane.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 139.03, for attitude in yaw, pitch, and roll of either a remote planar reflector or the detecting station.  
 139.07+, for the same plus automatic following or aligning while indicating the angle or misalignment.  
 141.1, for apex of angles strictly at the detecting station and where there is no automatic following or alignment.

**152.3 With reflection of a unidirectional source beam from a retroreflector:**

This subclass is indented under subclass 152.1. Subject matter including a reflective surface at a remote object from which a source beam directed along one axis reflects back to a source and photodetecting station colinearly or in parallel with respect to the source direction.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 139.03, for attitude in yaw, pitch, and roll of either a remote planar reflector or the detecting station.  
 139.07+, for the same plus automatic following or aligning while indicating the angle or misalignment.  
 141.1, for apex of angle strictly at the detecting station and where there is no automatic following or alignment.

**153 Alignment of axes nominally coaxial:**

This subclass is indented under subclass 138. Subject matter for aligning or testing the alignment of two axes where the axes in their aligned position are coaxial or form different

parts of a continuous straight line lying in a surface.

- (1) Note. This subclass includes, for example, optical means for testing the straightness of items such as rails or gun bores and the aligning of the optical axis of a lens with the mechanical axis of a tube.

**154 With screen:**

This subclass is indented under subclass 138. Subject matter including a viewing screen or surface upon which an image or spot of light may be projected.

SEE OR SEARCH CLASS:

- 353, Optics: Image Projectors, for projectors generally.  
359, Optical: Systems and Elements, subclasses 443+ for projection screens, per se.

**155 Wheel alignment:**

This subclass is indented under subclass 154. Subject matter including means for aligning the wheels of a vehicle.

- (1) Note. The term "alignment" as used in this subclass denotes the determination of the relationship between the axes of rotation of wheels, or the relationship between such rotation axes and some vehicle axis.

**213 PHOTOMETERS:**

This subclass is indented under the class definition. Subject matter for determining the intensity or quantity of light emanating from a particular location or direction.

- (1) Note. This and the indented subclasses provide for both the photocell type and the visual type of photometers, the visual type being where the eye makes the detection as opposed to the automatic detection of the photocell in this photocell type. The light whose intensity is to be determined may be natural light such as the sun or moon or artificial sources such as light bulbs or gas lamps. This and the indented subclasses provide for actinometers, per se, but actinometers

with camera structure are provided for elsewhere.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 43, for optical pyrometers where the intensity of emitted light is correlated to temperature of the substance emitting the light.  
51, for measuring the intensity of invisible radiation involving only optical principles and no significant invisible radiation structure. See also (1) Note.  
432+, for measuring the intensity of the light transmitted through substances.  
445+, for measuring the intensity of the reflected light from substances.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 336.1+ for methods and apparatus including electric signalling devices to detect or measure invisible radiant energy and subclasses 472.1+ for methods of nonelectric detection of radiant energy and invisible radiant energy responsive nonelectric signalling devices.  
324, Electricity: Measuring and Testing, subclasses 403+ for measuring and testing the electrical operating characteristics of electric lamps with or without optical measuring or testing.  
342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 417+ for direction finding radio receivers which detect the intensity and direction of beams of electromagnetic radiation.  
374, Thermal Measuring and Testing, subclass 32 for thermal measurement of the power or energy emitted from a radiation emissive source; and subclasses 121+ for radiation type thermometers.  
396, Photography, subclasses 213+ for actinometers combined with cameras. See (1) Note above.

**214 Pupillary:**

This subclass is indented under subclass 213. Subject matter wherein the light to be measured falls on the pupil of an observer to con-

trol the size of the pupil as by contraction or dilation of the iris, together with means to permit the observer to see his pupil and to compare or measure the size or tangent of the pupil as the light to be measured falls thereon.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

372+, for structure to measure articles for some type of dimensional size.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, for devices which visually measure by means of scales or standards or markings a linear dimensional size.

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 205+ for objective eye testing instruments.

### 215 **Integrating:**

This subclass is indented under subclass 213. Subject matter including structure for determining the quantity of light as by integrating the intensity of the light against time.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

236, for integrating spheres.

### 216 **Heat absorbing (e.g., radiometers):**

This subclass is indented under subclass 213. Subject matter including a movable mechanical element having areas or volumes of different heat absorbing characteristic, the element being moved by the infringing radiation producing a temperature differential in the respective areas or volumes, as by the gas adjacent the warmer area or volume producing greater pressure thereon.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 472.1+ for invisible radiation responsive non-electric signalling devices.

340, Communications: Electrical, subclasses 189+ where this phenomenon is used to transmit signals such as messages; subclasses 540+ to note conditions other than measurement of the intensity of light, particularly subclass 592.

374, Thermal Measuring and Testing, subclasses 121+ for radiometer type devices for measuring the temperature of hot bodies by measuring the heat radiation therefrom.

### 217 **Modulating (e.g., flicker beam):**

This subclass is indented under subclass 213. Subject matter including structure for modifying the intensity or frequency of the input light or electric current responsive to the light, as by interrupting the current or chopping the light.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

23, for stroboscopes.

48, for incandescent standard type optical pyrometers which use modulated light.

126, for lens or reflective image testing devices which use light modulators in focal length measurements.

151, for angle sides or axes alignment transverse to an optical axis type device which utilizes light modulators.

319+, for plural beam spectrophotometers which interrupt the light mechanically, electrically, or electro-optically.

322, for flicker beam absorption spectrophotometers.

323+, for modulation type spectrophotometers.

387, for width or diameter of threads or web type measuring devices with light modulators.

418, for light modulating type colorimeters.

447, for light reflection from material which involves light modulation.

SEE OR SEARCH CLASS:

332, Modulators, for electrical current modulators.

359, Optical: Systems and Elements, subclasses 227+ for light controlled by an opaque element or medium movable in or through the light path.

### 218 **Photoelectric:**

This subclass is indented under subclass 213. Subject matter including a light responsive device which may be photo-resistive or photo-voltaic together with an electrical meter or

other electrical indicating device electrically coupled to the light responsive device to indicate quantitatively the change produced by light infringing on the light responsive device.

- (1) Note. This subclass provides for the combination of the photocell, electrical coupling between the photocell and meter, and the meter. Class 250, Radiant Energy, subclasses 206+ provides for photocells and their controlled circuits, and subclasses 216+ for photocells together with optical systems. Class 324, Electricity: Measuring and Testing, especially subclasses 92 through 157 provides for galvanometer type meters with or without associated circuitry. Class 340, Communications: Electrical, subclass 600 provides for radiant energy indicators of the presence or absence type as opposed to the quantitative values furnished by the patents in this subclass 218. Class 116, Signals and Indicators, subclasses 284+ provides for rotary indicators generally, and subclasses 327+ for pointers and indicator arms.

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

- 52+, for photoelectric egg cinders.  
 124+, for optical element or device testing of the photoelectric type.  
 139.01+, for devices measuring the angle with respect to a remote point having specified applications with photodetection.  
 141.1+, for devices measuring the apex of an angle at a photodetection station with respect to a remote point.  
 152.1+, for devices measuring the apex of an angle at a point remote from a photodetection station.  
 237.1+, for photoelectric flaw detection.  
 364+, for polarization testing devices of the photosensitive type.  
 402+, for colorimeters of the photoelectric type.  
 432+, for photoelectric devices testing light transmission through substances.  
 445+, for photoelectric devices testing light reflection from surfaces.  
 625, for photoelectric mensuration or configuration comparison devices.

**SEE OR SEARCH CLASS:**

- 116, Signals and Indicators, see (1) Note above.  
 136, Batteries: Thermoelectric and Photoelectric, subclasses 243+ for photoelectric type primary batteries.  
 250, Radiant Energy, see (1) Note above.  
 313, Electric Lamp and Discharge Devices, subclasses 94+ for photosensitive devices, and subclasses 103+ for photosensitive devices having secondary emitters.  
 324, Electricity: Measuring and Testing, subclasses 96+ for photometers to determine electric quantities. See (1) Note above.  
 340, Communications: Electrical, see (1) Note above.

**219 Simultaneous sighting and reading measurement:**

This subclass is indented under subclass 218. Subject matter wherein there is structure to provide a field of view toward the area whose light intensity is to be determined and wherein the indications of the meter are presented in this field of view, to permit simultaneous sighting of the view and reading of the meter.

- (1) Note. The photometers classified here are essentially view finders with the meter scale and indicator in the optical path of the view finder.

**SEE OR SEARCH CLASS:**

- 396, Photography, subclasses 213+ for actinometers which include viewfinders, and subclasses 373+ for viewfinders.

**220 Multiple housings:**

This subclass is indented under subclass 218. Subject matter wherein the detector and the meter or indicator are placed in separate housings.

- (1) Note. The housings may be mechanically or electrically connected as by a hinge or separable electrical connector respectively.

**221 Responsive to incident or back lighting:**

This subclass is indented under subclass 218. Subject matter wherein optical structure is associated with the light responsive device to collect light coming from a direction other than that reflected from the viewed object.

- (1) Note. The optical structure is usually either a hemispherical light diffusing member or a reflector.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

225+, for photocell type photometers with light modifiers.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 216+ for photocell circuits with pre-photocell or optical devices.

**222 Plural detectors:**

This subclass is indented under subclass 218. Subject matter including a plurality of light responsive devices.

- (1) Note. The detectors may be simultaneously or selectively operable.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

221, for photometers having plural detectors responsive to incident or diffused back lighting.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 208.1+ for photocell circuits which include plural photocells, and subclass 578 for optical or pre-photocell systems with plural photosensitive elements.

**223 Logarithmic:**

This subclass is indented under subclass 218. Subject matter wherein the readings of the meter or indicator bear a logarithmic relation to the variations of the light sensed by the light responsive device.

- (1) Note. The logarithmic relationship may be obtained by a logarithmic amplification or attenuation of the electrical coupling between the detector and indicator,

or by a logarithmic variation in the magnetic circuit of the galvanometer indicator.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

224, for multi-sensitivity range photometers.

**224 Multisensitivity range:**

This subclass is indented under subclass 218. Subject matter including an optical element which is adjustable or removable to selectively vary the light transmission to the light responsive device or including an adjustable resistance in the electrical coupling between the device and the meter or indicator to absorb a portion of the energy otherwise passing to the meter or indicating device to provide selective sensitivity and thus a plurality of operating meter or indicator ranges.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

226, for electrical circuitry coupling the detector and indicator.

228, for photoelectric type photometers with movable scales.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclass 115 for electrical meters with plural ranges.

**225 With predetector light modifier (e.g., diaphragm):**

This subclass is indented under subclass 218. Subject matter including an optical element such as a lens, shutter, diaphragm, or mirror in the light path to the light responsive device to modify the light coming to the device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

221, for photoelectric type detectors with optical structure rendering the detectors responsive to incident or back lighting.

224, for multi-range photometers whose sensitivity is controlled by an adjustable optical element in the detector light path.

233, for visual type photometers with variable light apertures.

432+, for testing the light transmission properties of materials.

**SEE OR SEARCH CLASS:**

250, Radiant Energy, subclasses 216+ for photocells with pre-photocell optical elements.

359, Optical: Systems and Elements, subclasses 483+ for light polarization devices, subclasses 558+ for light diffraction elements, subclass 615 for light dispersion elements, subclasses 642+ for lenses, subclasses 227+ for light control by opaque elements movable in a light path, subclass 831 for prisms, subclasses 838+ for light reflectors, subclasses 885+ for light filters, and subclasses 894+ for optical apertures and tubes.

385, Optical Waveguides, appropriate subclasses for fiber optics, per se.

**226 Detector and indicator electrical coupling (e.g., amplifying or attenuating):**

This subclass is indented under subclass 218. Subject matter including some details of the electrical coupling or connection between the light responsive device and the meter or indicating device.

(1) Note. Examples of such coupling or connection are amplifiers, attenuators, and electrical connectors.

**SEE OR SEARCH CLASS:**

340, Communications: Electrical, subclass 600 for electrical signalling systems, generally, which are responsive to light, such as vision tones to aid the blind.

**227 With particular indicator:**

This subclass is indented under subclass 218. Subject matter including significant indicating device structure such as scales and pointers or such indicating structure bearing a particular structural relationship with the light responsive device.

(1) Note. The patents here are often directed to placing the light responsive device and the meter or indicator in particular related positions in the housing as to provide a compact arrangement.

**SEE OR SEARCH CLASS:**

116, Signals and Indicators, subclasses 200+, for indicators generally, and especially subclasses 284+ for rotary indicators and subclasses 327+ for pointers and indicator arms.

235, Registers, subclass 64.7 for photographic calculators.

324, Electricity: Measuring and Testing, subclasses 76.11+ for galvanometer type meters, and especially subclasses 151+ for such meters with permanent magnets.

**228 Movable scale (e.g., calibrating):**

This subclass is indented under subclass 227. Subject matter wherein a scale of the meter or indicating device is movable or adjustable as for calculating purposes.

**SEE OR SEARCH CLASS:**

235, Registers, subclass 64.7 for photographic calculators.

**229 Comparison:**

This subclass is indented under subclass 213. Subject matter including two optical paths, there being an optical element having known light absorbing properties in one of the paths or there being a light source in one of the optical paths having a known illumination characteristic (which may be dependent on the position of the light source), together with structure to facilitate comparison of the light in the two paths.

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

222, for photocell type photometers with plural photodetectors involving comparison.

402+, for comparison type colorimeters.

**230 With light standard:**

This subclass is indented under subclass 229. Subject matter including a source of light which constitutes a standard (known intensity) with which the light whose intensity is to be determined is compared.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 46, for variable light standards whether the standard is used for temperature or light intensity tests.  
243, for optical testing standards generally.

SEE OR SEARCH CLASS:

- 324, Electricity: Measuring and Testing, subclasses 403+ for lamp testing as where the efficiency of the electrical to light conversion of the lamp is determined. However, this Class 356 provides for the mere measurement of the radiation intensity from the lamp.

**231 Variable incandescent standard:**

This subclass is indented under subclass 230. Subject matter wherein the light standard is of the incandescent type and wherein the incandescence may be varied as by a variable resistance in series with the power supply to the filaments of the incandescent lamp.

- (1) Note. In this subclass the lamp is usually adjusted to proper incandescence and the light intensity determined from a scale reading of the variable resistance.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 46+, for an optical pyrometer with an electrically variable incandescent standard.

**232 Standard movable:**

This subclass is indented under subclass 230. Subject matter wherein the light standard is movable with reference to the comparison structure which includes a comparison partition or screen, or with reference to the sample to modify the intensity of the effective illumination from the light standard.

- (1) Note. A scale is usually associated with the movable light standard to provide a measure of the illumination.

**233 With variable light aperture size:**

This subclass is indented under subclass 213. Subject matter including an aperture in the optical path whose aperture size may be controlled to vary the illumination passing there-

through from a location whose light intensity is to be determined or including a plurality of apertures of different sizes one of which may be selected to pass a predetermined quantity of light, the purpose in both cases being to reduce the visible illumination to render the viewed object or indicia markings barely visible.

- (1) Note. The subject matter classified here may include scales for indicating the illumination intensity for general illumination purposes or for photographic purposes. The photometers classified here are of the visual type in the sense that the eye itself is the detector.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 43+, for optical pyrometers of the visual type.

SEE OR SEARCH CLASS:

- 235, Registers, subclass 64.7 for photographic calculators.  
352, Optics: Motion Pictures, subclass 139 for visual photometers combined with motion picture cameras.  
396, Photography, subclasses 213+ for visual photometers combined with cameras.

**234 Light absorbing:**

This subclass is indented under subclass 213. Subject matter including an optical light attenuating member or members in the optical path which is illuminated from a location whose light intensity is to be determined, the members being adjustable or selectively placed in the optical path to control the illumination reaching the eye, the purpose being in both cases to reduce the visible illumination to render the viewed object or indicia markings barely visible.

- (1) Note. See also (1) Note and the Search Notes under subclass 233 above.

SEE OR SEARCH CLASS:

- 359, Optical: Systems and Elements, subclass 888 for neutral density filters, subclass 889 for filters movable in or out of the optical path, subclass 890 for filters superposed in series, and



subclass 891 for filters in optical parallel.

**235 Absorber continuously variable (e.g., wedge):**

This subclass is indented under subclass 234. Subject matter wherein the optical light attenuating member has a variable light attenuating characteristic in a physical direction along the member to permit variation in the light passing through the member by movement of the member through the optical path.

**SEE OR SEARCH CLASS:**

359, Optical: Systems and Elements, subclass 888 for optical wedges.

**236 Integrating spheres:**

This subclass is indented under subclass 213. Subject matter including a hollow body of spherical interior and having an interior surface of highly reflecting and also diffusing material and having relatively small openings in the shell of the body to admit light for the purpose of raising the interior illumination to a level which depends only upon the amount of light entering the openings and not upon the reflection or diffusion of the incident light flux.

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

215, for photometers which integrate the light intensity in general and usually with respect to time.  
432+, for transmission testing devices which may include integrating spheres.  
445+, for reflection testing which may include integrating spheres.

**SEE OR SEARCH CLASS:**

250, Radiant Energy, subclass 228 for integrating spheres with photocells.  
324, Electricity: Measuring and Testing, subclasses 403+ for electric lamp testing including the electric operating characteristics and which may include an integrating sphere.

**237.1 INSPECTION OF FLAWS OR IMPURITIES:**

This subclass is indented under the class definition. Subject matter wherein the presence of an imperfection, or foreign substance is deter-

mined using light reflected from or passing through a viewed specimen.

(1) Note. Art residing in this subclass may include nominally claimed conveyors to support and transport the specimen being inspected. For details to a conveyor, see SEARCH CLASS below.

(2) Note. This subclass provides for the inspection of flaws, imperfections, and impurities having a human perceivable output. See SEARCH CLASS below.

(3) Note. This subclass provides for the inspection of flaws, imperfections, and impurities. See SEARCH CLASS below.

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

426+, for flaw or imperfection inspection with agitation or rotation of the inspected material.  
432+, for determining the light transmission properties of materials.  
445+, for determining the specular and diffuse light reflecting properties of materials.

**SEE OR SEARCH CLASS:**

198, Conveyors: Power-Driven, for power conveyors, per se, used in the transportation of material or articles past and beyond an optical test point of the visual or photosensitive type.  
209, Classifying, Separating, and Assorting Solids, subclasses 702+ which for the visual inspection of material or articles with structure to facilitate a physical separation of the articles or materials based upon physical differences of appearance.  
250, Radiant Energy, particularly subclasses 200+ provide for photocells and associated circuitry with optical structure which may include measuring and testing and subclasses 559.01+ for a photocell responsive to light from a material having a cross-sectional dimension which is small compared to length, and through additional structure (i.e., a circuit) produces an electrical or mechanical output indicative of some characteris-

tic of the material. See also (2) Note above.

- 324, Electricity: Measuring and Testing, subclasses 216+ for flaw testing involving magnetization, as with magnetized iron filings where the arrangement of the filings is viewed optically.
- 353, Optics: Image Projectors, for appropriate subclass for the projection of an image for viewing.
- 359, Optical: Systems and Elements, for subject matter for the general viewing of an object. subclasses 385+ for microscopes with viewed object illumination, and 798+ for lenses with viewed object or viewed field illumination. See (3) Note above.
- 362, Illumination, subclasses 138+ for inspection lamps.
- 414, Material or Article Handling, subclasses 134+ for manually controlled selective delivery systems which involve visual inspection of articles or sheet type material.

### 237.2 Surface condition:

This subclass is indented under subclass 237.1. Inspection of imperfections or impurities wherein the exterior or interior veneer of an article is examined.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 239.7, for the inspection of the surface condition of a transparent or translucent specimen.
- 243.4, for surface condition standards.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 559.4+ for circuitry responsive to a photocell, and wherein the photocell is arranged relative to the material so that the circuit provides an output indicating the presence or absence of the material or some indicia on the material in some predefined location.

### 237.3 Detection of object or particle on surface:

This subclass is indented under subclass 237.2. Inspection of surface condition wherein an article is examined for the existence of a contaminant residing on the veneer of the article.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 238.3, for the detection of foreign particles on or within a textile product.
- 239.5, for the detection of an object or particle in or on a transparent container.
- 239.8, for the detection of a foreign particle or object on the surface of a transparent article.
- 243.6, for a foreign object standard.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 559.41 for a photocell with associated circuitry capable of identifying the presence of a foreign substance on or embedded in a material from variations in a detected light signal.

### 237.4 On patterned or topographical surface (e.g., wafer, mask, circuit board):

This subclass is indented under subclass 237.3. Detection of an object or particle wherein the inspected article further includes a motif or raised three dimensional configuration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 237.5, for the inspection of a topographical surface.
- 243.7, for a standard for a surface further comprising texture.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 559.44 for a photocell having a circuit producing an output indicating the presence or absence of a marking, pattern, or indicia on the surface of the material.

### 237.5 On patterned or topographical surface (e.g., wafer, mask, circuit board):

This subclass is indented under subclass 237.2. Inspection of surface condition wherein the inspected article further includes a motif or raised three dimensional configuration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 243.7, for a standard for a surface further comprising texture.

## SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 559.44 for a photocell having a circuit producing an output indicating the presence or absence of a marking, pattern, or indicia on the surface of the material.

**237.6 Having predetermined light transmission regions (e.g., holes, aperture, multiple material articles):**

This subclass is indented under subclass 237.1. Inspection of surface condition wherein the inspected article further comprises a design feature, characteristic, or area permitting the transmission of light.

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

241.1, for the inspection of the interior of a hole or passage.

**238.1 Textile inspection:**

This subclass is indented under subclass 237.1. Inspection of imperfections or impurities wherein the specimen being viewed is a fiber or yarn for weaving or knitting into fabric or a woven or knitted fabric.

- (1) Note. This class provides for subject matter with detailed optical structure of the inspection of a textile specimen. See SEARCH CLASS below.

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

243.1, for thread counters.  
432+, for measuring the light transmission or absorption of material.

## SEE OR SEARCH CLASS:

26, Textiles: Cloth Finishing, for the nominal recitation of a device or process of cloth examination or inspection. subclass 70 for inspection and examination of cloth.  
73, Measuring and Testing, subclass 159 for fabric testing other than mere inspection or visual examination.  
223, Apparel Apparatus, subclass 39 for movable supports for garments combined with illumination to facilitate the visual inspection of the supported garment.

**238.2 Elongated textile product (e.g., thread, yarn, etc.):**

This subclass is indented under subclass 238.1. Textile inspection wherein the specimen being examined is fibrous.

**238.3 Detection of foreign material (e.g., trash, splinters, contaminants, etc.):**

This subclass is indented under subclass 238.1. Textile inspection designed specifically to detect the presence or absence of an uncharacteristic substance on or within the specimen.

- (2) Note. This subclass provides generally for detection of localized foreign particles or dirt.

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

239.5, for the detection of an object on or in a transparent or translucent container.  
239.8, for the detection of foreign matter on the surface of a transparent or translucent article  
432+, for the testing of materials where the particles are uniformly distributed through the material.

## SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 559.41 for a photocell with associated circuitry capable of identifying the presence of a foreign substance on or embedded in a material from variations in a detected light signal.

**239.1 Transparent or translucent material:**

This subclass is indented under subclass 237.1. Inspection of imperfections or impurities wherein the material being inspected allows the transmittance of light.

- (1) Note. For classification here the light must pass completely through the material and be viewed on the issuing side. Mere internal reflecting within the material is not sufficient for classification here.

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

73.1, for the optical inspection of an optical fiber or waveguide.

432+, for measuring light transmission through a material.

SEE OR SEARCH CLASS:

108, Horizontally Supported Planar Surfaces, subclass 23, for illuminated viewing tables.

**239.2 Optical element (e.g., contact lens, prism, filter, lens, etc.):**

This subclass is indented under subclass 239.1. Inspection of transparent or translucent material specifically designed to manipulate or alter light to achieve a particular result.

SEE OR SEARCH CLASS:

359, Optical: Systems and Elements, appropriate subclass for an optical element or system per se.

**239.3 Patterned surface:**

This subclass is indented under subclass 239.1. Inspection of transparent or translucent material further comprising an applied design or three dimensional configuration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

237.4, for the detection of a foreign particle or object on a patterned surface.

237.5, for the inspection of a patterned surface.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 559.44 for a photocell having a circuit producing an output indicating the presence or absence of a marking, pattern, or indicia on the surface of the material.

**239.4 Containers (e.g., bottles):**

This subclass is indented under subclass 239.1. Inspection of transparent or translucent material wherein the inspected object is a receptacle.

(1) Note. The most common subject matter here is bottle testing devices.

SEE OR SEARCH THIS CLASS, SUBCLASS:

239.6, for examination of container contents.

240.1, for the inspection of an opaque container.

**239.5 Detection of foreign matter on or in container:**

This subclass is indented under subclass 239.4. Transparent or translucent container further comprising a means for sensing undesired matter contained in or residing on the examined article.

SEE OR SEARCH THIS CLASS, SUBCLASS:

240.1, for the inspection of an opaque container.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 559.41 for a photocell with associated circuitry capable of identifying the presence of a foreign substance on or embedded in a material from variations in a detected light signal.

**239.6 Of container contents:**

This subclass is indented under subclass 239.4. Inspection of transparent or translucent container wherein the specimen being detected or examined is an article or substance confined within the transparent or translucent container.

**239.7 Surface condition:**

This subclass is indented under subclass 239.1. Inspection of transparent or translucent material wherein the specimen being detected is an exterior or an interior veneer of the container.

SEE OR SEARCH THIS CLASS, SUBCLASS:

237.2, for the inspection of a surface condition.

243.4, for a surface condition standard.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 559.4+ for circuitry responsive to a photocell, and wherein the photocell is arranged relative to the material so that the circuit provides an output indicating the presence or absence of the material or some indicia on the material in some predefined location.

**239.8 Detection of an object or particle on surface:**

This subclass is indented under subclass 239.7. Inspection of surface condition wherein the specimen being detected is a contaminant residing on the veneer of the article.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

238.3, for the detection of foreign matter on or within a textile product.

239.5, for the detection of an object on or in a transparent or translucent container.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 559.41 for a photocell with associated circuitry capable of identifying the presence of a foreign substance on or embedded in a material from variations in a detected light signal.

**240.1 Containers or enclosures (e.g., packages, cans, etc.):**

This subclass is indented under subclass 237.1. Inspection of imperfections or impurities wherein the specimen is an opaque receptacle for holding or carrying materials.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

239.4, for the inspection of a transparent or translucent container.

239.6, for the inspection of the contents of a transparent or translucent container.

**241.1 Bore inspection (e.g., borescopes, intrascope, etc.)**

This subclass is indented under subclass 237.1. Inspection of imperfections or impurities wherein the specimen is a hole, passage, or generally tube-like structure having a proximal end and a distal end, wherein light is directed to the distal end providing a view of the interior of the specimen from the distal or proximal end.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

138+, for optical alignment devices for checking the correlation of the bore of a gun with its sighting means.

154, for optical testing devices for checking the straightness of a bore.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 152.01+ for a process or apparatus for determining a physical characteristic of a borehole, a casing, or a drill rigging.

250, Radiant Energy, subclasses 358.1+ for instruments which include nonvisible radiation sources and filters for checking cracked interior surfaces in bores by means of phosphorescent or fluorescent substances.

324, Electricity: Measuring and Testing, subclass 220 for borescopes used in the testing of ferrous metal pipe which additionally includes means to dispense iron filings and magnetic means to magnetize the pipe so that the iron pipe filings will adhere magnetically to the pipe in a pattern conforming to the condition of the pipe.

359, Optical: Systems and Elements, subclasses 362+ for borescopes which include compound lens systems in the claims.

600, Surgery, subclasses 101+ and 184+ for endoscopes inserted into a natural or surgically constructed body orifice for viewing or treating functional disorders of the body with or without a self-contained illuminating means.

**241.2 Firearm bore inspection:**

This subclass is indented under subclass 241.1. Bore inspection wherein the inspected bore is that of a firearm.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

138+, for optical alignment devices for checking the correlation of the bore of a gun with its sighting means.

SEE OR SEARCH CLASS:

42, Firearms, appropriate subclass for firearms.

**241.3 With adjustable head:**

This subclass is indented under subclass 241.1. Bore inspection wherein the borescope head is movable.

**241.4 Flexible:**

This subclass is indented under subclass 241.1. Bore inspection wherein the borescope is constructed to possess pliable or elastic qualities.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

241.3, for a borescope having an adjustable head.

**241.5 Specific construction of distal end:**

This subclass is indented under subclass 241.1. Bore inspection wherein the bore scope has detailed structure at the tip of its insertable portion.

**241.6 Having guiding means:**

This subclass is indented under subclass 241.1. Bore inspection further comprising a means to navigate, pilot, or route the inspection means within the cavity, bore or hole.

**242.1 THREAD COUNTING:**

This subclass is indented under the class definition. Subject matter for determining the number of elements, cords, or strands in a fabric or web article.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

23+, for stroboscopes utilized to monitor moving webs or threads.

237.1+, for cloth inspection for flaws.

247+, for fiducial instruments which involves reticles with significant optical structure.

395, for the measurement of lengths by means of "moire" patterns.

429, for the monitoring of webs or threads for optical properties or flaws.

450, for testing apparatus involving light interference effects generally including diffraction patterns.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 297+, for a reticle for a sight line instrument having no significant optical feature.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 10, for numerical counting of individual objects one by one.

**243.1 STANDARD:**

This subclass is indented under the class definition. Subject matter wherein the testing process results form a basis for optical comparison with a specimen, article, or portions thereof under test.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

46, for electrical lamp circuits which utilize the lamp as a standard for photometry or for optical pyrometry measurements.

421+, for color charts.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 559.39 for a photocell and associated circuitry for evaluating a material comparing the circuit output to a reference or stored value.

**243.2 For liquid suspended particles:**

This subclass is indented under subclass 243.1. Standard wherein the specimen is a non homogenous mixture of an analyzed component in a dispersion medium.

SEE OR SEARCH CLASS:

73, Measuring and Testing, for a process or apparatus for detecting or determining the composition of, a constituent of, or a property of a liquid or a liquid suspension of a solid.

**243.3 Flying height testers:**

This subclass is indented under subclass 243.1. Standard wherein a gap formed by a read/write head and a record carrier element is optically compared to a basis.

**243.4 Surface standard:**

This subclass is indented under subclass 243.1. Standard wherein an exterior or interior veneer of an article or specimen is optically compared to a basis.

**243.5 Color:**

This subclass is indented under subclass 243.4. Surface standard further comprising the optical comparison of a hue, pigment, or tint of the article veneer.

**243.6 Foreign object:**

This subclass is indented under subclass 243.4. Surface standard further comprising the optical comparison for the existence of a contaminant residing on the veneer of the article with a basis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 237.3, for the detection of a foreign object on the surface of an article.
- 238.3, for the detection of foreign particles on or within a textile product.
- 239.5, for the detection of an object or particle in or on a transparent container.
- 239.8, for the detection of a foreign particle or object on the surface of a transparent article.

**243.7 Texture:**

This subclass is indented under subclass 243.4. Surface standard further comprising the optical comparison of the three dimensional characteristics or features of the article veneer with a basis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 237.5, for topographical surface flaw inspection.

**243.8 Light intensity:**

This subclass is indented under subclass 243.4. Surface standard further comprising the comparison of a light intensity measurement with a basis.

**244**

This subclass is indented under the class definition. Subject matter including holding structure for maintaining the article or material (solid, liquid, or gas) to be inspected, measured or tested in the desired inspection, measuring or testing position; or for maintaining the standard in the desired position.

- (1) Note. This subclass includes means to support the holding structure when not

otherwise classifiable. Usually the holding structure is shaped or otherwise adapted to permit passage of the testing light rays.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 311+, for sample holders which include heating or burner structure for spectroscopic analysis of the sample.
- 421, for color charts or standards.

SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, subclasses 501+ for geometrical gauges.
- 108, Horizontally Supported Planar Surfaces, subclasses 59+ for plural related horizontal support surfaces generally.
- 204, Chemistry: Electrical and Wave Energy, subclasses 600+ for electrophoretic or electro-osmotic apparatus, including the combination of such apparatus with optical measuring or testing means.
- 211, Supports: Racks, subclasses 13.1+ for special article supports usually of the framework type.
- 248, Supports, subclasses 127+ and 200+ for stands and brackets respectively.
- 250, Radiant Energy, subclasses 453.11+ for article or object supports for ray energy generally.
- 269, Work Holders, for holders for supporting work during a treating operation.
- 359, Optical: Systems and Elements, subclasses 396+ for transparent microscope slides.

**245 Cotton graders:**

This subclass is indented under subclass 244. Subject matter including a plurality of receptacles arranged in a unit for holding cotton standards, together with structure for facilitating the comparison of a selected standard with a cotton sample.

**246 Fluid containers (e.g., cells or cuvettes):**

This subclass is indented under subclass 244. Subject matter wherein the holder has side walls for restraining the fluid to be tested.

- (1) Note. The holder may be completely enclosed as to contain gaseous fluids. The holder may be of the flow-through type as by having an input and output orifice.

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

- 239.6+, for detection or examination of a specimen in a transparent or translucent container.  
427, for the inspection of container contents in motion.  
441+, for liquid particle suspension testing, such as turbidity.

**SEE OR SEARCH CLASS:**

- 73, Measuring and Testing, subclasses 61.41+ for strip cups.  
206, Special Receptacle or Package, appropriate subclasses for receptacles of general use which are not restricted to use in optical testing of materials.  
250, Radiant Energy, subclasses 428+ for fluent material containers, supports or transfer means for subjecting the material to radiation.  
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 100 and 102 for laboratory apparatus elements which include fluid containers.

**247 FIDUCIAL INSTRUMENTS:**

This subclass is indented under the class definition. Subject matter wherein an optical instrument establishes an optical axis whereby an observer may precisely orient the optical instrument relative to some remote point toward which the optical axis is directed, or and usually whereby the observer may orient some device such as a gun to which the optical instrument is attached.

- (1) Note. Where a reticle is recited in conjunction with a compound optical system classification is generally in Class 359, Optical: Systems and Elements, subclass 428. However, where the reticle or reticle image is adjustable for the purpose of changing the observer's line of sight relative to the central optical axis

of the instrument, classification will be in this class.

**SEE OR SEARCH CLASS:**

- 33, Geometrical Instruments, subclasses 227+, for similar subject matter where no significant optical structure is claimed.

**248 Artificial reference:**

This subclass is indented under subclass 247. Subject matter including, for the purpose of establishing a stabilized optical axis, means which tends to maintain its orientation in space irrespective of changes in the orientation of the supporting structure for this means.

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

- 143, for similar subject matter used in angle measuring means where a scale and target are simultaneously observable.  
148, for similar subject matter used in angle measuring means.

**249 Liquid surface (e.g., bubble level):**

This subclass is indented under subclass 248. Subject matter where the artificial reference is determined by the surface of a fluid.

**250 Pendular suspension of optical element or reticle:**

This subclass is indented under subclass 248. Subject matter where the artificial reference is determined by a pendulously suspended optical element or a reticle.

**251 Reticle lies outside viewing path:**

This subclass is indented under subclass 247. Subject matter where the lines of sight from the target and from a reticle converge and are optically combined.

**252 Reticle image transversely adjustable relative to optical axis:**

This subclass is indented under subclass 251. Subject matter wherein a reticle or an optical element is movable in order that the image of the reticle may be adjusted transversely to the principal optical axis of the instrument.



SEE OR SEARCH THIS CLASS, SUB-CLASS:

29, for similar subject matter where the reticle or optical element is controlled in response to the relative velocity of the observer and a remotely sighted point.

**253 Deflection of line of sight:**

This subclass is indented under subclass 247. Subject matter where the line of sight is deflected.

**254 Two or more deflections:**

This subclass is indented under subclass 253. Subject matter where there are two or more deflections of the line of sight.

SEE OR SEARCH CLASS:

359, Optical: Systems and Elements, subclasses 402+ for periscopes including a compound optical system, and subclasses 857+ for systems for viewing a remote object by means of plural reflections.

**255 By reflection:**

This subclass is indented under subclass 253. Subject matter where the line of sight is deflected by reflection.

SEE OR SEARCH CLASS:

359, Optical: Systems and Elements, subclasses 838+ for reflectors in general.

**256 MISCELLANEOUS:**

This subclass is indented under the class definition. Subject matter which is not provided for in any of the preceding subclasses of this class.

SEE OR SEARCH CLASS:

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 200+ for examining and testing apparatus involving optical testing apparatus specifically designed for eye examination.

352, Optics: Motion Pictures, subclass 244 for miscellaneous apparatus dealing with the taking and projection of motion pictures.

359, Optical: Systems and Elements, subclass 896 for miscellaneous optical systems and elements not provided for elsewhere.

**300 BY DISPERSED LIGHT SPECTROSCOPY:**

This subclass is indented under the class definition. Subject matter for the examination of a dispersed beam of light or selected portions thereof as by a prism or diffraction grating from a narrow beam of light as from a slit, or for utilizing a portion of a dispersed beam, such as from a monochromator, for examination of substances by transmitting light through or reflecting light from the substances or for the examination of the dispersed beam from a stimulated light emissive sample.

(1) Note. Included in this subclass are spectrometers.

(2) Note. The line between Class 250, Radiant Energy, and the spectroscopic examination found in this class is: Claims to a spectroscopic arrangement which include only the examination of visible radiation will be found in subclasses 300+; claims to a spectroscopic arrangement which include optical limitations which are usable in the infrared, ultraviolet, and visible light range will be found in subclass 51 in this class providing no significant nonvisible radiation or examining structure is involved in the claims; claims to a spectroscopic arrangement including a source of invisible radiation such as infrared or ultraviolet, or a particular material operative for the purposes of the disclosure only in the invisible radiation range, or a detector responsive only to invisible radiation will be classified in Class 250.

(3) Note. The line between Class 345, Computer Graphics Processing and Selective Visual Display Systems, and Class 356 with respect to spectroscopy and with respect to the remaining portions of Class 356 is: where a Class 356 device is claimed in combination with a recorder of the Class 346 type, Class 356 will take combinations including a broad optical test for Class 356 combined with a broad

Class 346 recorder. However, a name only optical test device in combination with a specific recorder will be classified in Class 346. Any details of the optical test device whether patentable or not with a specific recorder will be classified in Class 356.

- (4) Note. Diffraction crystals used to disperse X radiation when used with the combination of elements forming a spectrometer or spectroscope will not be classified here. See Class 378, X-Ray or Gamma Ray Systems or Devices, subclass 70.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 402+, for filter photometers which analyze the wave length and the intensity of emitted light or the light of specific wave lengths absorbed by materials as a result of reflective or transmissive tests, where filters rather than dispersing mediums are used to isolate various wave lengths of light.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 200+ for photocell circuits which do not involve the measurement of light or the testing of material by means of visible light; subclasses 336.1+ for methods and apparatus involving emission or absorption infrared or ultraviolet spectrometers.
- 359, Optical: Systems and Elements, subclasses 558+ for diffraction gratings and mounts; subclass 615 for light dispersion systems which do not involve the analysis of the dispersed light; subclasses 831+ for prisms and mountings for the prisms; subclasses 362+ for compound lens systems; subclasses 811+ for lenses and their supports; and subclasses 894+ for optical apertures including slits.
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 70+ for X-ray diffraction analysis.
- 399, Electrophotography, subclasses 9+ for diagnostics of electrophotographic devices, particularly subclasses 31+ for image-forming components.

### 301 With Raman type light scattering:

This subclass is indented under subclass 300. Subject matter which includes a directed beam of light, means to support transparent gaseous, liquid, or solid substances for transmission of the beam through the substance, and means transverse to the direction of the beam for detecting the light reflected or scattered by the molecules of the substance, and including the detection of the light caused by change of the rotational and vibrational energy of the molecules due to the light energy directed through the substance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 331+, for visible light monochromators of the prism and grating type which may be utilized in this test.
- 337+, for particle and molecular light scattering tests where no Raman spectra is involved.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 336.1+ for methods and apparatus which may involve Raman effect and utilize infrared or ultraviolet radiation.

### 302 For spectrographic (i.e., photographic) investigation:

This subclass is indented under subclass 300. Subject matter which includes an entrance slit, a dispersing means, an aperture, and a photographic medium associated with the aperture for recording the dispersed spectrum or portions thereof.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 316.1 for infrared or thermal pattern recording methods and apparatus; and subclasses 580+ for methods and apparatus photographing invisible radiation or materials subjected to invisible radiation generally.
- 346, Recorders, subclasses 107.1+ for optical recording of phenomenal information.
- 347, Incremental Printing of Symbolic Information, subclasses 224+ for apparatus and processes using light or beam to mark the record receiver.

- 378, X-Ray or Gamma Ray Systems or Devices, subclass 70 for X-ray diffraction analysis.
- 396, Photography, for photographic cameras for exposing photographic film.
- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, for process, product, and composition used in radiation imagery.
- 303 With spectral analysis:**  
This subclass is indented under subclass 302. Subject matter which includes, additionally, the development of the spectrograph and the qualitative and quantitative analysis of the developed spectrograph, as by transmissive photometric examination.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 404, for the analysis for the various colors of a developed color negative in order to correct for the exposure variables in the production of colored prints.
- 443+, for the analysis of black and white developed negatives of spectrograms.
- SEE OR SEARCH CLASS:
- 250, Radiant Energy, subclass 316.1 for photographic infrared detection or analysis of material; and subclasses 580+ for photographic detection of invisible radiation or analysis of material where an examination of a developed spectrogram may be involved.
- 304 With sectored disc:**  
This subclass is indented under subclass 302. Subject matter which includes a stepped or sectored opening therein to provide a light masking structure interposed between the light to be examined and the entrance slit of the spectrograph.
- (1) Note. The light masking means generally includes means to move the masking structure and an aperture configuration which is a logarithmic configuration along the slit from some fixed point.
- 305 With diffraction grating:**  
This subclass is indented under subclass 302. Subject matter which includes a diffraction grating as the dispersing element.
- SEE OR SEARCH CLASS:
- 359, Optical: Systems and Elements, subclasses 566+ for diffraction grating, per se.
- 306 With internal standard comparison:**  
This subclass is indented under subclass 300. Subject matter which includes means to detect and measure the intensity of a spectral line of a sought for element or composition relative to a second spectral line of the same or a second element or composition that is present in known amounts.
- (1) Note. This second component may be added to the sought for constituent or be present as a constituent of the sample tested.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 307, for similar subject matter wherein the intensity of the total emitted radiation is compared against the radiation of a specific wavelength inherent in the total radiation.
- 307 With background radiation comparison:**  
This subclass is indented under subclass 300. Subject matter which includes means to detect and measure the intensity of at least one spectral line present in emitted radiation relative to the total emitted radiation present.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 306, for the comparison involving emitted radiation of a known spectral line intensity and wavelength of an element with the intensity of the spectral line or lines of a tested chemical element, both the known and unknown element being present in the same emitted radiation.

**308 With synchronized spectrum repetitive scanning (e.g., cathode-ray readout):**

This subclass is indented under subclass 300. Subject matter which includes the periodic scanning of a dispersed light beam over the optical frequency spectrum, detecting the scanned dispersed beam, synchronizing a visual readout with the various wavelengths present in the detected dispersed beams, and correlating the intensity of the detected readout with each wavelength present in the dispersed beam.

- (1) Note. The readout is usually a cathode-ray tube.
- (2) Note. The synchronization of the scanning of the dispersed beam is with the movement of the dispersing means, the optical means associated with the dispersing means, or the electronics of the detection and readout circuitry.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

319, for spectrophotometers which use a cathode-ray tube readout where no repetitive scanning is involved.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 336.1+ for methods and apparatus having an invisible radiant energy responsive electric signalling device and a cathode-ray tube responsive to the device.

315, Electric Lamp and Discharge Devices: Systems, subclasses 1+ for cathode-ray tube circuit, generally, including deflection systems for the electron beam of the cathode-ray tube.

358, Facsimile and Static Presentation Processing, subclasses 500 through 540 and 400-304 for facsimile systems which utilize a cathode-ray oscillograph tube which do not involve a spectrum analysis of light or the light analysis of a substance reflectively or transmissively.

**309 Using plural beams:**

This subclass is indented under subclass 308. Subject matter wherein there are plural beams of light, and there is means to support a sample

or a substance to be tested in one or more beams.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

319+, for plural beam spectrophotometers which use a cathode-ray tube readout where no repetitive scanning is involved.

**310 With aperture mask:**

This subclass is indented under subclass 300. Subject matter including means for passing light, usually of a selected group of spectral wavelengths, between the light dispersing means and the light detection means.

**311 With sample excitation (e.g., burning):**

This subclass is indented under subclass 300. Subject matter including structure for heating, burning, or otherwise stimulating the sample to cause the emission of radiation for analysis.

- (1) Note. For classification here as opposed to subclasses 244+ some portion of the apparatus for heating, burning, or stimulating the samples or for analyzing the rays emitted by the specimen should be claimed.
- (2) Note. The combination of the heating or combustion of a sample and the spectrographic analysis of the heated sample is in this class (356) rather than in Class 23.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

244+, for sample holders for materials to be excited for spectrographic analysis, which do not include a heating means such as a flame, an arc, or spark device for the heating of the sample. See also (1) Note above.

302, for sample electrical or flame excitation when combined with a spectrographic recorder.

306, for sample electrical or flame excitation which additionally excites a substance whose wavelength and emission intensity at this wavelength are known.

307, for electrical or flame sample excitation which utilized the total emissive radiation produced as a standard of

- comparison against the intensity of light emitted by the sample at certain wavelengths.
- 308, for electrical or flame excitation of samples whose emitted radiation is detected by a repetitive, electro-optical scanning system.
- 417, for filter photometers which analyze certain wavelengths of light emitted as a result of electrical or flame excitation of a sample.
- 312 By electrical resistance heating (e.g., graphite tube):**  
This subclass is indented under subclass 311. Subject matter wherein the sample is heated to an excited state by passing an electrical current through the sample cell or support.
- SEE OR SEARCH CLASS:**  
219, Electric Heating, subclasses 600+ for inductive heating, subclasses 678+ for microwave heating, and subclasses 764+ for capacitive dielectric heating; subclasses 65 and 162 for apparatus and methods for the electron beam heating and disintegration of metals; subclasses 50+ for the methods and apparatus for resistive heating of metals; subclasses 260+ for resistive igniters of solid material; and subclasses 271+ for electrical resistive heater-type vaporizers.
- 313 By arc or spark:**  
This subclass is indented under subclass 311. Subject matter wherein the heating structure includes an arc or spark.
- (1) Note. Included herein are the subcombinations including the electrical arc or spark excitation unit which includes the support for the sample to be analyzed even though optical elements of the spectrophotometer are not claimed.
- SEE OR SEARCH CLASS:**  
219, Electric Heating, subclass 69 for the arc cutting or disintegration of metals; subclasses 121.11+ for the heating of metals by electric arc; subclasses 271+ for arc-type electric heaters with vaporizers; and subclasses 383+ for arc-type nonmetal heating devices.
- 313, Electric Lamp and Discharge Devices, subclass 243 for arc-type devices of the general usage type; and subclasses 326+ for electrode structure not of the consumable electrode type.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, for structure to support and feed electrodes of the consumable electrode type, and particularly subclass 60 for consumable electrodes not of the electrical welding type.
- 314 Including sputtering:**  
This subclass is indented under subclass 313. Subject matter wherein sample material is removed, as though by evaporation, from the electrodes of a gas discharge tube.
- 315 By flame:**  
This subclass is indented under subclass 311. Subject matter including a flame producer whose flame heats or burns the sample to cause the emission of radiation to be analyzed.
- (1) Note. See the Search Class notes below for the line between this class (356) and the class for all methods of burning of fuel not classified elsewhere.
- (2) Note. A light source and means to modify the light for general illumination purposes are classified elsewhere.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**  
417, for excitation photometers where filters rather than light dispersing structure are used to select the wavelength of the emitted light to be examined that is present in the excited sample.
- SEE OR SEARCH CLASS:**  
137, Fluid Handling, subclasses 205 and 604 for devices which utilize a separating apparatus to move a liquid or gaseous sample from a supply to another location.  
239, Fluid Sprinkling, Spraying, and Diffusing, see subclasses 144 and 422; see subclasses 398+ for the combining of separately supplied fluids which are emitted from a nozzle.

- 250, Radiant Energy, subclass 554 for flame source combined with a photo-cell where a physical characteristic of the flame is detected.
- 362, Illumination, for general illumination devices which include a light source and means to direct the light. A light source and a chimney, for example, without means to limit the light source specifically for examination purposes, such as a monochromator or means to hold additionally the material to be examined, would be classifiable in Class 362.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for apparatus having means to burn the material being analyzed.
- 431, Combustion, subclasses 4 and 126 for the methods and apparatus pertaining to the burning of a combustible fluid. See Notes 1, 2, and 3 below
- (1) Note. Class 431, Combustion, will take all methods of burning of fuel not classified elsewhere. Class 431 will take the combination which includes a burner having a nozzle or a pipe outlet means to feed a fuel, a combustion supporting fluid to the pipe or nozzle outlet to produce a flame, and means to feed a sample fluid into the flame produced by the burner so that the heat of the burner will increase the energy of the sample to the point whereby the sample will emit radiation.
- (2) Note. The combination of a spectral flame burner such as recited in Note 1 above with an optical element necessary to inspect the flame such as a "chimney" or "means to view the flame" where it is more than inspection of the flame and involves the examination of the color intensity or wavelength of the light of the flame, is classified in Class 356 rather than Class 431.
- (3) Note. Class 431 will not take the feeding of powdered material entrained in a fluid.
- 436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for processes involving the burning of material which involves a chemical reaction, or the analysis or treatment of the products of combustion where not elsewhere classified. See also (2) Note of subclass 311.
- 316 By high frequency field (e.g., plasma discharge):**  
This subclass is indented under subclass 311. Subject matter wherein the sample is excited by the field generated by a high frequency signal.
- SEE OR SEARCH CLASS:  
219, Electric Heating, subclass 121 for electric heating by a plasma arc discharge, per se.
- 317 By light:**  
This subclass is indented under subclass 311. Subject matter wherein the sample is excited by radiation in the visible spectrum.
- 318 Monochromatic (e.g., laser):**  
This subclass is indented under subclass 317. Subject matter wherein the light is of a single wavelength.
- 319 Utilizing a spectrophotometer (i.e., plural beam):**  
This subclass is indented under subclass 300. Subject matter wherein there are formed two beams of light, one or both beams may be monochromatic, means to support a substance in one or both beams to modify one or both beams, means to detect and compare the intensities of the two beams as modified by the substance or substances simultaneously or sequentially, and means responsive to the comparison means to indicate the relative intensities of the two beams.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
213+, for photometers which examine the intensity of visible light by visual and photoelectric methods.

- 416+, and 425, for colorimeters which utilize filters rather than a dispersing arrangement to determine the intensity of light at specific wavelengths or the absorption characteristics of substances which modify the light transmitted through or reflected from the substances.
- 432, for photometers which examine light transmitted through a substance.
- 445+, for photometers which examine light reflected from the surface of a substance.

**320 Having plural wavelengths:**

This subclass is indented under subclass 319. Subject matter wherein each beam is of a different wavelength.

**321 Having servo equalization:**

This subclass is indented under subclass 319. Subject matter which generally includes in at least one of the beams an optical member, such as a wedge, responsive to the comparison means to automatically equalize the intensities of both beams, or which includes an electrical member responsive to the comparison means to electrically create a null condition in the comparison means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 434+, for similar detection and comparison circuits which control the equalization of the light intensity only of plural beams, at least one beam being transmitted through a sample.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 204 for photo-electric circuits which adjust an optical system to balance light intensity in plural paths; and subclasses 336.1+ for methods and apparatus involving similar devices responsive to invisible radiation.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 151 and 158 wherein a radiant energy device controls an electric lamp load device.
- 318, Electricity: Motive Power Systems, subclasses 560+ for electric motor follow-up systems which include a self-balancing network.

**322 With polarized light beams:**

This subclass is indented under subclass 321. Subject matter in which two beams of visible radiation are polarized and vary in intensity cyclically with time, and the two beams are out of phase with each other; and wherein the optical member is of the magneto-optical type, a controlled vibrating mirror, a wedge, or an iris.

- (1) Note. Integrating spheres are generally part of the combination claimed.
- (2) Note. Included in the combination claimed is an indicator or recorder to note the change necessary to cause equal brightness in each path.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 236, for integrating spheres, per se.
- 323+, for spectrophotometers with beam modulation, per se.
- 367+, for polarimeters generally which may involve plural beams and servo equalization of the light intensities of both beams.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 228 for photo-electric optical or prephotocell systems which include integrating spheres.

**323 Having beam modulation:**

This subclass is indented under subclass 319. Subject matter which includes in the light path structure for periodically varying or blocking the light path in both beams as by a rotating shutter.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 232+ for light interrupters combined with photocells, and subclasses 336.1+ for methods and apparatus including at least an invisible radiant energy responsive electric signalling device responsive to plural modulated energy beams, especially subclasses 340 and 345+.
- 359, Optical: Systems and Elements, subclasses 227+ for opaque optical members controlling the passage of light.

**324 With plural dispersion:**

This subclass is indented under subclass 323. Subject matter which includes dispersing means and wherein the dispersion takes place in at least two distinct stages, in series.

**325 Prior to testing:**

This subclass is indented under subclass 323. Subject matter where the modulation of the beam occurs before the radiation enters the tested specimen.

**326 Utilizing a spectrometer:**

This subclass is indented under subclass 300. Subject matter wherein the spectroscopic examination is performed with an instrument having an entrance slit, a dispersing device, and one or more exit slits with which measurements are made at selected wavelengths within the spectral range or by scanning over the range.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

300, for spectroscopes.

331+, for monochromators.

**327 Having light polarizing means:**

This subclass is indented under subclass 326. Subject matter including polarizing apparatus to examine visible light or to examine articles or material by means of visible polarized light.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

364+, for polarized light examination, per se.

**328 Having diffraction grating means:**

This subclass is indented under subclass 326. Subject matter wherein the dispersive element is a diffraction grating.

**329 Including servo slit adjustment means:**

This subclass is indented under subclass 328. Subject matter wherein there is included a known frequency light source which may be part of the test emission source, an entrance slit, a dispersing means, a plurality of exit slits, one of which is associated with the known frequency dispersed by the dispersing means, a photosensitive detector responsive to the known light frequency received through its exit

slit, and servo control means responsive to the detector to adjust the relative position of the dispersing means and the entrance or exit slits.

- (1) Note. This subclass excludes recording spectrophotometers having a movable dispersing element to allow successively different light wavelengths to appear at the same exit slit, and having its movement mechanically synchronized to move the recorder and adjust the exit slit for the various wavelengths. See subclasses 321+ for this type of mechanically synchronized slit adjustment.

**330 Having optical gating means:**

This subclass is indented under subclass 326. Subject matter wherein the entrance and exit means contain areas which alternately transmit or block the passage of light.

**331 With monochromator structure:**

This subclass is indented under subclass 300. Subject matter including a light dispersing element such as a prism or diffraction grating together with a slit for selecting a narrow portion of the dispersed spectrum to provide a light beam which is essentially monochromatic or of narrow frequency bandwidth.

- (1) Note. Usually an entrance slit is provided between a source of light and the dispersing element, or a light source having a narrow beam width may be provided.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

51, for monochromators with optical limitations used in the infrared or ultraviolet range.

326+, for spectroscopes generally as where a viewing device is used for examining the light from the dispersing element either directly or through a test sample in place of an output slit. See also (1) Note under subclass 326.

420, for color light standards as where light filters rather than dispersing elements are combined with the light source.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 510 for invisible radiation monochromators



- exclusive of the infrared and ultraviolet optical types.
- 362, Illumination, subclasses 257+ for miscellaneous illuminating lamps; and subclasses 318+ for inspection lamps.
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 84+ for X-ray devices including monochromators.
- 399, Electrophotography, subclasses 9+ for diagnostics of electrophotographic devices, particularly subclasses 31+ for image-forming components.
- 332 Having adjustable color or bandwidth:**  
This subclass is indented under subclass 331. Subject matter including structure to vary the bandwidth or to vary the average or median frequency of the band over the range of the light emitted from the monochromator.
- (1) Note. The variation may be obtained by changing the width of one of the slits or by changing the reflection angle of the dispersing element.
- 333 In a double monochromator:**  
This subclass is indented under subclass 332. Subject matter wherein a plurality of dispersing elements with an intervening slit or equivalent filtering structure are provided between the dispersing elements, as for providing a narrower band of light.
- (1) Note. This subclass provides for two monochromators, generally in series, wherein the exit slit of one of the monochromators is also the entrance slit of the other monochromator.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 51, for double monochromators including optical limitations for use in the ultraviolet or infrared range of the electromagnetic spectrum.
- 319+, for plural beam spectrophotometers which include a double monochromator.
- SEE OR SEARCH CLASS:
- 399, Electrophotography, subclasses 9+ for diagnostics of electrophotographic devices, particularly subclasses 31+ for image-forming components.
- 334 With diffraction grating means:**  
This subclass is indented under subclass 332. Subject matter wherein the dispersive element is a diffraction grating.
- 335 FOR SIZE OF PARTICLES:**  
This subclass is indented under the class definition. Subject matter for determining in a group of discrete particles the size of individual particles or the average size of the particles in the group.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 39+, for the size, numbers, or volume of blood particles not provided for elsewhere.
- 432+, for light interference tests including diffraction patterns of microscopic bodies generally where the size of the discrete bodies is not involved.
- 439, for the number of particles in a gaseous suspension.
- 441+, for the number of particles in a liquid suspension.
- 625, for the measurement of articles or indefinite length materials by means of variation in visible light as affected by the articles or indefinite length materials.
- SEE OR SEARCH CLASS:
- 73, Measuring and Testing, subclass 865.5 for miscellaneous measurement of the size of particles.
- 250, Radiant Energy, subclass 222.1 for the sizing of discrete particles by methods involving visible and invisible light.
- 377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 10 for the size determination and the number of particles present in samples where the particles are numerically counted. See also the general note to the line between Class 377 and this class.

**336 By particle light scattering:**

This subclass is indented under subclass 335. Subject matter to visually or photoelectrically inspect or measure the scattering of light by particles or molecules entrained in a static or flowing medium.

**337 BY PARTICLE LIGHT SCATTERING:**

This subclass is indented under the class definition. Subject matter to visually or photoelectrically inspect or measure the atmospheric scattering of light, or the scattering by molecules of a gas or liquid media or by particles entrained in a flowing or static medium, which includes support means for the media or medium capable of transmitting light into and out of the support means, lighting means to direct light into and through a flowing or static gas or liquid with or without the entrained particles, and means to visually examine and measure or photoelectrically detect and indicate the intensity of the light scattered from the medium or from the particles in the medium at some angle other than the direction of the inspection light.

- (1) Note. In this subclass, the scattering is by reflection of light from discrete particles within a medium, as opposed to mere diffusion by scattering from an irregular surface in subclass 372.
- (2) Note. See subclasses 437+ and 441+ where suspended particles are not viewed for scattered light reflected from suspended particles, but for the reduction in the light intensity, and wherein light and the observation point lie in a direct line with the observed fluid between the light source and the observation point.
- (3) Note. Tyndallometers, nephelometers, and devices to measure the Rayleigh ratio are included in this section.
- (4) Note. The light used in the test may be monochromatic, polarized, or white light.
- (5) Note. Where particles in a fluid are counted one by one, see Class 377, subclass 10. Where the number of particles in a fluid is found by sensing the overall radiation reflected by light scattering

from the particles within the medium, the claims will be classified here in subclass 337.

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

- 301, for detection of light scattering of the Raman type.
- 335+, for the determination of the size and number of particles in a test medium by statistical methods.
- 437+, see (2) Note above.
- 441, see (2) Note above.
- 446, for scattered light tests caused by the reflection of light from a surface which causes a diffused light rather than a specular light condition.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, for photocell circuits or preoptical systems, which may sense fluent material in the optical path, which is responsive to scattered light from the fluent material.
- 340, Communications: Electrical, subclasses 627+ for signal systems responsive to fluent or pulverized material which may respond to scattered light reflected from the fluent or pulverized material.

**338 With photocell detection:**

This subclass is indented under subclass 337. Subject matter which includes photosensitive means activated by the scattered light received.

**339 At right angles to the light beam (e.g., nephelometer):**

This subclass is indented under subclass 338. Subject matter wherein the photosensitive means detects light scattered at an angle of substantially 90° to the incident light beam.

**340 At variable angle to the light beam:**

This subclass is indented under subclass 338. Subject matter wherein the angle between the incident light beam and the detected scattered light is variable.

**341 For light comparison means:**

This subclass is indented under subclass 338. Subject matter wherein the scattered light is compared with (a) a standard light, (b) a standard scattered light, (c) the directly transmitted

light, or (d) with the light prior to its scattering or transmission through the medium.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

51, for testing by means of infrared or ultraviolet energy when the subject matter is of an optical nature and is used alone or in combination with visible light.

433+, for scattered light tests which measure the directed light through the fluid rather than the scattered light.

446, for devices which compare the light scattering from a surface rather than the reflection of light from particles suspended in a fluid, or colloids, or the molecules of a gas or liquid.

**342 Of back-scattered light:**

This subclass is indented under subclass 338. Subject matter wherein light scattered from the incident beam is detected at an angle greater than 90° to the direction of the incident beam.

**343 Using plural photocells:**

This subclass is indented under subclass 338. Subject matter wherein more than one photosensitive device is used to detect the scattered light.

**344 BY ELECTROPHORESIS:**

This subclass is indented under the class definition. Subject matter which includes an electrophoresis cell for containing a fluid to be tested, generally means transmitting light through the fluid, and examination means to indicate or note the modification of the light due to the movement of particles suspended in the test fluid from the refractive index, the interference phenomenon, the absorption of light within the various layers of the fluid in the cell, or the Schlieren patterns.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

128+, for refraction of light tests of material under examination where electrophoresis is not involved.

129, for Schlieren test apparatus not involving electrophoresis.

450, for interference apparatus testing the refraction of light not involving electrophoresis, per se, in the claims.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 450+ for processes and subclasses 600+ for apparatus involving electrophoresis or electro-osmosis as defined therein, including the combination of electrophoresis or electro-osmosis with optical measuring or testing. Also, see the search class note to Class 356 in Class 204, subclass 450.

**364 BY POLARIZED LIGHT EXAMINATION:**

This subclass is indented under the class definition. Subject matter including polarizing apparatus to examine visible light or to examine articles or material by means of visible polarized light; or including apparatus to compare, when polarization is involved, light, per se, or light transmitted through or reflected from an article or material with a light standard.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

30+, for crystal or gem examination where polarized light is involved.

33+, for stress-strain examination of articles or material.

453, 487, and 491, for light interference measuring or testing involving polarized light.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 204 for photoelectric, servo electric systems of the visible light type which utilize polarized light; and subclass 225 for preoptical visible light systems of the polarized light type where no light or article testing is involved.

359, Optical: Systems and Elements, subclass 437 for scales or indicia reading which utilize a polarizer element; and subclasses 483+ for optical elements of the polarizer type.

362, Illumination, subclass 19 which includes polarizers used with general illumination devices.

**365 With birefringent element:**

This subclass is indented under subclass 364. Subject matter including a doubly refractive or birefringent element, that is, an element having the property of dividing a ray of light into two polarized rays (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 extra-ordinary ray is no longer considered to be birefringent within the meaning of this definition. However, a birefringent element in the form, for example, of a Nicol prism where the unwanted ray is deflected would be classified here.

**SEE OR SEARCH CLASS:**

- 359, Optical: Systems and Elements, for polarization systems or elements having a birefringent element.

**366 With polariscopes:**

This subclass is indented under subclass 364. Subject matter providing structure for examining articles or material and including a polarizer, a polarized light analyzer, a support usually for the article or material for examination between the polarizer and analyzer, and a visual viewer or photoelectric detector and indicator, the polarized light from the polarizer being transmitted through the article or material to the visual viewer or the photoelectric detector and indicator.

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

- 30+, for polariscopes used in gem examination.  
33+, for polariscopes used in stress-strain examination.

**SEE OR SEARCH CLASS:**

- 359, Optical: Systems and Elements, subclass 501 which includes series polarizers relatively adjustable.

**367 Including polarimeters:**

This subclass is indented under subclass 366. Subject matter including either a null type or directly indicating instrument for determining

the amount of polarized light rotation caused by the article or material being examined.

**368 With electro-optical light rotation:**

This subclass is indented under subclass 367. Subject matter including an electrically operated rotator of the polarization plane.

- (1) Note. Where an electro-optical rotating means is used to vary the intensity of the light, rate of the pulsations of light, or change the plane of polarization of the light of an article or material being examined without indicating the change in the polarization of the light, search subclasses 366, 369, and 370.

**SEE OR SEARCH CLASS:**

- 359, Optical: Systems and Elements, subclasses 246+, 281+, and 484 for electromagnetic and electrostatic type optical elements which rotate the plane of polarization of polarized light.

**369 Of surface reflection:**

This subclass is indented under subclass 364. Subject matter wherein a material or article is examined for surface reflection characteristics by means of polarized light.

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

- 445+, for light reflection testing generally.

**370 With light attenuation:**

This subclass is indented under subclass 364. Subject matter wherein the light to be tested or the light transmitted through or reflected from a sample or standard is reduced in intensity by means of polarizers and analyzers.

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

- 213+, for photometers generally.  
402+, for shade or color measurements generally.  
432+, for light absorption measuring generally.

**388 BY CONFIGURATION COMPARISON:**

This subclass is indented under the class definition. Subject matter including means for comparing a given configuration such as an article,

record, or scale with a standard either visually or by means of a photocell, both the preceding being effected by noting the light from the margins or surfaces of the specimens and standards to an observation point.

- (1) Note. The standard may be only another article of the same type.
- (2) Note. In patents where a visual comparison is made of an article with a standard, the two images must be superimposed or adjacent each other for simultaneously viewing. If the images are farther apart so that they are viewed alternately, the patent is in Class 359, subclass 373; or in Class 353 if projection is claimed.
- (3) Note. This subclass and those indented thereunder provide for comparing of articles where an image of the article and a scale, or the image of two articles being compared are viewed. If only the image of a scale is viewed, the patent is classified in Class 359, subclasses 436+; or Class 353 if projection is involved. If only the image of the article is viewed, the patent is classified in Class 359, subclass 373, where a compound lens system is employed; or in Class 353 if projection of an image is present.
- (4) Note. Class 33 provides for patents on article testing devices where a mechanical pickup or feeler engages or contacts the workpiece even though significant optical structure is recited in the claims.
- (5) Note. Class 250, especially in subclasses 216+, provides in general for photocells together with optical structure in the light path. For classification in Class 356, subclass 388 the photocell and optical combination must be so related as to or must include structure to give an indication of the comparison, such as being within or without the range of tolerance when the light beam is passed to the profile of the master or article under test.

SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, especially subclasses 501+ for testing devices including a feeler which contacts the article. See (4) Note above.
- 209, Classifying, Separating, and Assorting Solids, for devices for inspecting and sorting articles.
- 359, Optical: Systems and Elements, subclass 373 for object comparison compound lens systems; subclasses 436+ for scale readers; and subclasses 798+ and 804+ for object viewing structure involving lenses generally, i.e., not compound.
- 382, Image Analysis, subclasses 181+ for pattern recognition, for example printed circuit recognition by analysis of the image information.

**389 With photosensitive film or plate:**

This subclass is indented under subclass 388. Subject matter wherein the image of the configuration or the standard is photographically recorded for comparison purposes.

SEE OR SEARCH CLASS:

- 396, Photography, for photographic recording where the invention lies in the manner of recording the subject matter.

**390 With two images of single article compared:**

This subclass is indented under subclass 388. Subject matter including optical elements to permit the simultaneous viewing of two portions of a single configuration, such as opposite sides of a threaded screw, or two images of the same portion of a configuration one usually being inverted, for comparison thereof.

**391 With projection on viewing screen:**

This subclass is indented under subclass 388. Subject matter including a viewing screen and means to project an image thereon of the configuration or the standard.

**392 For comparison with master or desired configuration:**

This subclass is indented under subclass 391. Subject matter including means to simultaneously view and compare the configuration and a standard configuration of the same type,

or a pattern showing a desired or standard shape, or another configuration of the same type.

- (1) Note. In this subclass a representation of the master is usually a part of or adjacent the viewing screen, and an image of the test configuration is projected thereon; while in indented subclass 393 below, an image of the master and usually also an image of the test configuration are projected on the viewing screen.

**393 Having master or desired configuration projection:**

This subclass is indented under subclass 392. Subject matter including means to project a master or desired shape on the viewing screen in addition to an image of the test configuration.

- (1) Note. In the case of a contact comparison between an article and the gauge or master a beam of light may be projected between the gauge or master and the test configuration, and an image of the light between the gauge and test configuration then projected on a screen is in this subclass 393.

**394 With comparison to master, desired shape, or reference voltage:**

This subclass is indented under subclass 388. Subject matter including optical elements to permit the simultaneous viewing and comparison by the eye or by a photocell of the configuration and (a) a standard configuration of the same type, or (b) a pattern or gauge having a desired or standard shape, (c) another configuration of the same type, or (d) a reference voltage generated as an electrical analog of a desired configuration.

- (1) Note. Light may be projected between an article and a gauge and the test made by detecting the amount of that light with a photocell.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 622, for an article compared indirectly with a master as by testing the master first and setting up the results to compare the article to.

**395 With relatively movable optical grids:**

This subclass is indented under subclass 388. Subject matter comprising plural optical grids which are relatively movable.

- (1) Note. One or more of the grids may be an image of the actual grid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 151, for similar subject matter utilized in measuring angles.  
618, for mensuration of article displacement by "moire" fringe generation.

**396 With scale or optical grid displaced relative to remote fiducial mark:**

This subclass is indented under subclass 388. Subject matter wherein a scale or optical grid is displaced relative to a remote reference point.

- (1) Note. The reference point could be for example, a mark on the reticle of an eye piece or a photocell.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 150+, or similar subject matter used in measuring angles.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 216+ for miscellaneous photocell circuits.  
359, Optical: Systems and Elements, subclasses 436+ where the fiducial mark is immediately adjacent to the scale and an optical element such as a mirror or lens is used to facilitate reading the scale.

**397 With object being compared and scale superimposed:**

This subclass is indented under subclass 388. Subject matter where a scale and the object measured are viewed in a superimposed relationship.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 391, where the object and/or scale are projected on a viewing screen.  
394, where the object is compared with a master or desired shape.

**398 With object being compared and light beam moved relative to each other (e.g., scanning):**

This subclass is indented under subclass 388. Subject matter including means to scan or sweep a configuration with a light beam, or including means to translate or rotate a configuration in a light beam to facilitate determination of the size or shape of the configuration, usually by means of at least one photocell.

**SEE OR SEARCH CLASS:**

- 209, Classifying, Separating, and Assorting Solids, subclasses 577+ for optical testing in combination with sorting.
- 250, Radiant Energy, subclasses 229+ for photocells with light control members of the light interrupting type.
- 348, Television, subclass 142 for object measurement with camera and object moved relatively to each other, subclasses 195-205 for mechanical optical scanning, subclasses 209.99 for flying spot scanning.
- 358, Facsimile and Static Presentation Processing, subclasses 474 through 498 for optical scanning systems including flying spot scanners of the cathode-ray tube.
- 359, Optical: Systems and Elements, subclasses 227+ for light control by opaque members movable in the light path.

**399 BY ALIGNMENT IN LATERAL DIRECTION:**

This subclass is indented under the class definition. Subject matter where two objects or an object and a light beam are laterally aligned by displacing the objects along an axis essentially normal to the line connecting them or displacing the object and light beam along an axis essentially normal to the light beam.

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

- 138+, where the alignment involves rotation about an axis.
- 614, where the amount of displacement is measured.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclasses 200+ for such systems involving photocells and an optical system and with control of the optical system by the photocells.

**400 With light detector (e.g., photocell):**

This subclass is indented under subclass 399. Subject matter including means responsive to light.

**401 With registration indicia (e.g., scale):**

This subclass is indented under subclass 399. Subject matter wherein visual marking are used to determine the degree of alignment.

**402 BY SHADE OR COLOR:**

This subclass is indented under the class definition. Subject matter wherein light (emanating directly from a light source, or transmitted through or reflected from a substance) is analyzed for its frequency content by dividing the light into its component frequencies or bands of frequencies (which are usually of a predetermined character), or by comparison in frequency or intensity with standard lights (emanating directly from a light source, or transmitted through or reflected from a substance).

- (1) Note. The first mentioned light is the light sample or from the sample to be tested while the second mentioned light is the standard or from the standard.
- (2) Note. Search subclass 51 if either infrared or ultraviolet light is utilized in the test.
- (3) Note. When complementary colors are utilized to produce a gray-type visual response they will be classified in the appropriate portion of this color section.
- (4) Note. Where lamps including photo responsive detectors, per se, such as phototubes are tested for color response as an indication of their operating characteristics, see Class 324, especially subclasses 24+ for space discharge-type tubes and subclass 158.1 for solid-state-type devices. However, this Class 356 provides for color determination of light

from a lamp where the lamp operating characteristics are not involved.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

43+, for optical pyrometers which correlate the color of a light source or a heated light emissive substance with the temperature of the light source or the heated light emissive substance.

300+, for spectrosopes, spectrometers, and spectrophotometers which analyze light or substance for color and light intensity which involve the use of a dispersing element, such as a prism or diffracting medium, rather than a filter or filters to isolate the different colors present in the light or substances being tested.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 23.35 and 53+ for the testing of effluents of a mixture of gases or liquids such as chromatography tests which have contacted a solvent or sorbent component successively and selectively to determine the quantity, quality, or identity of a component of the effluent.

95, Gas Separation: Processes, subclasses 82+ for processes of gas separation using chromatography.

96, Gas Separation: Apparatus, subclasses 101+ for chromatography type apparatus for gas separation.

209, Classifying, Separating, and Assorting Solids, subclasses 580 through 582 for assorting articles based upon color sensing of articles.

250, Radiant Energy, subclass 226 for photo-electric preoptical systems dealing with color.

346, Recorders, see (3) Note of subclass 74 for the line between Classes 356 and 346.

374, Thermal Measuring and Testing, subclasses 106 and 162 for temperature determination by color, other than by thermally emitted radiation.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for analytical apparatus having color change indicating means.

436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for chemical analytical tests involving color changes.

**403 With merging colors or patterns (e.g., Maxwell disc):**

This subclass is indented under subclass 402. Subject matter which includes a plurality of different colored light sources or reflective standards, and means to optically or mechanically rotate the light source or the standards so that the optical or mechanical rotation causes the sources or standards of different colors to blend together to produce a visual sensation of another color, shade, or tint so that the merged color can be visual compared simultaneously with an unknown light or color sample.

(1) Note. The mechanically rotating standards known as "Maxwell's Discs" are included in this subclass.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

243.1+, for optical standards.

420, for colored light standards which utilize filters.

421+, for color charts and standards not of the Maxwell disc type.

SEE OR SEARCH CLASS:

434, Education and Demonstration, subclasses 98+ for the same subject matter used for display or educational purposes rather than for testing.

**404 Photography:**

This subclass is indented under subclass 402. Subject matter involving color photography such as: the examination of the color properties of negatives as for copying purposes, the examination of sensitometric colored strips for the purpose of controlling the making of prints, all testing subcombinations dealing with color printing not provided for elsewhere, and the examination of the color characteristics of the scenes to be photographed in color.



- (1) Note. All patents dealing with the testing of colored light which involve temperature determination and photography will be found under pyrometry in subclasses 43+.
- (2) Note. Under this section are visual and photoelectric reflection and transmission tests of colored prints or negatives to correct the color balance of one or more colors in the negative, and the tests may be sequentially or simultaneously performed when more than one test is performed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 43+, for optical pyrometers. See also (1) Note above.
- 443+, for light transmission or absorption of photographic film, per se.

SEE OR SEARCH CLASS:

- 346, Recorders, subclasses 29 and 33 for recorders which are designed for use with color negative tests which have no specific optical test structure recited in the claim.
- 355, Photocopying, subclasses 32+ for color projection printers which include plural color transmission examination of negatives for the purpose of color balancing a projection type print of the tested color negative; and subclasses 78+ for color printers of the contact type which measure the intensity of a plurality of different colors transmitted through a negative in addition to the contact printing structure.
- 358, Facsimile and Static Presentation Processing, subclasses 500 through 540, particularly subclasses 518-523 and 527 for color correction systems as applied to facsimile devices and for facsimile type.
- 359, Optical: Systems and Elements, subclasses 885+ for color filters, per se, which are used for photographic purposes.
- 399, Electrophotography, subclasses 31+ for electrophotographic devices using

optical measurement and test apparatus for diagnostic testing.

- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, appropriate subclasses for radiation imagery involving color.

**405 Tristimulus examination:**

This subclass is indented under subclass 402. Subject matter wherein there are devices which examine light, per se, or the light reflected from or transmitted through substances, and which include means to examine the light or the light modified by reflection or transmission from the substances, simultaneously or sequentially for hue, saturation, and intensity as based upon the response of the human eye.

- (1) Note. The devices may be of the visual or the photosensitive type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 300, for devices which examine a substance for tristimulus values where a dispersing element is used rather than color filters to construct the tristimulus curves.
- 406, for devices which examine light or substances reflectively or transmissively for at least three different colors but not for the tristimulus values.

SEE OR SEARCH CLASS:

- 209, Classifying, Separating, and Assorting Solids, subclasses 577+ for apparatus which physically separates one substance from another based upon the tristimulus factors of light.
- 235, Registers, subclasses 61 and 184 for devices which utilize the tristimulus factors obtained in the devices of this subclass 405 to obtain mechanically and electrically the analogue computations necessary to utilize the integrated responses of the tristimulus values.

**406 Trichromatic examination:**

This subclass is indented under subclass 402. Subject matter wherein there is apparatus to examine sequentially or simultaneously for at least three colors of light either directly or

when reflected from or transmitted through a substance to be tested.

- (1) Note. The devices may be of the visual or the photosensitive type.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 300+, for apparatus which may examine light emitted from substances or the absorption of light by substances or the examination of light, per se, by spectroscopes, spectrometers, or spectrophotometer which utilize monochromators which permit the entire visual spectrum of light to be used to examine substances or to examine light for any or all of the colors which may be inherent in the light examined.
- 405, for test structure similar to that used here but differing only in the type of filters used to examine the light or the substances.
- 407, for apparatus wherein the light from a substance or light itself is examined at the same time for two different colors.
- 419, for similar subject matter where the disclosure or the claims do not examine light or substances for at least three distinct colors, but use test structure similar to that found here and in subclass 405.

**407 With sample responsive to plural colors applied simultaneously:**

This subclass is indented under subclass 402. Subject matter which includes means to simultaneously transmit or reflect at least two different colored bands or frequencies of light, through or from the sample, means to filter the modified light into two different bands of light, and detector and indicating means responsive to the light modified by the sample and after filtering to note the intensity of the different bands of light.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 45, for plural color responsive optical pyrometers including photographic and metallurgical types.
- 300, for spectroscopic examination of apparatus which uses a dispersing

means rather than a filter to detect or examine the various bands of light.

- 366+, for devices which use an analyzer and a polarizer in the light path of a device testing light or a substance optically.

SEE OR SEARCH CLASS:

- 209, Classifying, Separating, and Assorting Solids, particularly subclass 582 for the physical separation of articles based on a color test, which involves at least two different colors.
- 235, Registers, subclasses 61+ and 150+ for apparatus responsive to a color test which performs a mathematical function to indicate a quantity correlated to the color test.
- 250, Radiant Energy, subclasses 201.1+, 206+, and 226 for plural photosensitive color circuits where no support for a sample is included in the claims or where no indicator for the light used in the test is included in the claims.
- 359, Optical: Systems and Elements, subclasses 885+ for colored filters.

**408 With sequential comparison of sample and standard:**

This subclass is indented under subclass 402. Subject matter wherein there is a light source and optical means to produce a beam or beams of visible light which may be monochromatic; (a) means to hold, move, and position sequentially either at least two samples or a sample and a standard into the path of the beam, or (b) means to cause the beam or beams to sweep or switch between fixed samples and standards; and electrical detecting and indicating means to note the light transmitted through or reflected from the samples and standards.

**409 Fluid color transmission examination:**

This subclass is indented under subclass 402. Subject matter wherein a fluid substance, a solute in a solvent, or a miscible liquid is examined by a transmissive light test (quantitatively or qualitatively) for the purpose of noting color, different shades or tints of colors, or the concentration of a solute in a solvent.

- (1) Note. Patents dealing with chromatography include a mass or masses of chemically absorptive material supported in a

transparent conduit so that a confined flow of liquid or gaseous material through the chemically absorptive material may produce a selective colored band or bands held in layers by absorptive phenomena. The layers and their interfaces may be examined visually or by radiation sensitive instruments to furnish qualitative determinations with respect to the chemical composition of the material analyzed. Those patents with significant claimed subject matter involving an optical color test following the absorption of a constituent of a liquid or gaseous material are included as originals in this schedule.

**SEE OR SEARCH CLASS:**

- 73, Measuring and Testing, subclasses 23.35 and 53.01+ for the methods and apparatus for examining the band or bands of the chromatography column to determine the quantity, quality, or the substances of the band or bands in a gas or liquid chromatography test.
- 95, Gas Separation: Processes, subclasses 82+ for processes of gas separation using chromatography.
- 96, Gas Separation: Apparatus, subclasses 101+ for chromatography type apparatus for gas separation.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for analytical apparatus involving chromatography or a colorimeter wherein a reactive reagent is used to develop color.
- 436, Chemistry: Analytical and Immunological Testing, for processes involving the combination of a gas or liquid chromatography test with a colorimetry test of the colored band or bands from the chromatography column where a chemically reactive reagent is necessary to develop the color for the colorimetry test.

**410 Of flowing liquids:**

This subclass is indented under subclass 409. Subject matter including apparatus which forms part of a liquid circulation system which permits constant or intermittent flow of the liquid being examined, and a support for the liq-

uid contained, and which is constructed to allow light to pass through the contained liquid for a visual or photosensitive examination.

- (1) Note. Included herein are a comparison of a test fluid with a light standard or with a standard of the same fluid, or a comparison of a voltage which is the result of the detected light transmitted through the fluid tested with a voltage level used as a standard as in a bridge circuit in null type recording and indicating instruments.

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

- 51, for infrared energy or filters utilized in the test circuitry.
- 246, for flow cells, per se.
- 319+, for spectrophotometers which utilize a dispersing element to produce the light radiation utilized in the same type of selective absorption test.
- 436+, for light transmission of liquids where no monochromatic light is involved in the test.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 3 and 93 for methods and apparatus for the control of flowing fluids which involve a color test of this Class 356.
- 250, Radiant Energy, subclasses 356 and 357 for the detection or measurement of invisible radiation used to test fluent material; subclasses 564+ for fluent material in the optical path and a photocell circuit; and subclasses 573+ for the detection of a fluent material in the optical path.
- 340, Communications: Electrical, subclasses 603+ for electrical condition responsive systems responsive to fluent material which utilize an electrical signalling device such as a light or bell rather than a meter or a recorder.
- 346, Recorders, particularly subclasses 31 through 33 for recorders operated by follow-up or rebalancing systems alone or in combination with a nominal optical test where the novelty alone is in the recorder, per se.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for continuous flowing fluid apparatus involving a color test and in which a chemical reaction occurs.

436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for processes involving continuous flowing fluid systems which include a color test wherein a chemical reaction occurs.

**411 With plural light detectors (e.g., photocells):**  
This subclass is indented under subclass 410. Subject matter including more than one photosensitive device.

**412 With ionic determination:**  
This subclass is indented under subclass 409. Subject matter including an unknown solution and one or more standards (which may be a transmissive liquid or solid or a reflective standard or any combination thereof) for the simultaneous comparison of the unknown solution with the standard or standards for similar color or slight differences in the same color which color standard or standards are correlated to ionic conditions existing in the solution examined.

(1) Note. Included in this group are apparatus which involves the finding of the pH value of solutions in terms of hydroxyl or hydrogen ion concentration, and titration apparatus in which no reagent is recited in the claims; and also included are other tests which involve the correlation of the tint or shade of a color with respect to the color of the standard solution in which the ion content is known.

(2) Note. The disclosure of the tests recited in (1) Note above is sufficient for placement in this subclass.

(3) Note. Included are optical tests to determine the concentration of solute in solvents.

SEE OR SEARCH THIS CLASS, SUBCLASS:

414, for filters which include solid and liquid filters and standards of the trans-

missive type where no ionic analysis is involved and no concentration of the solute and solvent is involved.

416+, for transmissive filters involved in a comparison test of gases or solid material.

SEE OR SEARCH CLASS:

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for chemical apparatus having means for performing color tests involving pH and titrations which claim the reagents, including the indicators, which chemically react in the tests.

436, Chemistry: Analytical and Immunological Testing, subclasses 1+ for chemical test processes which include color tests involving pH and titrations which claim the reagents, including the indicators, which chemically react in these tests.

**413 With variable light path length:**

This subclass is indented under subclass 409. Subject matter wherein the length of the light path through the liquid may be varied, as by inserting a light-transmitting member of constant light-transmitting length into the liquid to a desired depth and passing light through the liquid and the light-transmitting member in series.

(1) Note. Scales correlated with the change in the amount of the liquid in the light path are present in the disclosed device but are not always included in the claims.

(2) Note. Subcombinations of the devices are classified herein when they are not provided for elsewhere.

(3) Note. Included in this subclass are colorimeters of the "Duboscq" type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

441+, for turbidity measurements which may utilize the same structure as found in 413.

**414 With color transmitting filter:**

This subclass is indented under subclass 409. Subject matter including a filter element in the visible range positioned in the light transmission path of visual and photosensitive testing apparatus.

- (1) Note. Included in the group are visual extinction type, sequential and simultaneous comparison tests involving at least one known color standard and one unknown liquid. The standard may be a colored light source or light source plus a colored light transmissive filter.
- (2) Note. An infrared filter for the purpose of transmitting infrared or for preventing the heat rays of a light source from entering the liquid tested is not a filter under the definition of this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 51, for liquid colorimeters which include an infrared filter in the test or for the purpose of removing heat radiation from affecting the test results. See (2) Note above.
- 416+, for color-transmitting filters used in measuring shade or color, per se.
- 432+, for light transmission tests where no color or concentration of a solute in a solvent is involved in the optical test.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 211 for circuitry having photocells with inherent color sensitivity; subclass 226 for optical or prephotocell systems which include filters within the visible spectrum.
- 359, Optical: Systems and Elements, subclasses 577+ for interference type filters; and subclasses 885+ for filters generally which may be used to produce monochromatic bands of radiation within the visible spectrum.

**415 Including liquid filter comparison:**

This subclass is indented under subclass 414. Subject matter which includes at least two liquid light transmissive containers of the same type, the liquid in all of the containers differing

only in shade or tint from each other, and support means for the containers to permit the simultaneous viewing of all the contained liquids axially or laterally of the containers.

- (1) Note. Here the filters are the contained liquids which are standards of varying tint or shade of the unknown color or the filters are formed of a standard solution such as distilled water which is used in conjunction with colored transmissive solid filters which form various colors, tints, or shades. One of the liquids may be the tested colored solution.

**416 With color transmitting filter:**

This subclass is indented under subclass 402. Subject matter wherein a light filter having a particular light transmission characteristic to pass light of a particular color is disposed in the light path of the testing device.

- (1) Note. The filter may be in the light path between the sample and the light source or between the sample and the viewing position path.
- (2) Note. Included are visual devices of the extinction type, and of the equal intensity comparison type involving colored light, per se, or involving colored light reflected from or transmitted through a substance.
- (3) Note. Comparison types utilizing colored light standards are placed here rather than in subclass 190.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 43+, for optical pyrometers which may utilize colored light filters to determine the temperature of a light emissive source.
- 213, for photometers which measure the intensity of light without regard to the frequencies of light present in the light tested.
- 300+, for spectrosopes, spectrometers, and spectrophotometers which utilize a dispersing element such as a prism or a diffraction grating rather than a filter to separate collimated light into bands

of the various colors present in the light.

- 414+, for color-transmitting filters used in the examination of color transmission by fluids.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclass 226 for photocell optical systems which may utilize a visible colored light filter in the system where no indicator is claimed or disclosed and no support for object tested is included in the claims.
- 359, Optical: Systems and Elements, subclasses 885+ for filters, per se.

**417 Includ ed with sample excitation:**

This subclass is indented under subclass 416. Subject matter including a flame producer or an electrical excitation means wherein a specimen is burned or excited to produce visible radiation for analysis by light intensity or illumination measurement means.

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

- 213+, for photometers, per se.  
315, for flame spectroscopy.

**418 Including rotating sequential filters:**

This subclass is indented under subclass 416. Subject matter wherein there are rotating sequential filters positioned in the light path to rotate during the test.

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

- 217, for modulating photometers for the examination of the intensity of light.
- 434, for light transmission tests of the sequential type which may involve mechanical, electrical, or electro-optical modulating means, and where only the intensity of the light transmitted through a substance is involved.
- 447, for light reflection tests which include modulation of the reflected light from a substance where only the intensity of the reflected light is involved.

**419 Including multicolor filters:**

This subclass is indented under subclass 416. Subject matter wherein more than one filter is provided for the purpose of additively using more than one filter at the same time to produce a desired tint or shade for the purpose of comparing this produced tint or shade with an unknown color, or wherein a plurality of filters are provided, one of which is available at a time, as for the purpose of selecting only one visible band of radiation at a time from the light reflected from or transmitted through the sample.

- (1) Note. This sub will take wedge-shaped filters which pass different wavelengths.

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

- 43, for optical pyrometers which measure the temperature of a light emissive object by means of filters.
- 51, for optical tests which use infrared or ultraviolet radiation in the claimed test.
- 319+, for absorption spectrophotometers which utilize a dispersing member such as a prism or a diffraction grating rather than a filter to produce a plurality of narrow bands of visible radiation before or after radiation is reflected from or transmitted through a substance.
- 404, for photographic color test devices which may use a plurality of filters additively or sequentially for copying purposes such as color correction, colored negative examination, and colored light meters. However, see the pyrometric subclasses 43+ of this class where the claims or disclosure indicate the light reading to be in terms of temperature.
- 405, for tristimulus apparatus which utilize three filters, sequentially or simultaneously, corresponding to the stimulus received by the human eye.
- 406, for apparatus using three or more colored filters, sequentially, which is capable of trichromatic examination of light or material.

## SEE OR SEARCH CLASS:

- 348, Television, subclasses 655+ for apparatus which may use a plurality of filters to adjust the color balance in color television systems.
- 351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 216+ and 233+ for filters which are selectively interposed in the line of vision.
- 434, Education and Demonstration, subclass 102 for color comparison charts which utilize filters to show the effect of the addition of various colors on light.

**420 Included with colored light sources:**

This subclass is indented under subclass 416. Subject matter including devices to produce colored light standards which utilize a filter to provide colored light for test purposes as opposed to general illumination purposes.

- (1) Note. Light standards which utilize a dispersing device such as a prism or a diffraction grating along with a slit to form the various monochromatic light source are placed in the monochromator subclass 331.
- (2) Note. Where a colored light standard capable of use as a Class 362 general illumination device is claimed in combination with a support for a substance to be examined by this light standard, the original classification is in subclass 414.
- (3) Note. A colored light or its subcombinations capable of use as a test light standard which cannot be distinguished structurally as a colored general illumination device is classified in Class 362, rather than in Class 356.

## SEE OR SEARCH CLASS:

- 359, Optical: Systems and Elements, subclasses 291+ for electron beam devices which vary the angle that the beam hits a diffraction surface to produce colored and black and white light producing systems.
- 434, Education and Demonstration, subclasses 98+ for colored light projectors and the mixing of colored light

when the claims state the purpose of these devices is for educational or artistic purposes.

**421 With reflective multicolor chart or standard:**

This subclass is indented under subclass 402. Subject matter including one or a plurality of surfaces which reflect different colors or tints of a color for comparison with the color of the samples to be tested.

- (1) Note. The surface may be a liquid. The surfaces of the standard need not be of the same material as the sample to be tested.
- (2) Note. This group of subclasses includes both the chart and standards, per se, as defined in the above definition as well as color testing devices incorporating such charts or standards and not classifiable above.
- (3) Note. The standards and the comparative devices of this group are the type wherein a comparison of known and unknown is made simultaneously and may be of manipulative or hand held visual type; but these subclasses also provided for the photoelectric type.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 43+, for reflective standards where color is involved to determine the temperature of a heated object or emissive source.
- 243.1+, for optical standards generally as where color is not involved.
- 244+, for supports for liquid or solid standards generally.

## SEE OR SEARCH CLASS:

- 43, Fishing, Trapping, and Vermin Destroying, subclass 1 for fishing implements which utilize color to test for the most effective colored lure for the existing water conditions.

**422 Plate:**

This subclass is indented under subclass 421. Subject matter wherein the surfaces are formed as flat, platelike colored structures.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

229, for the comparison of light intensities where no color is involved and where the unknown light is compared with flat, platelike structures forming light reflecting standards.

243.1+, for visual standards other than the colored type.

433+, for the comparison of light transmitted through an unknown substance with light reflective standard plates where color is not involved.

448, for the comparison of light reflected from an unknown substance with light reflective standard plates where color is not involved.

SEE OR SEARCH CLASS:

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 61 for analytical apparatus which may be in the form of kits which utilize flat, platelike colored standards as a basis for a visual or photoelectric comparison with a colored substance reactively produced in order to determine the presence of a chemical element, anion, or cation.

#### 423 **Disk:**

This subclass is indented under subclass 422. Subject matter wherein the surfaces are disks or sectors which form disks.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

243.1+, for reflective standards which do not involve color testing.

SEE OR SEARCH CLASS:

434, Education and Demonstration, subclasses 98+ for multicolor charts which may be in the form of a disc, which are used for display and instruction purposes, and which may also be used as a standard for the comparison of an unknown color with the colors and their tints and shades formed in or on the disc.

#### 424 **Drum or endless tape:**

This subclass is indented under subclass 421. Subject matter wherein the surfaces are in the form of a endless member such as a tape or a drum.

#### 425 **With color determination by light intensity comparison:**

This subclass is indented under subclass 402. Subject matter wherein the color comparison of two masses is made by comparing the intensity of the light from the two masses (either transmitted or reflected).

(1) Note. This type of comparison has been designated in the literature as heterochromatic photometry. It is usually restricted to comparing different shades or tints of the same color. Usually filters are not used in color determination of this type.

(2) Note. Subclasses 432+ and 445+ provide for the reflection and transmissive testing of materials by noting the intensity of the reflected or transmitted light. The distinction between subclass 425 and subclasses 432+ and 445+ is that the articles examined in subclass 425 are of the same color and differ only in tint or shade from one another, while subclasses 432+ and 445+ have no color involved at all.

(3) Note. Where a liquid is tested for concentration of a solute in a solvent and the comparison is made with a light intensity source and where no color is involved at all and where the liquid is claimed, the original patent is placed under the appropriate subclasses of 409+ and is cross-referenced in 422.

(4) Note. Where a plurality of reflective colored standards are claimed in the comparison of a gaseous or solid colored substance and the comparison is noted visually or photoelectrically without the inclusion of filters, the original is classified under subclass 421 and cross-referenced in subclass 425.



SEE OR SEARCH THIS CLASS, SUB-CLASS:

409+, for analyzing chemical solutions by comparing colors on the basis of intensity alone. See (3) Note above.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, particularly subclass 581, where articles are physically separated on the basis of color by using only a light intensity test.

250, Radiant Energy, subclass 214 for circuits responsive to photosensitive devices which do not claim a support for articles examined for color by a light intensity test or do not claim an indicator.

362, Illumination, subclass 249.08 for light projectors which include a source of illumination together with means to modify the direction of the light from the source and structure to house the light arrangement.

**426 BY INSPECTION WITH AGITATION OR ROTATION:**

This subclass is indented under the class definition. Subject matter wherein there is apparatus to inspect articles of manufacture, including containers and contained fluids for foreign particles such as dirt, and which includes means to support and rotate, agitate, or otherwise move the containers or the fluid contents to cause motion of the article or of the particles in the fluid contents as part of the test procedure and not as a condition of transporting the article to and from the test location; and means to illuminate the article so that the illumination may be transmitted through the articles, containers or contained fluid or reflected from the article or container, or transmitted around portions of an article for the purpose of testing for defects, blemishes, flaws or any other type of imperfection.

(1) Note. Conveyors may be utilized to bring the articles to and beyond the test position and may be part of the test combination claimed where no specific class provides for the combination.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

237.1+, for apparatus which visually inspects materials or articles for imperfections.

**427 Of container contents:**

This subclass is indented under subclass 426. Subject matter wherein the supported and rotated or agitated articles are containers holding fluids, and the inspection is directed to the fluid itself, the inspection of the container being incidental.

(1) Note. Subclasses 337+ deal with fluids which have uniformly entrained within them particles which cause scattering when tested by a directed beam of light transmitted through the fluid. Here the particles entrained do not create a uniform condition, but a localized undesired imperfection within the encapsulated or contained fluid.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 61.41+ for the testing of suspensions of solids in liquids for determining the ratio of solid and like foreign matters to the liquid.

250, Radiant Energy, subclasses 564+ for fluent material in the optical path and a photocell circuit; and subclasses 573+ for the detection of a fluent material in the optical path.

**428 Of containers:**

This subclass is indented under subclass 426. Subject matter wherein the article is a container or receptacle which is tested by means of light transmitted through or reflected from the container or receptacle.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

51, for the transmission or reflective testing of containers for flaws or dirt which uses ultraviolet or infrared radiation in addition to visible light.

240.1+, for visual and photoelectric examination of containers for flaws or dirt wherein no rotation of the container is involved.

**SEE OR SEARCH CLASS:**

- 73, Measuring and Testing, subclasses 61.41+ for sediment or foreign content testing where the ratio or amount of the sediment or the foreign content to the liquid would be determined.
- 209, Classifying, Separating, and Assorting Solids, subclasses 524+ for the testing of containers for flaws by the use of visible light and the automatic rejection of the flawed containers as a result of this test.
- 250, Radiant Energy, subclass 224 for optical or prephotocell systems which include a support for an article to be tested and structure to relatively move the light ray and the article during the test; subclasses 336.1+ for methods and apparatus having an electric signalling device responsive to invisible radiation for testing articles; and subclasses 453.11+ for supports for irradiated objects.

**429 BY MONITORING OF WEBS OR THREAD:**

This subclass is indented under the class definition. Subject matter for inspecting or testing webs or threads of material including apparatus to support and transport the web under, over, or through an inspection station; a light source with optical means (which may include flying spot scanners) to direct the light through, around, or reflective from the web or thread; visual and photoelectric means (including comparator types) to detect changes in the light intensity produced by the light coating with the web or thread; and with the photoelectric alternative an indicator responsive to the photoelectric means to not quantitatively or qualitatively variations in optical properties or condition.

- (1) Note. When an optical test is claimed on a web or thread including an indicator, qualitative or quantitative, actuated in response to the test, classification is here rather than in Class 250, subclasses 548 and 559.01+.
- (2) Note. When the claims include a light source for the test, a support for the material tested, and a photosensitive

detector without the indicator classification is in this Class 356 as opposed to Class 250.

- (3) Note. The claimed terms “reject means,” “reject mechanism,” or “indicator means” do not necessarily qualify as an indication means for this class as these terms could be a relay mechanism or other switch mechanism which is not a qualitative or quantitative signalling means for this class. A single disclosure to an indicator, qualitative or quantitative with the term reject means claimed will be classified in this subclass 429 provided its indicator is not part of a more comprehensive arrangement classified elsewhere. For example, see Class 209.

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

- 242.1, for the counting of threads in woven fabrics where the fabric is stationary.
- 384+, for the determination of the width or diameter of a web or filament.

**SEE OR SEARCH CLASS:**

- 73, Measuring and Testing, subclasses 159+ for the testing or inspection of sheet material, including woven fabric materials where no optical tests, per se, are performed.
- 162, Paper Making and Fiber Liberation, subclasses 198 and 252+ for process and apparatus wherein an optical test may be utilized to control a paper making or fiber liberation process.
- 226, Advancing Material of Indeterminate Length, subclasses 3 and 15+ for processes and apparatus which utilize optical tests to laterally position a moving web.
- 250, Radiant Energy, subclasses 439+ for ray energy devices combined with a support for an article; subclasses 361+ for testing articles by using fluorescent or phosphorescent radiation; subclasses 336+ for the testing of articles by invisible radiations; subclasses 548, 559, and 571 for apparatus to significantly illuminate weblike material and to detect the illumination as modified by the weblike material; subclasses 229+ for adjustable light

- masking devices; and subclass 237 where the light masking devices are not adjustable. See also (1) and (2) Notes above.
- 340, Communications: Electrical, subclasses 227+ and 259+ for devices which are responsive to visible light tests to denote and indicate, by means of an electrically operated bell or light, the condition of a web, including motion picture film.
- 346, Recorders, subclass 33 for nominal optical test devices which operate a recorder of the Class 346 type where there is novelty in the recorder, per se.
- 352, Optics: Motion Pictures, subclasses 105+ for continuously moving films with optical viewers involving a periodic displacement of the optical axis for the purpose of inspecting the films, including flaw detection.
- 396, Photography, subclasses 567+ for fluid-treating apparatus where a light test is made to determine the value of light contrast of the exposed film to regulate the apparatus.
- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, process involving exposure of a radiation imagery receiver.
- 430 For flaws or imperfections:**  
This subclass is indented under subclass 429. Subject matter wherein the web or thread is tested for flaws or imperfections.
- (1) Note. The test for flaws or imperfections is usually manifested by a local variation in an optical characteristic of the material which stands out in contrast with the general or normal optical characteristics. This test is in contrast with the testing for the general reflecting or transmission properties of the web, and which is provided for in the generic subclass 429.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
238, for cloth inspection for flaws where the cloth is stationary.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclasses 548 and 559.01+ for web, strand, or records in the optical path where the light responsive element is not combined with an indicator; and subclass 237 for diaphragms, masks, or gratings combined with a photocell.
- 359, Optical: Systems and Elements, subclasses 894+ for a light mask, per se, where there is not intentional deviation of the light as by refraction or diffraction.
- 431 Including transverse scanning:**  
This subclass is indented under subclass 430. Subject matter including means for scanning in a direction other than the line of travel of a moving web or thread.
- 432 FOR LIGHT TRANSMISSION OR ABSORPTION:**  
This subclass is indented under the class definition. Subject matter wherein visible radiation is passed directly or with internal reflection through solid, liquid, or gaseous substances or any mixture thereof including coated solids, and detected visually or photoelectrically after it has passed through the substance for the purpose of determining the intensity, the change of intensity, the extinction of the radiation, or the outline of the radiation source or image.
- (1) Note. As between this class (356) and Class 250, the claimed combination of a light source, a support for a substance to be tested by a transmission test, and a photosensitive detector with or without indicating structure is classified in this class (356) providing there is the disclosure of an indicator responsive to the detector not provided for elsewhere. If an indicator of the quantitative type such as a meter is present in the claimed combination, classification is in class (356) regardless of the claiming of the support.
- (2) Note. The patents claiming a light source with the transmission of this light through a substance and detected (usually quantitatively) are in subclasses 432+. If no light source is claimed and only the light intensity of a specific location or locations is involved and not the amount of light attenuated in the passage of the light through a medium or a substance, or only the intensity of a light

source is desired without regard to the attenuation of the light in its passage through a medium, see subclasses 213+ on photometry.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 213+, for photometers. See also (2) Note above.
- 402+, for colorimetry.
- 445+, for light reflection measuring and testing.

SEE OR SEARCH CLASS:

- 209, Classifying, Separating, and Assorting Solids, subclass 588 for automatically assorting articles by light transmission inspection.
- 250, Radiant Energy, especially subclasses 218 and 219 for photocell systems with articles or material in the optical path. See also (1) Note above.

**433 By comparison:**

This subclass is indented under subclass 432. Subject matter wherein light is passed through a specimen to be tested and compared in intensity with some other light, whose intensity is known or may be determined.

- (1) Note. The light may be in beam form and the standard light may also be passed through a light-modifying medium. The specimen and standard light may emanate from a common source.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 46+, for optical pyrometers with incandescent standards.
- 229+, for visual comparison photometers.
- 402+, for shade or color comparison.
- 443+, for film density determination involving comparison.

**434 Photoelectric (e.g., sequential viewing):**

This subclass is indented under subclass 433. Subject matter including a photosensitive device which is responsive to the light passing through the specimen.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 218+, for photoelectric photometers of the comparator type.
- 402+, for colorimeters of the photoelectric comparator type.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 216+ for photocell circuits of the comparator type with optical or prephotocell systems; and subclasses 204+ for control of the light used by the system directly or indirectly as by controlling the optical elements in the light path to the photocell detector.

**435 With plural detectors (e.g., simultaneous viewing):**

This subclass is indented under subclass 434. Subject matter including a plurality of photodetectors, usually one being stimulated by the light from the specimen and the other being stimulated by the standard light.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 222, for photometers with plural detectors.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclasses 208+ for plural photocell controlled circuits; and subclass 578 for optical or prephotocell systems containing plural photocells.

**436 Of fluent material:**

This subclass is indented under subclass 432. Subject matter wherein visible radiation is detected after passing through a fluid substance.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 246, for fluid containers, per se, peculiar to testing.
- 335+, for determining the size of the particles or the size and the number of the particles present in a turbid solution.
- 337+, for particle light scattering wherein the light detected is that reflected from the particles in the turbid suspension.

## SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 64.41+ for the testing of the settling rate of a liquid suspension of solids.
- 250, Radiant Energy, subclasses 564+ for circuits for evaluating a fluent material; and subclasses 573+ for photocell detection of fluent material in an optical path.

**437 Gas:**

This subclass is indented under subclass 436. Subject matter wherein the fluent material is a gaseous substance.

**438 Exhaust, dust or smoke:**

This subclass is indented under subclass 437. Subject matter wherein there is a gas which includes entrained solid particles of dust or smoke.

- (1) Note. Both visual and photoelectric detection devices of the static and the flowing type are here.
- (2) Note. For light transmission tests involving chemical concentration of gases which do not contain particulate material, see the colorimeters in subclasses 402+ above.
- (3) Note. This subclass only provides for testing the transmission characteristic of a gas with particles of dust or smoke uniformly distributed therethrough. For testing the transmission characteristic of gases, per se, see subclasses 402+ where color is involved, or subclass 437 above.
- (4) Note. Included are the apparatus to determine the particle count in gases by means of light transmitted through the particle-containing gas.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 36+, for the preparation of sample gases which may include entrained moisture and/or particles such as "condensation nuclei,"
- 246, for fluid containers, per se.

- 337+, for the detection of light scattered by the entrained particles or moisture in a flowing or static gas.
- 441+, for liquid particle suspension testing.

**439 Contained:**

This subclass is indented under subclass 438. Subject matter wherein there is structure to enclose, at least partially, a gas which has entrained dust or smoke particles.

**440 With significant sample holder or supply:**

This subclass is indented under subclass 436. Subject matter including particular structural means to constrain, contain, move, or guide fluent material in the light beam.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 239+, for the detection of flaws or imperfections in motionless containers by passing light therethrough.
- 246, for sample holders for fluids, per se, peculiar to testing.
- 428, for the inspection of containers in motion.

## SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 864.91 for strip cups.
- 206, Special Receptacle or Package, appropriate subclasses or receptacles of general use which are not restricted to use in optical testing of materials.
- 250, Radiant Energy, subclasses 428+ for fluent material containers, supports, or transfer means for subjecting the material to radiation; and subclass 576 for sample holders or supply means of fluent material in an optical path.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 99+ for laboratory apparatus elements which may include fluid containers. An alternative electronic search of U.S. patents based upon a modification of the European Patent Office Classification (ECLA) System for certain subject matter in this subclass may also be found in Class 422 Cross-Reference Art Collections 908 - 948. (There are no definitions associated with these Cross-Reference Art Collections. The

most available disclosure as to the types of documents contained herein is given in any notes associated with the titles.)

**441 Having particles suspended in liquid:**

This subclass is indented under subclass 436. Subject matter including in the light path, liquid particle suspensions, such as turbid or colloidal suspensions, paint, or milk; and including a detector and indicator of the transmitted radiation through the liquid which is correlated to the turbidity of the solution or the number of the particles causing the turbidity.

- (1) Note. Both static and through-flow type test devices are included.
- (2) Note. In visual turbidity devices of the static and extinction type, scales are associated with the devices to note the depth at which the extinction of light occurs.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 39, for determining characteristics of blood particles present in a sample.
- 246, for fluid containers, per se, peculiar to testing.
- 335+, for determining the size of the particles or the size and the number of the particles present in a turbid solution.
- 337+, for particle light scattering wherein the light detected is that reflected from the particles in the turbid suspension.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 64.66 for the testing of the settling rate of a liquid suspension of solids.
- 250, Radiant Energy, subclasses 564+ for circuits for evaluating a fluent material; and subclasses 573+ for photocell detection of fluent material in an optical path.

**442 With light detector:**

This subclass is indented under subclass 441. Subject matter including photosensitive means responsive to light passing through the fluent material.

**443 Of photographic film:**

This subclass is indented under subclass 432. Subject matter wherein structure is provided to transmit light through a sheet, strip, or other translucent solid medium of a photographic nature, with provision to position the medium so that the light is transmitted either through all or selected portions of the medium, together with means to visually or photoelectrically determine the intensity of the transmitted light.

- (1) Note. Included in this subclass are photoelectric apparatus and visual apparatus which permit the visual comparison of the intensity of the light transmitted through a photographic negative with brightness standards or with light sources whose intensity can be varied in a calibrated manner by means of variable apertures or light attenuating mediums or with variable light sources.
- (2) Note. For photographic enlargers of the light projection type, see Class 355, Photocopying. The apparatus of these subclasses 443+ when claimed in combination with the structure of such an enlarger or when claimed as controlling the light of such an enlarger is classified in Class 355, Photocopying, subclasses 67+.
- (3) Note. For printers of the contact type, see Class 355, Photocopying, subclasses 78+; and for processes of this type which involve the exposure of a visible light sensitive medium or use of developed negative, see Class 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof. If as claimed the apparatus of subclasses 443+ is combined with a contact-type printer apparatus, or controls the exposing light of a contact printer, classification is in Class 396. For methods which involve the comparison of optical densities of the type found in subclasses 443+ in combination with an exposure of a visible light sensitive film, see particularly Class 96, subclasses 27+.
- (4) Note. The photometers which analyze the spectrographs such as formed by the

instruments of subclasses 302+ of this class are classified in these subclasses 443+.

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

- 51, for instruments responsive to infrared or ultraviolet and visible radiation being transmitted through a translucent solid medium in combination with means to measure the intensity of the light transmitted through the medium.
- 220, for photoelectric apparatus to measure logarithmically the intensity of light at some specific location.
- 243.1+, for light density standards, per se.
- 244, for specimen or standard supports for passing light through a solid.
- 404, for examination of the color properties of photographic negatives.
- 405, for photographic printing apparatus of the color type which includes color correction whereby light of at least three different colors is transmitted through a developed negative and the intensities of the various colors necessary to make a duplicate of the negative.

**SEE OR SEARCH CLASS:**

- 355, Photocopying, subclasses 67+ for photographic enlargers of the projection type with apparatus to measure the minimum and maximum optical densities of the developed negative from which copies are to be made. See also (2) Note above and subclasses 78+ for printers of the contact type. See (3) Note above.
- 396, Photography, subclasses 213+ for actinometer with camera, and subclass 563 for making of optical wedges by exposing photographic material.

**444 With scanning, sweeping, or moving detector over film:**

This subclass is indented under subclass 443. Subject matter wherein directed light transmitted through the sheet, strip, or other translucent solid medium is moved in a predetermined manner either by electronic means or by mechanically moving optical means; or wherein the sheet, strip, or other solid medium

is moved past the light source; or wherein the photoelectric means is moved selectively about the surface of the film sheet, strip, or medium in order to obtain the intensity of the light transmitted at a plurality of locations through the film sheet, strip, or other solid medium.

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

- 429+, for apparatus which monitors moving webs of the translucent, transparent, or opaque type.
- 614, where the amount of displacement is measured.

**SEE OR SEARCH CLASS:**

- 250, Radiant Energy, subclasses 555+ and 566+ for photoelectric apparatus to detect records such as photographic film; and subclasses 336.1+, especially subclasses 359.1 and 360.1, for methods and apparatus to inspect relatively moving objects with respect to invisible radiant energy with a radiation responsive electric signalling device.
- 358, Facsimile and Static Presentation Processing, subclasses 474 through 498 and 500-540 for optical devices of the facsimile type which utilize flying spot scanner light beams for transmission through a film or films for the purpose of detecting the optical density for reproducing a facsimile type picture.
- 396, Photography, subclasses 567+ for fluid-treating apparatus which includes a photocell for performing an optical density check on the film being processed, and means for controlling the apparatus.

**445 OF LIGHT REFLECTION (E.G., GLASS):**

This subclass is indented under the class definition. Subject matter which includes either a material or a sample designed to be placed next to or upon a material or sample to be examined on the basis of reflected light intensity; and which includes either light generating and optical means to direct the generated light, or optical means to direct natural light onto the material or sample to be examined, so that the light is reflected therefrom for examination by visual or photosensitive means to indicate or

record, when so desired, the intensity or differences of intensity of the reflected light.

- (1) Note. This subject matter is limited to surface reflection.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 237.1+, for visual light inspection apparatus which check for local variations in the overall light intensity from articles or material as caused by imperfections or flaws.
- 300+, for dispersion type test apparatus which reflects light from standards or unknown substances at selected frequencies.
- 369, for measuring or testing surface reflection using polarized light.
- 402+, for devices which measure the intensity of light reflected from materials or the comparison of colors by means of reflective standards.
- 625, for mensuration devices with which measurement is based upon the intensity of light reflected from an article or material.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 29 for the determination of vapor content of a gas by light scattering of a light beam reflected from a test surface; subclasses 104+ for surface testing; and subclass 160 for measuring the light intensity of a reflected beam of light from a dyed thread sample which is indicative of the color of the sample.
- 209, Classifying, Separating, and Assorting Solids, subclasses 580+ and 587 for radiant energy devices which separate articles physically on the basis of the intensity of reflected radiation which is correlated to the surface or the color of the article.
- 250, Radiant Energy, subclasses 216+ wherein light reflected from articles, material, or animate beings controls a photosensitive detector.
- 340, Communications: Electrical, subclasses 227, 234, and 235 for electrical signalling apparatus which utilize the intensity of reflected light to note

a change of condition including ice formation, moisture, or humidity conditions.

**446 With diffusion:**

This subclass is indented under subclass 445. Subject matter wherein the light reflected from the material or sample is scattered by reason of the surface irregularities of the material or sample alone; or wherein the reflected light is a combination of the scattered light and specularly reflected light; or wherein the reflected light is scattered from particles distributed on the surface of the material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 237.1+, for inspection of material or articles for flaws which include the detection of contaminants such as dirt within a bottled fluid.
- 337+, for light scattering caused by more or less uniformly distributed particles internally in a fluid, liquid, or gas which may be moving or static.
- 427, for light scattering caused by contaminants, such as dirt or other particles, which are entrained in encapsulated or bottled fluids, where agitation or rotation is used to cause the unwanted particles to move about within the fluid.
- 448, for comparison apparatus of the reflected light type which does not involve light diffusion.

**447 With modulation (e.g., flicker beam):**

This subclass is indented under subclass 445. Subject matter including devices which modify the light reflected from the material or article in a repetitive manner, mechanically or otherwise.

- (1) Note. Comparative reflecting devices of the modulator type are classified here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 217, for photometers of the modulating type both visual and photoelectric wherein the light intensity at some location alone is desired.
- 314+, for spectrophotometers which utilize mechanical, electrical, or optical modulators including the polarized light



- type to obtain the light intensities or the difference in light intensities for one or more frequencies of visible light where a dispersing means is used to obtain the various frequencies of light.
- 418, for colorimeters which utilize light modulators.
- 448 By comparison:**  
This subclass is indented under subclass 445. Subject matter including visual or photoelectric apparatus which compares the reflected light in intensity from the sample or material with the light from a standard material or article.
- (1) Note. The usual comparator type includes regular and stereomicroscopes wherein a comparison of the reflected light intensity is made with a standard, which may be a photograph, where no dimensional length, profile, color plus light intensity, or flaw check is involved.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
402+, for comparison systems of the visual and photoelectric type which are based upon the frequency and the intensity of light reflected from at least the unknown material or sample.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclasses 208 and 578 for plural light sources and photocells which may be used in a comparator of light intensity as reflected from a sample or material with a standard light intensity where no indicator or test material support is claimed.  
340, Communications: Electrical, subclasses 146.3 and 5.1-5.92 which may utilize the intensity of light as reflected from documents to note the position of identifying marks or items on the documents.  
359, Optical: Systems and Elements, subclass 373 for compound lens systems of the object comparator type.  
382, Image Analysis, subclass 112 which may utilize the intensity of light as reflected from the document to denote the information content.
- 450 BY LIGHT INTERFERENCE (E.G., INTERFEROMETER):**  
This subclass is indented under the class definition. Subject matter in which plural coherent light beams interact to produce a cancellation or reinforcement of wave energy, for measuring or testing.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
4.09+, for range or remote distance measuring wherein a photo detector is responsive to light interference fringes.  
28.5, for light interference measurement of velocity.  
35.5, for material strain analysis by light interference measurement and testing.  
242, for moire pattern templates for the determination of the number of threads in a fabric such as a stocking.
- SEE OR SEARCH CLASS:  
33, Geometrical Instruments, subclass 700 for an interferometer combined with a mechanical arrangement for contacting the work piece.  
73, Measuring and Testing, subclass 655 for interferometric vibration measuring.  
250, Radiant Energy, subclass 231.13 for shaft angle transducers, 237 for hoods, grating, baffles, diaphragms, and masks, 227.11 for light conductors, and 550 for interference pattern detection.  
318, Electricity: Motive Power Systems, subclass 640 for a positional Servo system for optical adjustment by feedback from a light or optical measuring instrument.  
359, Optical: Systems and Elements, subclass 370 for an interference microscope; subclass 498 for an optical device using interference effects with polarized light, not limited to measuring or testing; and subclass 577 for an optical modifying device, in general, which utilizes the phenomenon of light interference.  
399, Electrophotography, subclass 9 for diagnostics of electrophotography

devices, particularly subclass 31 for image-forming components.

**451 Spectroscopy:**

This subclass is indented under subclass 450. Measuring and testing by light interference wherein an interference phenomenon is used to analyze the spectral characteristics of light.

- (1) Note. See Search Notes under subclass 300 above.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 300, for dispersed light spectroscopic measuring and testing.  
402, for filter photometers which analyze the wavelength and intensity of emitted or absorbed light by materials as a result of reflective or transmissive tests, where filters rather than dispersive mediums are used to isolate wavelengths of light.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 339.07 for an infrared spectrometer.  
324, Electricity: Measuring and Testing, subclass 95 for measuring or testing electricity having a wave guide or electrically long line and 96 for measuring or testing electricity utilizing radiant energy.

**452 Having particular linear mirror drive or configuration:**

This subclass is indented under subclass 451. Spectroscopy further comprising specific details of a linear mirror drive or mirror configuration of a spectrometer.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 455, for spectroscopic measuring further comprising a rotating, pendulous, or wedge scanning element.

SEE OR SEARCH CLASS:

- 359, Optical: Systems and Elements, subclass 871 for mirrors with supporting structure.

**453 Polarization:**

This subclass is indented under subclass 451. Spectroscopy wherein the interfering beams are created using a polarized interferometer.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 487, for measuring and testing by light interference wherein the interacting light waves are polarized and of differing frequencies.  
491, for measuring and testing by light interference wherein an interacting light wave of the interferometer is polarized.

**454 Fabry-Perot type or Etalon type:**

This subclass is indented under subclass 451. Spectroscopy wherein the interfering beams are created by at least two parallel surfaces in optical alignment, at least one of which is partially transmissive, forming a resonant cavity.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 480, for a Fabry-Perot interferometer further comprising a passive optical waveguide to conduct one interfering beam.  
506, for a gap measurement using a Fabry-Perot interferometer.  
519, for measuring and testing by light interference using a Fabry-Perot interferometer having a specific structure or configuration.

SEE OR SEARCH CLASS:

- 359, Optical: Systems and Elements, subclasses 577+ for interference filters.

**455 Having a rotating, pendulous, or wedge scanning element:**

This subclass is indented under subclass 451. Spectroscopy wherein scanning is accomplished by rotating or moving a transmissive element in one of the beam paths, or by rotating or pendulously moving a reflector.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 452, for a particular linear mirror drive configuration.

- SEE OR SEARCH CLASS:  
359, Optical: Systems and Elements, subclasses 871+ for mirrors with supporting structures.
- 456 Imaging:**  
This subclass is indented under subclass 451. Spectroscopy matter wherein an interference phenomenon is used to analyze spectral characteristics of light over an entire scanned image.
- SEE OR SEARCH CLASS:  
382, Image Analysis, subclass 280 for Fourier image transform.
- 457 Holography:**  
This subclass is indented under subclass 450. Measuring and testing by light interference wherein at least one of the interference light beams is reconstructed from a record of phase and amplitude information of that light beam wavefront.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
488, for measuring and testing by light interference by wavefront division.  
499, for measuring and testing a displacement or distance by wavefront division.  
521, for measuring and testing by light interference by wavefront division.
- SEE OR SEARCH CLASS:  
73, Measuring and Testing, subclass 656 for holograms used in vibration testing.  
250, Radiant Energy, subclass 550 for holographic pattern detection.  
359, Optical: Systems and Elements, subclasses 1+ for basic subject matter in the field of holography.
- 458 For optical configuration:**  
This subclass is indented under subclass 457. Holography including means to determine a relative distribution of parts, elements, or external form of an object.
- SEE OR SEARCH CLASS:  
359, Optical: Systems and Elements, subclasses 15+ for a hologram used as an optical element.
- 459 Rotation rate (e.g., ring laser gyros):**  
This subclass is indented under subclass 450. Measuring and testing by light interference wherein counter-rotating beams are interfered producing a signal indicative of a rotation due to rotation of a gyro about its sensitive axis.
- SEE OR SEARCH CLASS:  
372, Coherent Light Generators, subclass 94 for a resonant cavity having a ring configuration.
- 460 By fiber or waveguide interferometer (e.g., Sagnac effect):**  
This subclass is indented under subclass 459. Rotation rate wherein beams of differing phase are generated as a result of counter-propagation of beams in a fiber coil interferometer due to rotation of a coil around its sensitive axis.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
477+, for measuring and testing by light interference using a fiber or waveguide interferometer.  
483, for a non-rotation rate Sagnac interferometer.
- SEE OR SEARCH CLASS:  
385, Optical Waveguides, subclass 12 for an optical waveguide sensor and 14 for an integrated optical circuit.
- 461 Resonant loop:**  
This subclass is indented under subclass 460. Fiber or waveguide interferometer wherein beams of differing frequency are generated as a result of counter-rotation of beams in a resonant fiber or waveguide cavity.
- SEE OR SEARCH CLASS:  
372, Coherent Light Generators, appropriate subclasses for laser structure not limited to measuring or testing.
- 462 Multi-axis (X-Y-Z) having multiplexing:**  
This subclass is indented under subclass 460. Fiber or waveguide interferometer wherein an output is generated as a result of rotation of multiple fiber coil interferometers, each having a different axis of sensitivity, and further comprising a processing means shared between the different interferometers.

- 463 Multiple harmonic output:**  
This subclass is indented under subclass 460. Fiber or waveguide interferometer wherein multiple harmonic outputs of a bias modulation frequency are generated.
- 464 Having null feedback loop:**  
This subclass is indented under subclass 460. Fiber or waveguide interferometer wherein a feedback loop is used to null a phase difference due to a coil rotation.
- 465 Fiber coil winding:**  
This subclass is indented under subclass 460. Fiber or waveguide interferometer wherein a specific coil winding is used to compensate for non-reciprocal effects on a fiber coil.
- SEE OR SEARCH CLASS:  
242, Winding, Tensioning, or Guiding, appropriate subclass for a process or apparatus for progressively winding elongated flexible material more than 360° about an axis of a take-up of restricted length.
- 466 Having m x n loop coupler where m is greater than 2 and n is greater than or equal to 2 (e.g., passive bias):**  
This subclass is indented under subclass 460. Fiber or waveguide interferometer wherein a passive phase bias between counter-rotating beams is produced by a coil coupler.
- 467 Four frequency, multi-oscillator, non-planar cavity:**  
This subclass is indented under subclass 459. Rotation rate wherein at least four counter-rotating frequencies co-exist within an interferometer cavity.
- SEE OR SEARCH CLASS:  
385, Optical Waveguides, subclasses 15+ for optical waveguides with optical couplers.
- 468 Cavity output beam combiner:**  
This subclass is indented under subclass 459. Rotation rate wherein specific beam combining structure is used to combine counter-rotating beams outside a cavity.
- 469 Cavity mirror details:**  
This subclass is indented under subclass 459. Rotation rate including specific cavity mirror structure.
- SEE OR SEARCH CLASS:  
310, Electrical Generator or Motor Structure, subclasses 311+ for piezoelectric elements and devices.  
372, Coherent Light Generators, subclass 107 for a particular resonant cavity having mirror support or alignment structure.
- 470 Passive cavity (laser source outside cavity):**  
This subclass is indented under subclass 459. Rotation rate wherein a beam source is located outside of a resonant interferometer cavity.
- 471 Multi-axis cavity:**  
This subclass is indented under subclass 459. Rotation rate wherein different interferometer cavities share at least one common mirror.
- 472 Lock-in prevention:**  
This subclass is indented under subclass 459. Rotation rate wherein a bias is used to separate frequencies of beams at low rotation rates.
- 473 Path length control (PLC):**  
This subclass is indented under subclass 472. Lock-in prevention wherein a path length of a cavity is maintained at a specific frequency.
- 474 Having dither signal removal from output:**  
This subclass is indented under subclass 472. Lock-in prevention wherein a system oscillating signal is extracted from an output signal.
- 475 Having dither signal control:**  
This subclass is indented under subclass 472. Lock-in prevention further comprising a means to control oscillating of a system.
- 476 By dithering (suspensions, drives, flexures):**  
This subclass is indented under subclass 472. Lock-in prevention wherein specific mechanical structure is used in biasing the interferometer by dithering (oscillating) the interferometer.

- SEE OR SEARCH CLASS:  
310, Electrical Generator or Motor Structure, subclasses 311+ for piezoelectric elements and devices.
- 477 Using fiber or waveguide interferometer:**  
This subclass is indented under subclass 450. Measuring and testing by light interference having a passive optical waveguide to conduct at least one of the interfering beams.
- (1) Note. The term "passive" is intended to exclude interferometers in which the fiber or waveguide includes a laser.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
460+, for the generation of beams of differing phase as a result of counter-propagation of the beams in a fiber coil interferometer due to rotation of the coil around its sensitive axis.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclass 227.11 for light conductors.  
372, Coherent Light Generators, appropriate subclasses for laser structure not limited to measuring or testing.  
385, Optical Waveguides, appropriate subclass for optical waveguides.
- 478 Multiplexed sensor array:**  
This subclass is indented under subclass 477. Fiber or waveguide interferometer wherein a plurality of sensors are connected in an array.
- 479 Having a short coherence length source:**  
This subclass is indented under subclass 477. Fiber or waveguide interferometer wherein the coherence length of a light source is such that interference occurs only within a very narrow range of path length difference.
- 480 Resonant cavity:**  
This subclass is indented under subclass 477. Fiber or waveguide interferometer wherein the beams to be interfered are created by a resonant cavity or resonant loop.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
454, for the spectral analysis of light using a Fabry-Perot or Etalon interferometer.  
461, for a resonant loop for rotation rate detection.  
519, for measuring or testing by light interference using a Fabry-Perot interferometer having a specific structure or configuration.
- 481 Refraction indexing:**  
This subclass is indented under subclass 477. Fiber or waveguide interferometer wherein a change in phase between interfering beams is due to some change in refraction index in or along at least one of the beam paths.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
517, for measuring and testing by light interference using refractive indexing.
- 482 For distance or displacement measurement:**  
This subclass is indented under subclass 477. Fiber or waveguide interferometer wherein the fiber interferometer is arranged to measure small changes in position of an article or small length of space between two points.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
486, for measuring displacement or distance having light beams of different frequencies.  
493, for measuring displacement or distance having a polarized beam.  
498, for measuring displacement or distance by light interference.
- 483 Plural counter-propagating beams (e.g., non-motion Sagnac device):**  
This subclass is indented under subclass 477. Fiber or waveguide interferometer wherein an optical fiber or waveguide forms a closed loop through which the interacting light beams travel in opposite directions.
- 484 Having light beams of different frequencies (e.g., heterodyning):**  
This subclass is indented under subclass 450. Measuring and testing by light interference

wherein the coherent light beams are of different frequency.

**485 For dimensional measurement (e.g., thickness gap, alignment, profile):**

This subclass is indented under subclass 484. Measuring and testing using light beams of different frequency wherein the interference pattern is indicative of the height, width, depth, thickness or change in a position of an object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

482, for measuring distance or displacement using a fiber or waveguide interferometer.

492, for measuring dimensions further comprising a polarized beam.

496, for measuring dimensions by light interference.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 559.19+ for the use of radiant energy in measuring dimensions.

**486 Displacement or distance:**

This subclass is indented under subclass 485. Dimensional measurement wherein the interferometer is arranged to measure small changes in position of an article or small length of space between two points.

SEE OR SEARCH THIS CLASS, SUBCLASS:

482, for measuring distance or displacement using a fiber or waveguide interferometer.

493, for measuring displacement or distance further comprising polarized light.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 559.26 for the use of radiant energy in longitudinal measurements.

**487 Polarization:**

This subclass is indented under subclass 486. Distance or displacement measurement in which interacting light waves of a heterodyning interferometer are polarized.

SEE OR SEARCH THIS CLASS, SUBCLASS:

491, for measuring and testing by light interference wherein an interacting light wave of the interferometer is polarized.

493, for measuring displacement or distance having a polarized beam.

**488 Having wavefront division (e.g., by diffraction):**

This subclass is indented under subclass 487. Polarization wherein the beams to be combined are obtained by dividing the wavefront of an input beam.

SEE OR SEARCH THIS CLASS, SUBCLASS:

494, for measuring and testing displacement or distance with wavefront division wherein the interacting light beams are polarized and of the same frequency.

499, for measuring and testing displacement or distance with wavefront division wherein the interacting light beams are of the same frequency.

521, for measuring and testing by wavefront division by light interference.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 231.13+ for shaft angle transducers and 237 for hoods, grating, baffles, diaphragms, or masks.

**489 Contour or profile:**

This subclass is indented under subclass 485. Dimensional measurement including means for determining a contour, profile, or shape of a surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:

495, for measuring a contour or profile using polarized light.

511, for measuring a contour or profile by light interference.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 559.22 for the measurement of a surface contour using radiant energy.

- 490 Alignment:**  
This subclass is indented under subclass 485. Dimensional measurement further comprising a means to determine an alignment of a surface relative to a reference line or plane.
- 491 Having polarization:**  
This subclass is indented under subclass 450. Measuring and testing by light interference wherein an interacting light wave of the interferometer is polarized.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
453, for spectral analysis.  
487+, for measuring and testing by light interference wherein the interacting light waves are polarized and of differing frequencies.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclass 559.29 for measuring position using radiant energy.  
359, Optical: Systems and Elements, subclass 498 for an optical device using interference effects with polarized light, not limited to measuring or testing.
- 492 For dimensional measurement:**  
This subclass is indented under subclass 491. Polarized light wherein the interference pattern is indicative of the height, width, depth, thickness or change in a position of an object.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
482, for measuring displacement or distance using a fiber or waveguide interferometer.  
485+, for measuring displacement or distance using light beams of different frequencies.  
496, for a measuring dimensions by light interference.
- 493 Displacement or distance:**  
This subclass is indented under subclass 492. Dimensional measurement wherein the interferometer is arranged to measure small changes in position of an article or small length of space between two points.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
482, for measuring displacement or distance using a fiber or waveguide interferometer.  
486+, for measuring displacement or distance using light beams of different frequencies.  
498+, for measuring displacement or distance by light interference.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclasses 559.19+ for the use of radiant energy in measuring dimensions.
- 494 Having wavefront division (e.g., by diffraction):**  
This subclass is indented under subclass 493. Displacement or distance wherein the beams to be combined are obtained by dividing the wavefront of an input beam.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
488, for measuring displacement or distance using light beams of different frequencies and further comprising wavefront division.  
499, for measuring displacement or distance further comprising wavefront division.  
521, for measuring and testing by light interference with wavefront division.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclasses 231.13+ for shaft angle transducers and 237 for hoods, grating, baffles, diaphragms, and masks.
- 495 Contour or profile:**  
This subclass is indented under subclass 492. Dimensional measurement including means for determining a contour, profile, or shape of a surface.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
489, for a contour or profile measurement using a light beams of different frequencies.

511+, for a contour or profile measurement by light interference.

**SEE OR SEARCH CLASS:**

250, Radiant Energy, subclass 559.29 for measuring position using radiant energy.

**496 For dimensional measurement:**

This subclass is indented under subclass 450. Measuring and testing by light interference wherein an interference pattern is indicative of a height, width, depth, thickness or change in a position of an object.

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

482, for measuring a displacement or distance using a fiber or waveguide interferometer.  
485+, for measuring a dimension using light beams of different frequencies.  
492+, for measuring and testing a dimension using polarized light.

**SEE OR SEARCH CLASS:**

250, Radiant Energy, subclasses 559.19+ for the use of radiant energy in measuring dimensions.

**497 Having short coherence length source:**

This subclass is indented under subclass 496. Dimensional measurement wherein the coherence length of a light source is such that interference occurs only within a very narrow range of path difference.

**498 Displacement or distance:**

This subclass is indented under subclass 496. Dimensional measurement wherein the interferometer is arranged to measure small changes in position of an article or small length of space between two points.

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

482, for measuring a displacement or distance using a fiber or waveguide interferometer.  
486+, for measuring a displacement or distance using light beams of different frequencies.  
493+, for measuring a displacement or distance using polarized light.

**SEE OR SEARCH CLASS:**

250, Radiant Energy, subclass 559.26 for the use of radiant energy in longitudinal measurements.

**499 Having wavefront division (e.g., by diffraction):**

This subclass is indented under subclass 498. Displacement or distance wherein the beams to be combined are obtained by dividing a wavefront of an input beam.

(1) Note. This is in contrast to a division of amplitude at a partially reflecting surface.

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

488, for measuring and testing with light beams of different frequencies further comprising wavefront division.  
494+, for measuring and testing using polarized light with wavefront division.  
521, for measuring and testing by light interference with wavefront division.

**SEE OR SEARCH CLASS:**

250, Radiant Energy, subclasses 231.13+ for shaft angle transducers and 237 for hoods, grating, baffles, diaphragms, or masks.

**500 X-Y and/or Z table:**

This subclass is indented under subclass 498. Displacement or distance having specific structure allowing movement in two spacial directions.

**SEE OR SEARCH CLASS:**

33, Geometrical Instruments, subclass 1 for geometrical instruments having motion in the x-y direction.  
250, Radiant Energy, subclasses 559.19+ for the use of radiant energy in measuring dimensions.  
318, Electricity: Motive Power Systems, subclass 640 for photoelectric or optical-type measuring instruments.

**501 Of probe head (e.g., atomic force microscope):**

This subclass is indented under subclass 498. Displacement or distance wherein a displace-



ment is due to a force exerted on a measuring or sensing probe head.

SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, subclasses 700+ for geometrical instruments used for measuring distance.
- 250, Radiant Energy, subclass 309 for an electron probe.

**502 Surface displacement due to acoustic wave propagation:**

This subclass is indented under subclass 498. Displacement or distance in which a distance measuring interferometer determines small changes in article position due to propagation of an ultra sonic wave in a test sample.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 432, for measuring and testing using light transmission and absorption.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 655+ for using vibratory techniques to measure or test an article further including a light beam indicator.

**503 Thickness:**

This subclass is indented under subclass 496. Dimensional measurement including measurement of an extent of an object in its smallest direction.

SEE OR SEARCH CLASS:

- 250, Radiant Energy, subclass 559.27 for the use of radiant energy in thickness measurements.

**504 Refraction from surfaces of different refractive index:**

This subclass is indented under subclass 503. Thickness measurement wherein refractions of wavefronts from different surfaces due to Snells law are used to produce an interference pattern.

**505 Gap:**

This subclass is indented under subclass 496. Dimensional measurement including an arrangement for measuring (a) small changes in a space between articles or (b) a small space between two surfaces.

**506 Fabry-Perot type:**

This subclass is indented under subclass 505. Gap measurement wherein a gap is created by at least two surfaces in optical alignment, at least one of which is partially transmissive, forming a resonant cavity.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 454, for spectral analysis using a Fabry-Perot interferometer.
- 480, for measuring and testing using a fiber or waveguide Fabry-Perot interferometer.

**507 Between slider/disc (e.g., flying height):**

This subclass is indented under subclass 505. Gap measurement wherein the gap is formed by a read/write head and a record carrier element.

SEE OR SEARCH CLASS:

- 360, Dynamic Magnetic Information Storage or Retrieval, subclass 75 for the active control of a recorder or reproducer mechanism further including head position control and 102+ for a fluid bearing head.

**508 For orientation or alignment:**

This subclass is indented under subclass 496. Dimensional measurement including means for determining an alignment or orientation of a surface relative to a reference line or plane.

SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, subclasses 365+ for a level indicating device.
- 250, Radiant Energy, subclass 559.29 for measuring position using radiant energy.

**509 Between mask and wafer:**

This subclass is indented under subclass 508. Orientation or alignment wherein a reference plane is a mask and a surface is a wafer.

SEE OR SEARCH CLASS:

- 438, Semiconductor Device Manufacturing: Process, subclass 8 for semiconductor manufacture combined with a measurement or test.

- 510 Tilt:**  
This subclass is indented under subclass 508. Orientation or alignment wherein a change in angle of the surface is determined.
- 511 Contour or profile:**  
This subclass is indented under subclass 496. Dimensional measurement including means for determining a contour, profile, or shape of a surface.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
489, for a contour or profile measurement using a light beams of different frequencies.  
495, for a contour or profile measurement using polarized light.
- SEE OR SEARCH CLASS:  
250, Radiant Energy, subclass 559.22 for the measurement of a surface contour using radiant energy.
- 512 By wavefront detection:**  
This subclass is indented under subclass 511. Contour or profile measurement wherein a wavefront representative of an area of a surface is one of the interfering beams.
- 513 Of highly reflective surface (e.g. mirror):**  
This subclass is indented under subclass 512. Wavefront detection wherein the wavefront is specularly reflected from a highly reflective surface such as a mirror.
- 514 Planar surface:**  
This subclass is indented under subclass 513. Highly reflective surface having a physical characteristic of being confined to two dimensional space.
- 515 Of transmission (e.g., lens):**  
This subclass is indented under subclass 512. Wavefront detection wherein the wavefront is transmitted through an object under test.
- 516 Step height (differential, between points):**  
This subclass is indented under subclass 511. Contour or profile measurement wherein points on a surface are measured and the difference between points is indicative of the profile.
- 517 For refractive indexing:**  
This subclass is indented under subclass 450. Measuring and testing by light interference wherein the beams are phased in accordance with a refractive index to be measured.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
481, for measuring and testing using a fiber or waveguide interferometer further including refractive indexing.
- 518 Having Schlieren effect:**  
This subclass is indented under subclass 517. Refractive indexing wherein the interferometric determination of refractive index is combined with a Schlieren test.
- 519 Having partially reflecting plates in series (e.g., Fabry-Perot type):**  
This subclass is indented under subclass 450. Measuring and testing by light interference wherein the beams to be interfered are created by at least two surfaces in optical alignment, at least one of which is partially transmissive, so as to form a resonant cavity.
- 520 Having shearing:**  
This subclass is indented under subclass 450. Measuring and testing by light interference wherein the beam to be tested is combined with itself after an introduction of either a radial or lateral shear.
- 521 Having wavefront division (by diffraction):**  
This subclass is indented under subclass 450. Measuring and testing by light interference wherein the beams to be combined are obtained by dividing the wavefront of an input beam.
- (1) Note. This is in contrast to a division of amplitude at a partially reflecting surface.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
488, for measuring and testing with light beams of different frequencies further comprising wavefront division.  
494, for measuring and testing using polarized light with wavefront division.

- 499, for dimensional measuring and testing by light interference further including wavefront division.
- 600 SURFACE ROUGHNESS:**  
This subclass is indented under the class definition. Subject matter for measuring irregularity of a surface.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
124 through 127, for lens testing or reflective image former testing.  
237, for inspection of flaws or interperfection in material, generally.  
359, for interferometer type flatness testers.  
432, through 444, for optical transmission testing, generally.  
445, for optical reflection testing, generally.  
446, for measuring diffuse reflection, per se.  
601, for measuring shape or surface configuration.
- SEE OR SEARCH CLASS:  
33, Geometrical Instruments, subclasses 290 through 299 for using a light ray type instrument to indicate the horizontal of the line of sight of a device.
- 601 SHAPE OR SURFACE CONFIGURATION:**  
This subclass is indented under the class definition. Subject matter for determining the general shape of an object or surface.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
2, for contour plotting.  
124 through 127, for lens testing or reflective image former testing.  
237, for inspection for flaws or interperfection in material.  
359, for interferometer type flatness testers.  
388 through 398, for measuring by configuration comparison, per se.  
432, through 444, for optical transmission testing.  
445, for optical reflection testing.  
446, for measuring diffuse reflection.
- 601, for measuring the shape or surface configuration of a surface.
- SEE OR SEARCH CLASS:  
33, Geometrical Instruments, subclasses 290 through 299 for using a light ray type instrument to indicate the horizontal of the line of sight of a device.
- 602 Triangulation:**  
This subclass is indented under subclass 601. Subject matter wherein the measurement is performed by projecting a beam or pattern of light onto the surface and detecting the image of the surface with a spot or pattern thereon and using triangulation to determine a shape.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
3.01 through 3.09, for triangulation ranging to a point with one projected beam.  
3.1 through 3.12, for triangulation ranging with photodetection, but with no projected beam.  
623, for using triangulation to determine position or displacement.  
631, for using triangulation to determine thickness.
- 603 Projection of structured light pattern:**  
This subclass is indented under subclass 602. Subject matter wherein the projected light pattern has structure beyond a point or single line of sight.
- 604 Pattern is series of non-intersecting lines:**  
This subclass is indented under subclass 603. Subject matter wherein the projected pattern is a series of non-intersecting lines, such as projected grating.
- 605 Moire:**  
This subclass is indented under subclass 604. Subject matter wherein an image of the projected pattern of lines is viewed through a grating to create a moire pattern.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
618, for moire pattern with scale or grid.

- 606 Line of light projected:**  
This subclass is indented under subclass 602. Subject matter wherein a single line of light is projected unto the surface.
- 607 Scan:**  
This subclass is indented under subclass 606. Subject matter wherein means such as a rotating or oscillating mirror is used to scan the projected line of light over the surface being measured.
- SEE OR SEARCH CLASS:  
359, Optical: Systems and Elements, subclasses 196.1 through 226.3 for optical scanning means, per se.
- 608 Scan:**  
This subclass is indented under subclass 602. Subject matter wherein means such as a rotating or oscillating mirror is used to scan the projected line of light over the surface being measured.
- SEE OR SEARCH CLASS:  
359, Optical: Systems and Elements, subclasses 196.1 through 226.3 for optical scanning means, per se.
- 609 By focus detection:**  
This subclass is indented under subclass 601. Subject matter wherein shape or surface configuration is determined by focusing a light beam or projected pattern onto a surface.
- 610 By projection of coded pattern:**  
This subclass is indented under subclass 601. Subject matter wherein a coded pattern is projected onto the surface and the location of points onto determine on the surface relative to the coded pattern is used to determine the shape of the surface.
- 611 By stereo:**  
This subclass is indented under subclass 601. Subject matter wherein two images from two cameras or other view in are compared to determine the shape of the surface.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
2, for determining a contour plot of a surface, generally land, through the use of two stereo images.  
388 through 398, for measuring by configuration comparison, per se.
- 612 By specular reflection:**  
This subclass is indented under subclass 601. Subject matter wherein the shape of the surface of the surface is determined by measuring the angle or direction that a beam of light is specularly reflected from the surface.
- 613 Silhouette:**  
This subclass is indented under subclass 601. Subject matter wherein the shape of the object is determined from measurements of one or more silhouettes of the object.
- 614 POSITION OR DISPLACEMENT:**  
This subclass is indented under the class definition. Subject matter wherein (a) a position or location, or (b) a change in position or location is measured.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
3 through 22, for range or remote distance measurement.  
4.09, and 4.1, for light interference measurement of displacement or distance over large distances.  
138 through 155, for axial or angular alignment by optical measuring and testing.  
356, and 358, for light interference measurement of small displacement or distance.  
399, for alignment in a lateral direction by optical measuring and testing.
- 615 Position transverse to viewing axis:**  
This subclass is indented under subclass 614. Subject matter wherein a position or location generally transverse to a viewing axis of the measuring arrangement is determined.
- 616 Having scale or grid:**  
This subclass is indented under subclass 615. Subject matter wherein a scale or grating is

- placed on the object to determine position or displacement.
- SEE OR SEARCH CLASS:  
33, Geometrical Instruments, subclass 707, for measurement of distance using optical grid counting.
- 617 Coded scale:**  
This subclass is indented under subclass 616. Subject matter wherein the scale is coded to indicate a position of the scale relative to a viewing position.
- 618 Moire:**  
This subclass is indented under subclass 616. Subject matter wherein the scale or grid is viewed through a scale or grid that creates moire fringes.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
605, for use of moire pattern to determine shape or configuration.
- 619 Quadrature detection:**  
This subclass is indented under subclass 618. Subject matter wherein moire fringes are detected at two or more out-of-phase positions.
- 620 Special mark or target on object:**  
This subclass is indented under subclass 615. Subject matter wherein a target or other mark on an object is viewed to determine the position of the object.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
401, for the use of marks or targets to effect alignment of two objects.
- 621 Occulting a projected light beam:**  
This subclass is indented under subclass 615. Subject matter wherein a position of an object is determined by a shadow created when the object moves into, out of, or through a light beam.
- 622 Position of detected arrangement relative to projected beam:**  
This subclass is indented under subclass 615. Subject matter wherein a beam of projected light strikes a detector or other means, such as
- a retro-reflector, and the position of the beam on the detector is indicative of the position.
- 623 Triangulation:**  
This subclass is indented under subclass 614. Subject matter wherein an image of a projected beam or pattern of light on a surface of an object is viewed from an angle other than along the projected beam and the position of the surface is determined from the apparent shift in position of the image of the beam or pattern.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
3.01 through 3.09, for triangulation ranging to a point with one projected beam.  
3.1 through 3.12, for triangulation ranging with photodetection, but with no projected beam.  
602, for using triangulation to determine shape or surface configuration.  
631, for using triangulation to determine the thickness of an object.
- 624 Focus:**  
This subclass is indented under subclass 614. Subject matter wherein the position of an object is obtained from a determination of the degree of focus of a surface being measured or of a light of pattern projected onto the surface.
- 625 DIMENSION:**  
This subclass is indented under the class definition. Subject matter wherein a physical dimension of an object is measured.
- 626 Cavities:**  
This subclass is indented under subclass 625. Subject matter wherein a dimension of a hole or cavity, such as its depth or diameter, is determined.
- 627 Volume:**  
This subclass is indented under subclass 625. Subject matter wherein the volume of an object is determined.
- 628 Area:**  
This subclass is indented under subclass 625. Subject matter wherein an area of a generally planar configuration is determined.

**629 Light scanning:**  
This subclass is indented under subclass 628. Subject matter wherein an area is determined by light scanning a surface.

**630 Thickness:**  
This subclass is indented under subclass 625. Subject matter comprising means to measure the distance between opposite surfaces in a direction perpendicular to the length and breadth of an object.

**631 By triangulation:**  
This subclass is indented under subclass 630. Subject matter comprising means to project a beam or pattern of light onto a surface and using apparent shift of an image of the beam or pattern to determine thickness of an object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3.01 through 3.09, for triangulation ranging to a point with one projected beam.

3.1 through 3.12, for triangular ranging with photodetection, but with no projected beam.

602, for using triangulation to determine shape or surface configuration.

623, for using triangulation to determine position or displacement.

**632 Of light permeable material:**  
This subclass is indented under subclass 630. Subject matter wherein the thickness of a light permeable material is measured.

(1) Note. This subclass includes material not completely transparent. The absorption of light as it passes through the material is used to determine thickness.

**634 Length:**  
This subclass is indented under subclass 625. Subject matter comprising means to measure the largest dimension of an article, or if the article is moving, the dimension in the direction of movement.

**635 Width or diameter:**  
This subclass is indented under subclass 625. Subject matter comprising means for measuring width or diameter of an object.

**636 Line width:**  
This subclass is indented under subclass 635. Subject matter comprising means for measuring the width of a feature on a surface.

**637 Web:**  
This subclass is indented under subclass 635. Subject matter comprising means for measuring the width of a web.

SEE OR SEARCH THIS CLASS, SUBCLASS:

249 through 431, for general monitoring a web, such as for defects.

**638 Shadow or beam blocking:**  
This subclass is indented under subclass 635. Subject matter wherein measurement is determined from an object's occlusion of a light beam.

**639 Scanning:**  
This subclass is indented under subclass 638. Subject matter wherein a projected beam of light is scanned over a surface or a light from the object is scanned over a detection arrangement by means of an optical scanner, such as a rotating or oscillating mirror.

**640 Single beam scans entire width or diameter:**  
This subclass is indented under subclass 639. Subject matter wherein the scanning of the beam is such that it passes across the entire width or diameter of the object, being occulted by one edge thereof, and is later unocculted as it passes by the opposite edge of the object.

#### 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 INSPECTION FOR FLAWS OR IMPERFECTIONS (356/237):

Subject matter for determining differences in the appearance over the surface or over or through internal structure of the material (liquid or solid) forming an article or receptacle contents, by viewing the surface or

interior by light reflected from the surface or passing through the interior of the material, such differences representing flaws, cracks, imperfections, foreign substances or dirt.

**FOR 101 Cloth or thread inspection (356/238):**

Subject matter wherein the article or material viewed is a woven or knitted fabric or an article formed from fabric such as an article of clothing, the partial transparency of the fabric being provided by the spaces between the fibers.

**FOR 102 Passing light through a transparent or translucent article (356/239):**

Subject matter involving structure for passing light through a transparent or translucent material forming an article.

**FOR 103 Containers (e.g., bottles) or contents (356/240):**

Subject matter wherein the transparent or translucent articles are formed as receptacles, and the receptacles or their liquid contents are inspected or examined.

**FOR 104 Bore inspection (e.g., borescopes) (356/241):**

Subject matter which includes optical means such as prisms, mirrors and the like together with their supports providing a light directing means into one end of a bore for facilitating the inspection of the interior surface of the bore from the other end; or lighting means combined with the supported means onto the interior of the bore and to direct the reflected light from the interior surface of the bore to the exterior of the bore for inspection purposes.

**FOR 105 THREAD COUNTING (356/242):**

Subject matter for facilitating the visual counting of threads in a fabric or registering the count of the variation produced by threads on light passing over the threads of a fabric.

**FOR 106 STANDARDS (356/243):**

Subject matter including structure forming a basis for optical comparison with the specimen or portions thereof under test.

**FOR 107 BY LIGHT INTERFERENCE (E.G., INTERFEROMETERS):**

Subject matter wherein measuring or testing, coherent light beams interact to produce cancellation or reinforcement of wave energy.

**FOR 108 Spectroscopy:**

Subject matter wherein the interference phenomenon is used to analyze the spectral character of light.

**FOR 109 Holography:**

Subject matter wherein at least one of the interference light beams is reconstructed from a record of the phase and amplitude information of that light beam wavefront.

**FOR 110 For optical configuration:**

Subject matter including means to determine the relative distribution of the parts or elements, or the external form of an object.

**FOR 111 With light beams of different frequency (e.g., heterodyning):**

Subject matter wherein light beams of different frequency are mixed together in the formation of an interference pattern.

**FOR 112 For rotation rate (e.g., ring laser):**

Subject matter wherein the beams of different frequency are generated as a result of the rotation of the interferometer.

**FOR 113 With polarization:**

Subject matter wherein the interacting light waves of the interferometer are polarized.

**FOR 114 With partially reflecting plates in series (e.g., Fabry-Perot type):**

Subject matter wherein the beams to be interfered are created by at least two surfaces in optical alignment, at least one of which is partially transmissive.

**FOR 115 With shearing:**

Subject matter wherein the beam to be tested is combined with itself after the introduction of either a radial or lateral shear.

**FOR 116 With wavefront division (e.g., by diffraction):**

Subject matter wherein the beams to be compared are obtained by dividing the wavefront of an input beam.

**FOR 117 For dimensional measurement (e.g., thickness):**

Subject matter wherein light interference is examined to determine the height, width, depth, or change in position of an object.

**FOR 118 Of displacement or distance:**

Subject matter including means for determining small changes in position of an article or small length of space between two points.

**FOR 119 For dimensional measurement (e.g., thickness):**

Subject matter wherein the interference pattern is indicative of the height, width, depth, or change in position of an object.

**FOR 120 Of displacement of distance:**

Subject matter including means for measuring small changes in position of an article or small length of space between two points.

**FOR 121 For optical configuration:**

Subject matter wherein one of the light beams is reflected from or transmitted through an object, to determine the relative disposition of the parts or elements, or the external form of the object.

**FOR 122 With two light beams (e.g., Twyman-Green):**

Subject matter including a reference beam in addition to the object beam.

**FOR 123 For refractive indexing:**

Subject matter wherein the beams are phased in accordance with a refractive index to be measured.

**FOR 124 With Schlieren effect:**

Subject matter wherein the interferometric determination of refractive index is combined with a Schlieren test.

**FOR 125 For orientation and alignment:**

Subject matter including means for determining the alignment or orientation of a surface relative to a reference line or plane.

**FOR 126 FOR FLATNESS:**

Foreign art collection including optical structure to indicate the deviations in light rays which are reflected from or transmitted

through a material, which deviations are in turn due to deviations in the flatness of the material.

- (1) Note. The flatness deviation may result from surface or thickness irregularities in the material or bends or wrinkles in otherwise flat sheet material.

**FOR 127 BY MENSURATION:**

Foreign art collection including means for determining quantifiable characteristics of an article, such as a dimension, the area of a surface or its precise position with respect to a reference.

- (1) Note. This subclass and those indented thereunder provide for the actual measuring or comparing of articles where an image of the article and a scale are viewed. If only the image of a scale is viewed the patent is classified in Class 359, subclasses 436+; or Class 353 if projection is involved. If only the image of the article is viewed the patent is classified in Class 359, subclass 373, where a compound lens system is employed; or in Class 353 if projection of an image is present.
- (2) Note. Article testing devices where a mechanical pickup or feeler engages or contacts the workpiece even though significant optical structure is recited in the claims are classified elsewhere.
- (3) Note. In general photocells together with optical structure in the light path are classified elsewhere. For classification in these subclasses 372+ of Class 356, the photocell and optical combination must be so related as to or must include structure to give an indication of the measurement such as being within or without the range of tolerance when the light beam is passed to the profile of the master or article under test.

**FOR 128 Of article displacement:**

Foreign art collection wherein changes to an article either by movement or by replacement are measured.

**FOR 129 Including moire fringe generation:**



Foreign art collection wherein moiré fringes are created in response to interference between regular patterns in or on the article and a superimposable grid or light pattern.

**FOR 130 Of position:**

Foreign art collection including means to measure the distance or direction or an object to a reference.

**FOR 131 Of contour or profile:**

Foreign art collection including means to measure the shape of an object.

**FOR 132 With curve readers:**

Foreign art collection wherein the object is a two-dimensional curve.

**FOR 133 Of cavities:**

Foreign art collection including means to measure the internal dimensional properties of holes.

**FOR 134 Of area or volume:**

Foreign art collection including means for determining the area of a configuration or the volume of a mass.

- (1) Note. This subclass includes also integrating means where this involves no more than optically determining the area under a curve.

**FOR 135 By scanning:**

Foreign art collection wherein the total area or volume of a configuration is determined by sequentially determining elemental areas of the configuration and summing them.

**FOR 136 Of thickness:**

Foreign art collection including means for measuring between opposite surfaces or depth or in a direction perpendicular to the length and breadth of an object.

**FOR 137 Of light permeable material:**

Foreign art collection for measuring the thickness of light permeable material, the measuring operation depending upon the fact that the material is light permeable.

**FOR 138 Of length:**

Foreign art collection including means for measuring the largest dimension of an arti-

cle, or if the article is moving, the dimension in the direction the article is traveling.

**FOR 139 Of width or diameter:**

Foreign art collection including means for measuring the width or diameter of an object.

**FOR 140 Of moving object:**

Foreign art collection wherein the object being measured changes position.

**FOR 141 By scanning or light interruption:**

Foreign art collection including means for sequentially moving a light beam across the article, or for periodically interrupting a light beam directed toward the article.

**FOR 142 By scanning or light interruption:**

Foreign art collection including means for sequentially moving a light beam across the article, or for periodically interrupting a light beam directed toward the article.

END