CLASS 73, MEASURING AND TESTING

SECTION I - CLASS DEFINITION

(1) This is the generic class for processes and apparatus for making a measurement of any kind or for making a test of any kind, and takes all such subject matter not provided for in other classes.

(2) The term "test" includes inspection, processes and apparatus for determining qualities by inspection being included where not provided for in other classes.

(3) This class is the generic class for sampling and takes all sampling apparatus and processes not otherwise provided for; see subclasses 863+ and the notes thereto.

SECTION II - NOTES TO THE CLASS DEFINITION

(1) Note. Processes and apparatus for its practice are classified together.

(2) Note. Substantially all apparatus classes have means to automatically control the operation of the apparatus. Such automatic controls usually involve some means to measure or test a condition or change of condition, the measuring or testing means then operating to control or regulate the apparatus in accordance with the results of the measurement or test. For such subject matter, the class appropriate to the type of apparatus controlled should be investigated. No attempt has been made to search note automatic controls.

SECTION III - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

Measuring and testing, per se, of the following types are found in Subclass References to the Current Class and References to Other Classes, below:

ACOUSTICAL;

BIOLOGICAL;

CHEMICAL;

ELECTRICAL;

GEOMETRICAL INSTRUMENTS;

INSPECTING;

OPTICAL (See Radiant Energy);

RADIANT ENERGY (See Optical)

SPEED MEASURING;

SURGICAL;

TIME MEASURING;

WEIGHING SCALES;

MASS SPECTROMETRY

(1) Note. For elements, not combined with means to indicate the result of a measurement or test, and not combined with means to automatically control art devices, that respond to a condition or change of condition. Also see the reference to the Radiant Energy class.

(2) Note. Art apparatus or process significantly claimed, in combination with measuring or testing is classified in general in the class providing for the art apparatus or process. The line stated for particular classes should be consulted.

SECTION IV - SUBCLASS REFERENCES TO THE CURRENT CLASS

SEE OR SEARCH THIS CLASS, SUBCLASS:

32+, for devices responsive to specific gravity of liquids. (See Lines With Other Classes and Within This Class, (1) Note, above).

54+, for devices responsive to viscosity of liquids. (See Lines With Other Classes and Within This Class, Mass Spectrometry, (1) Note, above).

174, for feelers for gauges. (See Lines With Other Classes and Within This Class, Mass Spectrometry, (1) Note, above).

227+, for straight line light ray type and 300+ for indicator of direction of force traversing natural media. (See Lines With Other Classes and Within This Class, Mass Spectrometry, (1) Note, above).

279+, for pressure responsive diaphragms for volume or rate of flow meters, per se. (See Lines With Other Classes and Within This Class, Mass Spectrometry, (1) Note, above).

322.5, for floats, per se. (See Lines With Other Classes and Within This Class, (1) Note, above).

335+, for humidity responsive elements. (See Lines With Other Classes and Within This Class, Mass Spectrometry, (1) Note, above).

501+, for feelers for gauges. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

514.01+, for acceleration responsive elements. (See Lines With Other Classes and Within This Class, Mass Spectrometry, (1) Note, above).

527+, through 551, for speed responsive elements. (See Lines With Other Classes and Within This Class, Mass Spectrometry, (1) Note, above).

649+, for devices responsive to and for measuring vibrations of a body. (See Lines With Other Classes and Within This Class, Mass Spectrometry, (1) Note, above).

741, for Bourbon tubes, per se, for fluid pressure gauges. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

861.42+, for devices responsive to differential pressures. (See Lines With Other Classes and Within This Class, Mass Spectrometry, (1) Note, above).

SECTION V - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, (Apparatus or Process Combined With Measuring or Testing)

26, Textiles: Cloth Finishing, subclass 70 for inspection and examination of cloth. (Inspecting).

26, Textiles: Cloth Finishing, (Apparatus or Process Combined With Measuring or Testing).

28, Textiles: Manufacturing, subclasses 226+ especially subclass 227 for apparatus and processes of detecting knots, bunches, or slubs in threads.

33, Geometrical Instruments, for measuring and testing involving only the determination of the characteristics and mutual relation of points, lines, angles, surfaces and solids and for mechanically guided means for describing lines. Class 73 has combinations of geometrical instruments with other measuring or testing means. (Geometrical Instruments)

33, Geometrical Instruments, subclass 501, for feelers for gauges 227+, for straight line light ray type and 300+, for indicator of direction of force traversing natural media. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

34, Drying and Gas or Vapor Contact With Solids, subclass 88 for combinations having inspecting means as a part thereof. (Inspecting).

34, Drying and Gas or Vapor Contact With Solids, subclasses 88, 89 for such apparatus combined with inspecting, indicating or testing means. (Apparatus or Process Combined With Measuring or Testing).

47, Plant Husbandry, subclass 14 for apparatus and processes for ascertaining the life in seeds. (Apparatus or Process Combined With Measuring or Testing).

74, Machine Element or Mechanism, (Apparatus or Process Combined With Measuring or Testing).

84, Music, (Apparatus or Process Combined With Measuring or Testing).

99, Foods and Beverages: Apparatus, subclasses 285, 342+, for infusors and cooking devices combined with measuring and testing means. (Apparatus or Process Combined With Measuring or Testing).

60, Power Plants, subclasses 527 through 531 for heat actuated mechanisms producing force or motion and having no specified motion utilizing structure (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

65, Glass Manufacturing, subclasses 29.1+ and 29.12+ for glassworking or treating processes including programming, timing, cycle control, inspecting, measuring, or testing; subclasses 158+ and 160+ for glassworking and treating apparatus with inspection, programming, timing, cycle control, inspecting, measuring, or testing means. (Inspecting)

74, Machine Element or Mechanism, subclasses 5+ for gyroscopes. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

84, Music, subclass 409 for tuning forks. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

92, Expansible Chamber Devices, appropriate subclasses. For the line between Class 73 and Class 92, see References to Other Classes of the class definition of Class 92, under SEARCH CLASS 73. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

95, Gas Separation: Processes, for processes of gas separation, per se. Class 73 will take the combination of gas separation and significant gas analysis. The combination of gas separation and a nominal step of "analyzing" or "detecting" without further detail of the analysis or detection is insufficient to cause a patent to be placed in Class 73; that patent will be placed in Class 95. Also, if there is feedback from the analytical apparatus to control or effect a change in the gas separating operation, then classification is in Class 95. (Chemical)

96, Gas Separation: Apparatus, for apparatus for gas separation, per se. Class 73 will take the combination of gas separation apparatus and significant gas analysis means. The combination of gas separation apparatus and nominal means for "analyzing" or "detecting" without further detail of the analysis or detection means is insufficient to cause a patent to be placed in Class 73; that patent will be placed in Class 96. Also, if there is feedback means from the analytical apparatus to control or effect a change in the gas separation, then classification is in Class 96. For volume or rate of flow meters combined with gas and liquid separators, see subclass 200 in Class 73. (Chemical).

101, Printing, subclasses 35+, for selective printing machines in which the control of the printing element selected is by a gauge measuring the article printed upon and the article is other than a rectangular sheet. (Apparatus or Process Combined With Measuring or Testing)

116, Signals and Indicators, for devices for giving a signal or indication other than electrical of the presence or absence of a condition, and in subclasses 200+ for nonelectrical indicating means, such as dial and pointer structure, not claimed in combination with any particular measuring or testing means provided for in Class 73. Class 73 takes the combination of measuring or testing means significantly claimed combined with a signal or indicator, and devices that respond to a condition and give a series of indications which follow or vary with the variations of the condition wherein more than a mere named operator for the signal or indicator is included. (Apparatus or Process Combined With Measuring or Testing).

118, Coating Apparatus, subclasses 712+ for coating apparatus having measuring or testing features. (Inspecting)

128, Surgery, (Apparatus or Process Combined With Measuring or Testing).

128, Surgery, subclasses 630+ for methods and apparatus for diagnosing diseased or abnormal condition of the body. (Surgical)

136, Batteries: Thermoelectric and Photoelectric, (see also Note 4),subclass 182 for batteries combined with testing or indicating means. (Apparatus or Process Combined With Measuring or Testing).

136, Batteries: Thermoelectric and Photoelectric, subclass 89 for electro-optical batteries and subclass 200, for thermal sensitive batteries. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

137, Fluid Handling, subclasses 227+, 524 and 551+ for fluid handling means combined with an indicator register, recorder, alarm or inspection means. (See also (4) Note). (Apparatus or Process Combined With Measuring or Testing)

138, Pipes and Tubular Conduits, subclass 90 for pipe plugs having either provision for introducing a fluid into the pipe or for the attachment of a gauge. (Apparatus or Process Combined With Measuring or Testing)

148, Metal Treatment, subclasses 128+ for process of heat treating metal in the solid state; and involving also a measuring, testing or sensing operation. The operation generally, is directed to control of the heat treatment. (Chemical)

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 64 and 378 for laminating processes and apparatus having measuring or testing features. (Apparatus or Process Combined With Measuring or Testing)

162, Paper Making and Fiber Liberation, subclasses 49, 198 and 263 for measuring and testing in combination with fiber liberation or paper making. (Apparatus or Process Combined With Measuring or Testing).

166, Wells, subclasses 250+ for well processes including measuring and testing means, subclass 264 for processes of merely sampling a well fluid and appropriate subclasses for corresponding apparatus and subclasses 64, 66 and 113 for well apparatus including measuring or testing means. (Apparatus or Process Combined With Measuring or Testing).

177, Weighing Scales, appropriate subclasses for a weigher, per se; for a weigher with features for making a test not specifically provided for in Class 73; and for a weigher in combination with another measuring device not provided for

in Class 73. (Apparatus or Process Combined With Measuring or Testing).

177, Weighing Scales, appropriate subclasses for a weigher, per se; especially subclasses 50+ for a weigher with features for making a test not specifically provided for in Class 73; and subclass 245 for a weigher in combination with another measuring device not provided for in Class 73.

181, Acoustics, subclass .5 for miscellaneous mechanical detectors for sound waves. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

181, Acoustics, subclasses 101+, 123+ and 125 for devices analogous to "sonic" or acoustical testing apparatus of this (73) class. (Acoustical)

194, Check-Actuated Control Mechanisms, for check controlled measuring and testing devices, and subclasses 302+ for fraud preventing coin-testing devices. (Apparatus or Process Combined With Measuring or Testing)

198, Conveyors: Power-Driven, subclass 502 for a conveyor combined with load measuring means, and subclasses 504+ for a conveyor combined with a load weighing means. (Apparatus or Process Combined With Measuring or Testing)

200, Electricity: Circuit Makers and Breakers, for the combination of a measuring instrument and a circuit controller when specific structure of the circuit controller is claimed. Class 73 takes the combination of a class 73 measuring instrument and a circuit controller when the circuit controller is claimed broadly. In connection with Class 200, the definitions of the subclasses of Class 73 which provide for measuring instruments combined with other structure are modified by this note. (Apparatus or Process Combined With Measuring or Testing).

203, Distillation: Processes, Separatory, subclasses 1+ for a process of separatory distillation including a positive step of determining a specific characteristic for control purposes. (Chemical).

204, Chemistry: Electrical and Wave Energy, subclasses 400+ for apparatus for performing electrolytic analysis and testing. (Chemical)

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 775+ for electrolytic analysis and testing processes. (Chemical)

209, Classifying, Separating, and Assorting Solids, (see also the Class 209 reference for Inspecting), for testing and assorting of solids in accordance with physical characteristics, as by sifting materials to determine the proportion of each size in the whole; attention is called particularly to assorting in subclasses 509+ which includes means for testing or measuring objects and sorting them in accordance with their characteristics. (Apparatus or Process Combined With Measuring or Testing).

209, Classifying, Separating, and Assorting Solids, subclass 702 for manual assorting involving inspecting means. (Inspecting)

221, Article Dispensing, subclass 155 for article dispensers not otherwise provided for, having transparent inspecting or viewing means so that the articles can be dispensed and may be inspected. (Inspecting)

222, Dispensing, subclasses 154+, for inspecting devices combined with fluent material dispensers so that the material to be dispensed may be inspected. (Inspecting)

222, Dispensing, (see also Class 222 reference for Inspecting), for dispensers which involve volume measuring, and see section 6 of the main class definition of Class 222, for the line with volume or rate of flow meters. The notes to Class 222 set forth the search field for apparatus for dispensing measured quantities of material.

234, Selective Cutting (e.g., Punching), subclasses 33+ for a selective cutting device provided with stopping means responsive to detection of improper treatment of work (e.g., failure to punch in every column, or to follow a 2 - 5 code). (Apparatus or Process Combined With Measuring or Testing)

235, Registers, subclass 61 for mechanical calculators and subclass 92 for electrical counting techniques which may include testing or measuring. (Apparatus or Process Combined With Measuring or Testing).

241, Solid Material Comminution or Disintegration, for solid comminution combined with measuring or testing of material. See section 12 of the main class definition of that class for a statement of the line. (Apparatus or Process Combined With Measuring or Testing).

248, Supports, subclass 27 for means for supporting an instrument in a panel. (Apparatus or Process Combined With Measuring or Testing)

250, Radiant Energy, for measuring and testing by radiant energy and measuring radiant energy. See particularly subclass 250 for wavemeters for radiated electro-magnetic waves, 253+ for methods and apparatus to irradiate earth material above or below the ground and testing the

radiation modified or emitted as a result or irradiation by the material or testing the radiation emitted by the material, 281+ for methods and apparatus for the ionic separation or analysis of materials, 306+ for methods and apparatus for the inspection of solids or liquids by charged particles, 336.1+ for methods and apparatus including invisible radiant energy responsive electric signalling having detectors sensitive to infrared, ultraviolet, X-ray, radio-active rays and neutron radiation or to a radiation source modified by a tested material: and 472.1+ for methods of detecting invisible radiation by a nonelectrical detector or invisible radiation nonelectrical detectors, per se. (Radiant Energy--also see Optical references).

250, Radiant Energy, subclasses 336+ for speed responsive devices using an invisible radiation source and an electric signalling device and, subclasses 459+ for speed responsive stroboscopes using invisible radiation and a luminous screen.

250, Radiant Energy, subclass 71 for fluorescent detectors of ray energy, subclasses 83+ for miscellaneous detectors of ray energy. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

250, Radiant Energy, subclasses 281+ for methods and apparatus for the ionic separation or analysis of ionic material by the mass to charge ratio of the ionic material (e.g., mass spectrometry). (Electrical)

252, Compositions, subclass 408 for chemical indicating compositions. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above)

252, Compositions, subclass 299.01 for liquid crystal compositions and subclass 408.1 for analytical, testing or indicating compositions involved in a physical test procedure. (Chemical).

290, Prime-Mover Dynamo Plants, for electric generating means driven by a prime mover (a motor other than an electric motor) having prime-mover controls (e.g., throttle, fuel valve, etc.) which are characteristic of controls used on prime movers. The line between Class 290 and Class 73 is as follows: Where the claimed subject matter is clearly limited to testing the prime mover, or where the generating means is designated specifically as a “dynamometer”, or a generator having an absorption circuit (such as, for example, an induction disk, or a resistor across the armature circuit of the generator), original classification is in Class 73. Where the generating means is claimed merely as a “generator” or a “dynamo-electric machine” and the claim is not otherwise limited to testing, original classification is in Class 290, regardless of the specific disclosure. (Electrical)

292, Closure Fasteners, subclasses 307+ for miscellaneous seals and sealing devices, which may be employed in connection with measuring and testing devices. (Apparatus or Process Combined With Measuring or Testing).

310, Electrical Generator or Motor Structure, appropriate subclasses, for the structure of electrical generators. The line between testing means which generate electricity in Class 73 and generating means in Class 310 is as follows: Where the claimed subject matter is limited to structural details only of a dynamoelectric machine or a generator of a dynamometer, original classification is in Class 310 regardless of the title or function assigned to the structure (for example, a “dynamometer” having detailed structure set forth which pertains only to the structure of the generating mechanism, per se, is classifiable in class (310).

310, Electrical Generator or Motor Structure, subclass 306 for pyromagnetic devices and subclass 311 for piezoelectric devices. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

315, Electric Lamp and Discharge Devices: Systems, see Note 3C.

315, Electric Lamp and Discharge Devices: Systems, subclasses 364+, for processes and apparatus for testing such devices. (Electrical)

320, Electricity: Battery and Condenser Charging and Discharging, subclass 48. (Electrical)

322, Electricity: Single Generator Systems, appropriate subclasses, for systems of control of electric generators of general application. The line between testing means which generate electricity in Class 73 and generating systems in Class 322 is as follows: Where the claimed subject matter is limited (either positively or by necessary inference) to a system which includes a “dynamometer” or to a dynamoelectric machine having an absorption circuit (such as for example a dynamoelectric machine or generator having an eddy current disk or an induction disk or having a resistor connected across the output circuit thereof), original classification is in Class 73. Where the claimed subject matter is limited merely to an electric “generator” or to a “dynamoelectric machine”

in combination with control means therefor, original classification is in Class 322, regardless of the disclosure, except as noted herein above in the reference to Class 290. (Electrical)

324, Electricity: Measuring and Testing, for testing to determine electrical properties by electrical means even though nonelectrical values are derived from the electrical values determined. Note particularly subclasses 323+ for ore detection by determination of electrical properties, subclass 71.5 for the determination of nonelectric properties by measuring electric properties, and subclasses 76.11+ for the measurement of electricity, per se. (Electrical)

324, Electricity: Measuring and Testing, subclasses 68+ for electrical speed measurement. (Speed Measuring).

338, Electrical Resistors, subclasses 2+ for strain gauge type resistors and subclasses 13+ for resistors whose value changes in response to a condition or conditions. Also see the Electrical reference to Class 338. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

338, Electrical Resistors, subclasses 2+ includes resistors of the strain gauge type together with the device which is subject to deformation when not otherwise classifiable or with structure securing the resistor to such a device. When the meter, Wheatstone bridge connection, or other current measuring device is claimed with the resistor in the above combination, classification is in Class 73, especially subclasses 763+ and 133+. Class 338, subclasses 13+, includes resistors, per se, responsive in resistance value to a change in condition, or resistors combined with a condition sensing actuator which modifies the resistance value of the resistor, such as indented subclasses 25+ for resistors responsive to ambient temperature, subclass 33 for resistors with a float actuator, subclasses 34+ for resistors with gas, vapor, or moisture absorbing or collecting, subclasses 36+ for resistors which are fluid or gas pressure actuated, and subclass 47 for force actuated resistors. The inclusion of a meter, Wheatstone bridge or other current measuring device in series with the resistor in this combination would be sufficient for classification in Class 73, especially subclass 29 for moisture content or vapor pressure analysis, subclasses 453 and 308 for float actuated resistors with indicators, subclasses 133+ for dynamometers, and subclasses 398+ for fluid pressure gauges of the current modifying type. (Electrical)

338, Electrical Resistors, see Mass Spectrometry, (1) Note, above.

340, Communications: Electrical, subclasses 670+ for electrical speed alarms. (Speed Measuring)

340, Communications: Electrical, subclasses 870.01+ takes telemetric signaling means useful in transmitting a measured quantity, not limited to any particular measuring instrument provided for in other classes, while Class 73 takes such telemetric signaling means in combination with a particular measuring means of the type provided for in Class 73. (Electrical)

Class 340 also, in subclasses 500+ takes electrical devices permanently associated with the object or environment being monitored for giving a signal or indication of the presence or absence of a condition but wherein no quantitative measurements may be made. Devices for making a quantitative measurement of the type provided for in Class 73 in which the instrument responds to a condition and a series of indications are given which follow or vary with the variations of the condition are in Class 73, even though employing electrical signaling means, such as lamps, to indicate visually the result. The general line is that Class 73 takes particular measuring or testing means, even though claimed in combination with electric signaling means, while Class 340 takes the signaling subcombination. (Electrical).

340, Communications: Electrical, see Mass Spectrometry, (1) Note, above.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), see Mass Spectrometry, (1) Note, above.

342, Communications: Directive, Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), appropriate subclasses, for those utilizing transmitted radio wave energy; see subclasses 1 through 205 for those utilizing reflected or otherwise returned radio wave (radar) energy. (Speed Measuring)

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 1 through 205 for miscellaneous apparatus and method which involve the use of a reflected and/or otherwise returned radio wave (radar) system for detecting an object, or to measure the distance, direction and/or velocity of an object, and subclasses 350+ for directional radio. (Radiant Energy--also see Optical references).

343, Communications: Radio Wave Antennas, subclasses 700+ for antennas. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

346, Recorders, appropriate subclass. (Speed Measuring).

346, Recorders, appropriate subclass. (Time Measuring).

346, Recorders, (Apparatus or Process Combined With Measuring or Testing).

346, Recorders, appropriate subclass. (Electrical)

351, Optics: Eye Examining, Vision Testing and Correcting, subclasses 200+ for optical eye examining and vision testing instruments such as optometers. (Optical, also see Radiant Energy References).

356, Optics: Measuring and Testing, for processes and apparatus which utilize visible light to measure the optical properties of substances, test visible light for optical properties and which use visible light to test for nonoptical properties not classified elsewhere particularly subclasses 23+ for optical stroboscopes, subclasses 32+ for material strain analysis, subclasses 43+ for optical pyrometers, subclasses 124+ for lens or reflective image former testing, subclasses 213+ for photometers and subclasses 237+ for visual flaw inspection apparatus. (Optical, also see Radiant Energy References).

362, Illumination, subclasses 2, 138 and 139 for inspection lamps. (Inspecting).

362, Illumination, (see also Class 362 reference for Inspecting), subclasses 23+ for measuring instrument dials combined with illuminating means. (Apparatus or Process Combined With Measuring or Testing).

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 141+ for underwater vibration detectors and subclasses 178+ for geophysical vibration transducers. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above)

368, Horology: Time Measuring Systems or Devices, appropriate subclasses and the classes specified under "SEARCH CLASS" in the class and subclass definitions. (Time Measuring).

369, Dynamic Information Storage or Retrieval, subclasses 53.1 through 53.45 for an indication or test of an information storage or retrieval device or element thereof. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above.)

369, Dynamic Information Storage or Retrieval, see Note 4.

374, Thermal Measuring and Testing, for testing to determine a thermal condition or property of a specimen. (Electrical)

374, Thermal Measuring and Testing, subclasses 6+ for determination of distance or position by measuring a thermal quantity related thereto. (Geometrical Instruments).

374, Thermal Measuring and Testing, for the combination of a thermal test and a thermal test and a nonthermal test. (Apparatus or Process Combined With Measuring or Testing).

376, Induced Nuclear Reactions: Processes, Systems, and Elements, subclasses 153+ for detection of radiation by an induced nuclear reaction; subclasses 207+ for means to control a nuclear reaction; subclasses 207+ for means to control a nuclear reactor which means may include measuring and testing means; and subclasses 245+ for measuring or testing means; and subclasses 245+ for measuring or testing a fission reactor condition. (Chemical)

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, appropriate subclasses, especially subclasses 50+, 105+ and 129+ for analyzing apparatus involving means for causing, promoting, regulating, or controlling a chemical reaction. (Chemical)

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 55+ for structured visual or optical indicator, per se, such as a litmus paper or other chemical test papers. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above)

424, Drug, Bio-Affecting and Body Treating Compositions, subclasses 1.11+ for Class 424 compositions containing a radionuclide and subclasses 9.1+ for compositions and methods for diagnosing or testing for a body condition or determining the potency of a medicine in a living being. (Biological)

424, Drug, Bio-Affecting and Body Treating Compositions, appropriate subclasses for class defined in vivo test compositions and methods, particularly subclasses 1.11+ wherein a radionuclide or intended radionuclide is recited. (Radiant Energy--also see Optical references)

428, Stock Material or Miscellaneous Articles, subclass 616 for a bimetallic element, per se. (See Lines With Other Classes, Mass Spectrometry, (1) Note, above).

435, Chemistry: Molecular Biology and Microbiology, subclasses 4+ for processes in which there is a direct or indirect qualitative or quantitative measurement or test of a material which contains an enzyme or microorganism as well as processes in which a material containing an enzyme or microorganism is used to perform a qualitative or quantitative measurement or test, and compositions therefor and the processes of making such compositions; and subclasses 287.1+ for an apparatus for performing the above processes. (Chemical)

435, Chemistry: Molecular Biology and Microbiology, subclass 35 for a test method which involves both an enzyme or microbial reaction and the use of a radioactive material and subclass 288.7 for an optical enzyme or microbial reaction measuring and testing device in combination. (Radiant Energy--also see Optical references).

436, Chemistry: Analytical And Immunological Testing, subclasses 57+ for a test method (which involves both a chemical reaction (e.g., ion exchange) and a measurement of radioactivity or isotope distribution. (Radiant Energy--also see Optical references).

455, Telecommunications, subclasses 2.01, 67.11-67.7, 115.1-115.4 and subclasses 226.1-226.4 for measuring and testing of modulated carrier wave communications.

494, Imperforate Bowl: Centrifugal Separators, subclass 10, for apparatus of that class provided with means for measuring or testing. (Apparatus or Process Combined With Measuring or Testing).

702, Data Processing: Measuring, Calibrating, or Testing, appropriate subclasses for data processing system or calculating computer which is utilized to effect a measuring, testing, or monitoring operation on an external device or quantity, wherein the external device or quantity is only nominally claimed. When significant structure to the measuring or testing device is claimed, classification is in Class 73. (Apparatus or Process Combined With Measuring or Testing).

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 1+ for measurement system in a specific environment, subclasses 85+ for calibrating or correction system, subclasses 108+ for testing system, and subclasses 127+ for generic measurement system. Class 73 takes the combination of register claimed broadly or specifically in combination with significant measuring or testing of the type provided for in Class 73. (Electrical)

935, Genetic Engineering: Recombinant DNA Technology, Hybrid or Fused Cell Technology, and Related Manipulations of Nucleic Acids, which provides a search collection for processes of altering the genetic structure of micro-organisms; genes and methods of modifying genes and their expression; vectors and methods of modifying vectors; methods of introducing DNA into a cell; microorganisms, per se, which have had their genetic sequence altered by recombinant DNA techniques or by cell fusion or by uptake of DNA; testing; separation techniques; apparatus; and methods of use of vectors or of the genetically engineered micro-organisms; methods of gene therapy or genetic modification of living organisms. (Chemical; and Radiant Energy [and see Optical references]).

SUBCLASSES

1.01 INSTRUMENT PROVING OR CALIBRATING:

This subclass is indented under the class definition. Subject matter comprising a process or an apparatus for (a) ascertaining (i.e., proving) the quality of a measuring device, a testing device, or a condition responsive device by testing the respective device, or (b) checking, adjusting, or standardizing systematically (i.e., calibrating) the graduations of a quantitative measuring instrument or a condition responsive device (e.g., sensors, safety valves, etc.).

(1) Note. Where the proving or calibrating is by measuring means or testing means of a kind provided for in another measuring or testing class, the subject matter is found in the other measuring or testing class. See such measuring or testing class and the Lines With Other Classes to this class definition.

(2) Note. Where more structure of a measuring device, a testing device, or a condition responsive device is recited than that which is necessary to (a) prove or calibrate or (b) identify the measuring device, the testing device, or the condition responsive device, the subject mat-

ter goes with the analyzer or the condition responsive device.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 455+ for a line condition change responsive valve.

200, Electricity: Circuit Makers and Breakers, appropriate subclasses for mechanical switches with adjustment means.

250, Radiant Energy, appropriate subclasses for measuring invisible light combined with calibration, particularly subclass 252.1 for (a) a method for establishing a reference indication of invisible radiation or (b) a method of error determination or correction using a reference indication of invisible radiation level; and subclass 363.09 for a method of invisible radiant energy responsive electrical signalling with a radiant energy source and with calibration.

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclass 48 for test or calibration structure for an active solid-state device.

324, Electricity: Measuring and Testing, subclass 74 for testing or calibrating electric meters by purely electrical means; subclass 130 for systems for measuring, testing, or sensing electricity, per se, with self calibration; subclass 202 for calibration of magnetic measuring or testing systems; and subclass 601 for calibration of impedance, admittance, or other electrically stimulated response measuring or testing systems.

340, Communications: Electrical, subclass 501 for an apparatus for providing a humanly perceptible signal in response to a predetermined condition (e.g., alarms) combined with calibration or compensation means and subclass 870.04 for a telemetry system combined with calibration means.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 165+ for testing or calibrating of a radar system.

356, Optics: Measuring and Testing, appropriate subclasses for an apparatus for measuring or testing by measuring visible light combined with proving or testing means, especially subclass 6 for testing or indicating the condition of a range finder with regards to its adjustment, alignment, or calibration by measuring visible light; subclass 46 for an electric light utilizing a lamp as a standard for photometry or optical pyrometry measuring; subclass 124 for lens or reflective image former testing in general; and subclass 243 for an apparatus for measuring or testing visible light including structure for a basis for comparison with a specimen or a portion thereof under test.

374, Thermal Measuring and Testing, subclasses 1+ for calibration or testing of a thermally responsive device.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 29 for calibrating or testing an electrical counter.

378, X-Ray or Gamma Ray Systems or Devices, subclass 207 for a testing or calibration accessory of an X-ray or gamma ray system.

435, Chemistry: Molecular Biology and Microbiology, subclass 967 for a cross-reference art collection of standards, controls, materials (e.g., validation studies, buffer systems, etc.).

702, Data Processing: Measuring, Calibrating, or Testing, appropriate subclasses for the use of an electronic calculator to adjust a measurement device.

1.02 Gas or liquid analyzer:

This subclass is indented under subclass 1.01. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device which is being proven or calibrated either (1) detects or measures the composition of, or some constituent or an identifying characteristic of a gas or gaseous mixture or (2) detects or determines the composition of, a constituent of, or a property of a liquid or a liquid suspension of a solid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23.2+, for a gas analyzer or sensor, per se, in particular subclasses 23.21+ for a gas analyzer including means for making a correction for an undesirable variation in a condition within an apparatus or in a test result due to such condition.

53.01+, for liquid testing (e.g., liquid chromatography), per se.

73+, for detecting the moisture content of a material.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclass 401 for fault testing of a sensor or a component of an electrolytic analysis and testing apparatus and subclass 408 for such an analysis or testing apparatus with means for temperature or pressure compensation.

250, Radiant Energy, subclasses 253+ for the detection of a gas either within or emanating from the earth by invisible radiation emanating from the gas naturally or as a result of irradiation by invisible radiation; and subclasses 336.1+ for testing of a gas by utilizing an electric signalling device detecting radiation induced or emitted naturally or detecting infrared, ultraviolet, X-ray, or gamma radiation or neutrons modified by the gas.

324, Electricity: Measuring and Testing, appropriate subclasses for testing an electrical property of a gas, in particular subclasses 464+ for analyzing gas using ionization effects.

338, Electrical Resistors, subclasses 34+ for a resistor, per se, which is responsive to the condition of a gas wherein no quantitative measurements of the gas are disclosed.

340, Communications: Electrical, subclasses 632+ for an electrical indicator providing a humanly perceptible signal representing a predetermined condition of a gas.

356, Optics: Measuring and Testing, subclasses 402+ for gas analysis utilizing a colorimeter to determine the shade or color of the gas.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for an apparatus utilizing a chemical reaction to analyze gas.

436, Chemistry: Analytical and Immunological Testing, subclass 68 for a process which utilizes a chemical reaction to analyze gas.

1.03 Reference standard:

This subclass is indented under subclass 1.02. Subject matter including a means for providing a reference criterion and wherein the apparatus for proving or calibrating uses the reference criterion for comparison purposes for proving or calibrating the device.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 427+ for an electrolytic gas sample sensor, per se, combined with a gas reference material; and subclass 435 for a standard reference electrode in an electrolytic analysis or testing apparatus.

356, Optics: Measuring and Testing, subclass 243 for an apparatus for measuring or testing visible light including structure forming a basis for comparison with a specimen or a portion thereof under test.

436, Chemistry: Analytical and Immunological Testing, particularly subclasses 8+ for a composition for standardization, calibration, simulation, or processes of use in preparation for chemical testing.

1.04 Permeable outlet or flawed element:

This subclass is indented under subclass 1.03. Subject matter wherein the reference standard comprises (a) a barrier having interstices, pores, or micropores through which the liquid or gas diffuses or (b) a solid body having a known imperfection which is detected by the gas or liquid.

1.05 Piston, sprayer, nozzle, or orifice:

This subclass is indented under subclass 1.03. Subject matter wherein the reference standard comprises either (a) a solid cylinder or disk that fits snugly into a large cylinder and moves back and forth under fluid pressure (i.e., a piston), (b) a means for discharging a fine jet of liquid from a pressurized container (i.e., a sprayer), (c) a tube having a taper or constriction (i.e., a nozzle), or (d) an opening (i.e., an orifice).

SEE OR SEARCH THIS CLASS, SUBCLASS:

1.16+, for either (a) proving or calibrating a flowmeter having a nozzle or (b) using a flowmeter having a nozzle to prove or calibrate a device.

216, for a Weir type flowmeter having a constriction in the form of a submerged orifice or discharge nozzle.

294, for a liquid level or depth gauge having a funnel or hose nozzle.

861.61+, for a flowmeter having a pressure differential type (a) orifice or (b) flow nozzle.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclasses for a sprayer or a nozzle, per se.

1.06 Gas:

This subclass is indented under subclass 1.02. Subject matter wherein either (a) the apparatus for proving or calibrating the device or (b) the device which is being proven or calibrated is an apparatus for detecting or measuring the composition of or some constituent of a gas or gaseous mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23.2+, for a gas analyzer or sensor, per se, in particular subclasses 23.21+ for a gas analyzer including means for making a correction for an undesirable variation in a condition within an apparatus or in a test result due to such condition.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclasses 400+ for an electrochemical gas sensor, per se.

324, Electricity: Measuring and Testing, particularly subclasses 464+ for analyzing gas using ionization effects and appropriate subclasses for testing gas by measuring impedance, admittance, and related quantities.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for an apparatus utilizing a chemical reaction to analyze a gas, particularly subclass 89 for gas chromatography.

436, Chemistry: Analytical and Immunological Testing, particularly subclass 68 for a process utilizing a chemical reaction for determining the gases in the blood and subclasses 161+ for chromatography.

1.07 Span or zero:

This subclass is indented under subclass 1.06. Subject matter wherein the measuring, testing, or condition responsive device produces an output signal in response to a condition being sensed and wherein the device is proven or calibrated by setting a range of values or a base value for the output signal.

1.08 Dynamometer:

This subclass is indented under subclass 1.01. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated measures or determines force, torque, work, or mechanical power.

(1) Note. For purposes of this subclass, a dynamometer may either be employed to measure an applied load or to apply a measured load (e.g., for test purposes).

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.39, for a viscometer measuring shearing torque between parallel surfaces wherein more structure of the force measuring device is recited than is necessary to describe the calibrating apparatus.

862+, for a dynamometer, per se.

SEE OR SEARCH CLASS:

177, Weighing Scales, appropriate subclasses, in particular subclass 50 for a weighing scale combined with testing wherein more structure of the force measuring device is recited than is necessary to describe the calibrating apparatus.

310, Electrical Generator or Motor Structure, subclass 338 for a force responsive piezoelectric sensor combined with mechanical energy coupling means.

318, Electricity: Motive Power Systems, appropriate subclasses for a dynamometer controlling a motor, in particular subclass 646 for a positional servo system with force or weight measuring.

324, Electricity: Measuring and Testing, subclass 727 for piezoelectric crystal testing.

338, Electrical Resistors, subclasses 2 through 6 for strain gauges, per se, in particular subclass 5 for a dynamometer type strain gauge, and subclass 47 for a force actuated electrical resistor.

340, Communications: Electrical, subclasses 665+ for an electrical indicating system providing a humanly perceptible signal in response to a predetermined force or stress.

GLOSSARY

FORCE:

The strength or energy exerted upon or brought to bear or the cause of motion or change in motion or a state of rest.

POWER:

The rate at which work is done or the rate at which energy is transferred.

TORQUE:

A turning or twisting force or a force that produces or tends to produce rotation or torsion.

WORK:

The transference of energy that is produced by motion at the point of application of force which is measured by multiplying the force and the displacement of its point of application in the line of action.

1.09 Torque:

This subclass is indented under subclass 1.08. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated is responsive to a force couple or moment of force that induces or resists rotation of a body about a point or an axis (i.e., torque).

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.041+, for dynamometers comprising means responsive to plural torques wherein more structure of the force measuring device is recited than is necessary to describe the calibrating apparatus.

862.08+, for a device for measuring torque, work, or power comprising sensing means responsive to a force couple or moment of force that induces or resists rotation of a body about a point or axis combined with a calibrating apparatus wherein more structure of the force measuring device is recited than is necessary to describe the calibrating apparatus.

1.11 Electrical:

This subclass is indented under subclass 1.09. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated comprises means for having an effect resulting from the existence of stationary or moving electric charges.

1.12 Wrench:

This subclass is indented under subclass 1.09. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated is a hand or power tool with fixed or adjustable jaws for twisting or turning an object.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.21+, for torque measuring wrench.

1.13 Weight:

This subclass is indented under subclass 1.08. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated measures, tests, or is responsive to a measure of the heaviness of an object.

SEE OR SEARCH CLASS:

177, Weighing Scales, appropriate subclasses, in particular subclass 50 for a weighing scale combined with testing wherein more structure of the force measuring device is recited than is necessary to describe the calibrating apparatus.

1.14 Rotor unbalance or a roller having a smooth surface:

This subclass is indented under subclass 1.08. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated either (1) determines the amount of or the location of a mass or force causing unbalance in a rotatable body or (2) tests or measures a physical characteristic of or is responsive to a rotating cylindrical shaped body having a surface free of roughness, irregularities, or projections.

SEE OR SEARCH THIS CLASS, SUBCLASS:

66+, for rotor unbalance measuring or testing, per se.

1.15 Load cell (e.g., strain gauge or piezoelectric sensor):

This subclass is indented under subclass 1.08. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated comprises a means which produces a signal in response to a force being applied thereto.

SEE OR SEARCH THIS CLASS, SUBCLASS:

760, for measuring a specimen stress or strain or for testing by stress or strain application.

862+, for dynamometers where strain in a part of the measuring apparatus itself is utilized as an index of power applied thereto or transmitted thereby.

SEE OR SEARCH CLASS:

411, Expanded, Threaded, Driven, Headed, Tool-Deformed, or Locked-Threaded Fastener, subclasses 8+ for fastener devices having means functioning to facilitate measuring or to denote the attainment of a desired stress or strain in a fastener device in situ.

1.16 Volume of flow, speed of flow, volume rate of flow, or mass rate of flow:

This subclass is indented under subclass 1.01. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated determines (1) a size or extent of flow of a fluent material, (2) a rate of flow of a fluent material, (3) a rate of motion of a specific dimensional amount of a fluent material, or (4) a response of a fluent material due to an acceleration other than in the normal direction of flow of the fluent material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

170.01+, for fluid flow direction determination, in particular subclasses 170.11+ for fluid flow velocity determination.

861+, for volume of flowmeters or rate of flowmeters and combinations of which they are a part.

1.17 Plug with leak detector:

This subclass is indented under subclass 1.16. Subject matter including a movable barrier for the introduction of a known flow volume combined with a means sensing an undesirable escape of a fluent material through an opening wherein the proving or the calibrating is performed by utilizing the movement of the barrier for the introduction of a known flow volume.

1.18 Sphere:

This subclass is indented under subclass 1.16. Subject matter wherein the movement of a three-dimensional surface, having all points of which are equidistant from a fixed point (e.g., a ball), is used for introducing a known flow volume.

1.19 Piston:
This subclass is indented under subclass 1.16. Subject matter wherein the movement of a solid cylinder or disk that fits snugly into a large cylinder and moves back and forth under fluid pressure or displaces or compresses fluid is utilized for introducing a known flow volume.

1.21 With plural pistons:
This subclass is indented under subclass 1.19. Subject matter wherein the movement of more than one piston in a cylinder is utilized for introducing a known flow volume.

1.22 With magnetic or optical sensor:
This subclass is indented under subclass 1.19. Subject matter including either (a) a body having properties of attracting materials, as iron, by virtue of a surrounding field of force created by motion of its atomic electrons and the alignment of its atoms which change in response to the movement of the piston or (b) a body whose response to light changes in response to the movement of the piston.

SEE OR SEARCH CLASS:
250, Radiant Energy, for a photocell circuit generating positional information.
324, Electricity: Measuring and Testing, subclasses 200+ for measuring using a magnetic sensor, per se, especially subclasses 207.11+ for determination of a displacement using a magnetic sensor, per se.
356, Optics: Measuring and Testing, subclasses 372+ for optical measuring and testing by mensuration.

1.23 With position sensing switch:
This subclass is indented under subclass 1.19. Subject matter including a means for opening or closing an electrical circuit or for diverting current from one conductor to another conductor in response to a change in position of the piston.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, subclasses 61.04+ for a liquid level responsive switch.

1.24 Tracer:
This subclass is indented under subclass 1.16. Subject matter comprising either (a) an identification substance that can be followed through the course of a process, providing information on the pattern of events in the process or on the redistribution of parts or elements involved (i.e., a tracer substance) and a detector means wherein (1) the tracer substance is introduced into the fluid at a fixed rate and (2) the detector means is placed downstream of the fluid flow and is responsive to a concentration of a tracer substance or (b) a fixed concentration of an identification substance that can be followed through the course of a process, providing information on the pattern of events in the process or on the redistribution of parts or elements involved (i.e., a tracer substance) and a detector means wherein (1) the fixed concentration of the tracer substance is introduced into the fluid and (2) the detector means is placed downstream of the fluid flow and is responsive to the rate of introduction of the fixed concentration of the substance.

(1) Note. For the purpose of this subclass, a body or substance that moves along with the fluid flow without impeding the fluid flow is a tracer.

SEE OR SEARCH THIS CLASS, SUBCLASS:
170.04, for determining the direction of fluid flow by use of a tracer.
861.05+, for determining a fluid flow rate by measuring the time required for a tracer placed in the fluid to travel from one position to another.

SEE OR SEARCH CLASS:
250, Radiant Energy, appropriate subclasses for an invisible radiation tracer for measuring fluent flow, especially subclasses 259+ for the use of tracer material in a well to test for leakage into or out of a well, subclasses 302+ for flow metering using invisible radiation type tracer methods, subclasses 306+ for rate of flow testing using charge particles, subclass 356.2 for flow metering using a radioactive tracer, and subclass 359.1 for use of

invisible radio tracers for fluent material level tests.

378, X-Ray or Gamma Ray Systems or Devices, subclass 51 for X-ray devices which may include flow metering.

1.25 Orifice or restriction:

This subclass is indented under subclass 1.16. Subject matter wherein either (a) the proving or calibrating apparatus or (b) the device being proven or calibrated either comprises (1) an opening sending out a controlled amount of flow of the fluent material or (2) a structure allowing a controlled amount of flow of the fluent material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

861.52+, for utilizing an apparatus for measuring a differential device having a restriction to make a volume or rate of flow determination, especially subclasses 861.61+ for utilizing an apparatus for measuring a differential device having a restriction or orifice to make a volume or rate of flow determination.

1.26 Nozzle or venturi:

This subclass is indented under subclass 1.25. Subject matter wherein the proving or calibrating apparatus or the device being proven or calibrated comprises (a) a tube having a taper or a constriction through which the fluent material passes or (b) a means having flared ends connected by a constricted middle through which the fluent material passes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

861.62+, for utilizing an apparatus for measuring a differential device having a restriction and a flow nozzle to make a volume or rate of flow determination.

1.27 Turbine, geared meter, pulse activated or counter:

This subclass is indented under subclass 1.16. Subject matter wherein either (a) the apparatus for proving or calibrating the device or (b) the device being proven or calibrated comprises either (1) a motor operated by water, steam, or air directed against cups, blades, or vanes on the rim of a wheel (i.e., turbine), (2) an instrument that measures fluent material passing through it via the use of rotary driven indicating members (i.e., geared meter), (3) a means having a property which changes in response to regularly occurring stimuli (i.e., pulse activated), or (4) a meter for totaling a parameter related to flow (i.e., counter).

1.28 Turbine or geared meter:

This subclass is indented under subclass 1.27. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated includes either (1) a motor operated by water, steam, or air directed against cups, blades, or vanes on the rim of a wheel or (2) an instrument that measures fluent material passing through it via the use of rotary driven indicating members (i.e., geared meter).

SEE OR SEARCH THIS CLASS, SUBCLASS:

861.79+, for utilizing a turbine to make a volume or rate of flow determination.

1.29 Anemometer or pitot tube:

This subclass is indented under subclass 1.16. Subject matter wherein either (a) the apparatus for proving or calibrating the device or (b) the device being proven or calibrated includes either (1) a means for measuring speed of wind or (2) a means that includes a tube which is placed in a moving body of fluid and is used to measure a kinetic head.

SEE OR SEARCH THIS CLASS, SUBCLASS:

861.84, for utilizing anemometer to make a volume or rate of flow determination.

1.31 With liquid level monitor or timer:

This subclass is indented under subclass 1.16. Subject matter including (a) an apparatus for determining a predetermined level or depth of a body of liquid or sensing a predetermined level or depth of body of liquid or (b) an apparatus for measuring the time for travel of a fluid from one point to another.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1.73+, for calibrating liquid level measuring devices.

290+, for liquid level measuring, per se.

1.32 Prover bell:
This subclass is indented under subclass 1.31. Subject matter which includes a bell-shaped object for introducing a known volume into (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated.

1.33 With floating element or weighing:
This subclass is indented under subclass 1.16. Subject matter wherein (a) the apparatus for proving or calibrating the device or (b) the device being proven or calibrated includes either (1) an element which lies in a liquid without sinking or which is suspended in a gas or (2) an element for measuring the heaviness of the fluent material.

1.34 With signal processing, span or set point adjustment (e.g., zero correction):
This subclass is indented under subclass 1.16. Subject matter wherein the apparatus for calibrating or proving comprises means for (a) performing a significant operation on an electrical signal in accordance with an algorithm or electronic circuitry, (b) performing an arithmetical or some limited logic operation to adjust a multiplier or scale, or (c) adjusting a base value (span) or an offset (e.g., zero correction).

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.88, for a proving or calibrating apparatus or a device being proven or calibrated other than a volume of flow, speed of flow, volume rate of flow, or mass rate of flow involving span or zero setting.
861.01+, for a flowmeter with indirect temperature or density compensation.

1.35 With pressure measurement or plural flowmeters:
This subclass is indented under subclass 1.16. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated comprises (1) means for determining a force per unit area exerted by the fluid or (2) more than one means for measuring a flow of a fluent material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.57+, for a proving or calibrating apparatus or a device being proven or calibrated other than a volume of flow, speed of flow, volume rate of flow, or mass rate of flow type and utilizing fluent pressure measurement.
700+, for a fluid pressure gauge, per se.

1.36 Metering dispenser:
This subclass is indented under subclass 1.16. Subject matter wherein either (a) the apparatus for proving or calibrating a device or (b) the device being proven or calibrated is a measuring means which issues out fluent material in portions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
168, for the testing of pumps or hydraulic equipment.

1.37 Speed, velocity, or acceleration:
This subclass is indented under subclass 1.01. Subject matter wherein either (a) the apparatus for proving or calibrating or (b) the device being proven or calibrated detects or determines either (1) a time rate of change of position of a body (i.e., speed), (2) or a time rate of change of position of a body in a given direction (i.e., or velocity), or (3) a time rate of change of speed or velocity of a body (i.e., acceleration).

SEE OR SEARCH THIS CLASS, SUBCLASS:
121+, for other than purely electrically or purely optically measuring speed, velocity, or acceleration in testing a vehicle brake.
167+, for other than purely electrically or purely optically measuring speed, velocity, or acceleration in testing a projectile.
178+, for other than a purely electrically or a purely optically measuring speed, velocity, or acceleration to test navigational instrument.
488+, for utilizing an inertial element for mechanical speed, velocity, or acceleration measuring and electrical speed, velocity, or acceleration mea-

suring other than a purely electrical or purely optical measuring type utilizing an inertial element; in particular, subclasses 514.01+ for an acceleration measuring apparatus utilizing an inertial element.

507, for comparing the speed of one device with another by measuring speed by means being other than purely electrical or purely optical.

652+, for apparatus for sensing vibrations by an inertial element.

861+, for fluid flow rate measuring other than by a purely electrical or a purely optical measuring means.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 231 and 232 for straight-line-light ray sighting instruments involving speed; subclasses 300+ for direction sensing and indicating instruments which may involve speed measuring of a non-purely electrical or non-purely optical measuring type, particularly subclasses 318+ wherein a gyroscope is utilized for controlling or stabilizing purposes; and subclasses 391+ for pendulums which may respond to and be calibrated in terms of acceleration.

250, Radiant Energy, appropriate subclasses for measuring invisible light to measure speed where no manual manipulation is involved.

324, Electricity: Measuring and Testing, subclasses 160+ for purely electrical speed measuring.

356, Optics: Measuring and Testing, appropriate subclasses for measuring visible light to determine speed.

1.38 Accelerometer utilizing an inertial element:

This subclass is indented under subclass 1.37. Subject matter wherein the device being proven or calibrated comprises an inertial member having an intrinsic or relational property which changes in response to a time rate of change of speed or velocity of a body which can be used to measure acceleration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

491+, for an acceleration measuring apparatus or method including means retaining a reading of maximum acceleration.

503.3, for determining speed by utilizing a gyroscope for combining acceleration and time.

504.03, for using gyroscopic or Coriolis effect on an inertial element to determine both angular rate and linear acceleration.

652+, for an apparatus sensing vibrations by use of an inertial member.

866.2, for a process or an apparatus for measuring a time rate of change in a sensed condition not provided for elsewhere.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 28+ for a mechanical indicator, per se, which provides a humanly perceptible signal in response to acceleration and includes no quantitative measuring means.

310, Electrical Generator or Motor Structure, subclass 329 for an inertia operated mechanical energy coupling means for a piezoelectric element or device.

324, Electricity: Measuring and Testing, subclass 162 for a purely electrical speed measuring means including an electrical accelerometer which senses acceleration by means other than an inertial element.

340, Communications: Electrical, subclass 669 for an electrical indicator or alarm which provides a humanly perceptible signal in response to a predetermined acceleration and provides no indication of a quantitative measurement.

356, Optics: Measuring and Testing, for an apparatus or a process for determining acceleration by measuring visible light and involving no mechanical manipulation.

361, Electricity: Electrical Systems and Devices, subclasses 280+ for an acceleration responsive capacitor.

1.39 Involving pendulum or impact:

This subclass is indented under subclass 1.38. Subject matter wherein either (a) the inertial member either comprises or is supported by an object suspended from a fixed support so that it

is free to swing back and forth or (b) the device is responsive to a force resulting from collision of one body with another.

SEE OR SEARCH THIS CLASS, SUBCLASS:

504.04, for a multi-sensor for determination of angular rate using gyroscopic or Coriolis effect combined with a determination of linear acceleration and including a vibratory inertial body.

504.12+, for measuring angular velocity using gyroscopic or Coriolis effect on a vibratory inertial body.

514.15, for acceleration measuring by means of a vibratory inertial mass.

514.29, for measuring acceleration by means of a vibrating sensor.

514.36, for acceleration measuring by means of a pendulum type inertial element wherein no rebalance is recited.

570+, for a vibrator, per se, used in testing or the testing of a vibrator.

1.41 Optical or magnetic sensing:

This subclass is indented under subclass 1.37. Subject matter comprising a sensing means whose characteristic changes in response to a light beam being modified in accordance with the change in the property of an inertial member due to the speed or velocity of the body or the sensing means comprising a body whose magnetic characteristic changes in response to the change in the property of the inertial member due to the speed or velocity of the body.

SEE OR SEARCH THIS CLASS, SUBCLASS:

653, for an inertial type vibration sensing means having a light beam indicator.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 227.14+ for a condition responsive light guide and subclasses 231.1+ for a light valve actuated by an external dynamic physical quantity.

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, for a magnet or an electromagnet, per se.

336, Inductor Devices, subclass 30 for an inductor device having an acceleration responsive inductance adjusting means.

1.42 Timing apparatus (e.g., fuse, camera, or shutter):

This subclass is indented under subclass 1.01. Subject matter wherein the device being proven or calibrated measures passage of time.

1.43 Chronometer (e.g., clock, watch, or watch unbalance):

This subclass is indented under subclass 1.42. Subject matter wherein the device being proven or calibrated includes means providing a humanly perceptible indication of a passage of time.

SEE OR SEARCH CLASS:

368, Horology: Time Measuring Systems or Devices, appropriate subclasses for a timer, per se.

1.44 Using antenna or radio frequency (RF):

This subclass is indented under subclass 1.43. Subject matter wherein either (a) the apparatus for proving or calibrating the device or (b) the device being proven or calibrated either (1) includes a metallic device for transmitting or receiving electromagnetic waves (i.e., an antenna) or (2) utilizes a frequency lying in the range of frequencies, between about 3 kilohertz and 300 gigahertz, over which electromagnetic radiation is used in radio transmission (i.e., radio frequency).

SEE OR SEARCH CLASS:

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), appropriate subclasses for an antenna, per se.

1.45 Using optical sensor or element:

This subclass is indented under subclass 1.43. Subject matter wherein either (a) the apparatus for proving or calibrating the chronometer or (b) the chronometer being proven or calibrated includes a means whose optical characteristic changes in response to a stimulus.

SEE OR SEARCH CLASS:

250, Radiant Energy, appropriate subclasses for an optical sensor, per se.

1.46 With sound sensor:
This subclass is indented under subclass 1.45. Subject matter wherein either (a) the apparatus for proving or calibrating the chronometer or (b) the chronometer being proven or calibrated includes a means whose characteristic changes in response to sound.

SEE OR SEARCH THIS CLASS, SUBCLASS:
649+, for a vibration or sound testing sensor.

1.47 Resilient element:
This subclass is indented under subclass 1.45. Subject matter wherein either (a) the apparatus for proving or calibrating the chronometer or (b) the chronometer being proven or calibrated includes a means having the capacity of returning to an original form immediately upon the withdrawal of a force which causes compression or distortion.

1.48 Using sound sensor or piezoelectric vibration sensor:
This subclass is indented under subclass 1.43. Subject matter wherein either (a) the apparatus for proving or calibrating the chronometer or (b) the chronometer being proven or calibrated includes either (1) a means having a characteristic which changes in response to sound or (2) an element which produces electricity in response to pressure being applied thereto by a detection of vibration.

(1) Note. A tick detector, unless otherwise set forth, is found here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
649+, for a vibration or sound testing sensor.

1.49 Plural watches or plural sensors:
This subclass is indented under subclass 1.48. Subject matter wherein the device being proven or calibrated includes at least two chronometers or transducers.

1.51 Resilient element:
This subclass is indented under subclass 1.48. Subject matter wherein either (a) the apparatus for proving or calibrating the chronometer or (b) the chronometer being proven or calibrated includes a means having a capacity of returning to an original form immediately upon the withdrawal of a force which causes compression or distortion.

1.52 Plural watches:
This subclass is indented under subclass 1.43. Subject matter wherein the devices being proven or calibrated includes at least two chronometers.

1.53 With resilient element:
This subclass is indented under subclass 1.43. Subject matter wherein either (a) the apparatus for proving or calibrating the chronometer or (b) the chronometer being proven or calibrated includes a means having a capacity of returning to an original form immediately upon the withdrawal of a force which causes compression or distortion.

1.54 Coil spring:
This subclass is indented under subclass 1.53. Subject matter wherein the resilient element is a spirally wound elastic member.

SEE OR SEARCH CLASS:
267, Spring Devices, subclasses 166+ for coil springs, per se.

1.55 Plural coil springs:
This subclass is indented under subclass 1.54. Subject matter wherein the resilient element comprises at least two spirally wound elastic members.

1.56 Optical instrument (e.g., camera shutter) or optical sensor:
This subclass is indented under subclass 1.42. Subject matter wherein the timer being proven or calibrated is either (a) an instrument which is operated by light or (b) an element whose characteristic changes in response to light.

1.57 Fluid pressure:
This subclass is indented under subclass 1.01. Subject matter wherein the device being proven or calibrated either (a) measures fluid pressure or (b) is responsive to fluid pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
700+, for a fluid pressure gauge.

1.58 Vacuum:
This subclass is indented under subclass 1.57. Subject matter wherein either (a) the apparatus for proving or calibrating the fluid pressure measuring device uses subatmospheric pressure or (b) the device being proven or calibrated is responsive to or measures a subatmospheric pressure.

1.59 With signal correction or processing:
This subclass is indented under subclass 1.57. Subject matter including either (a) a means for (1) performing an operation on an electrical signal to or from the fluid pressure measuring device in accordance with a set of rules which result in a significant change in the signal or (2) performing an arithmetical or some limited logic operation upon or with a signal to or from the fluid pressure responsive or measuring device in a systematic manner or (b) a means for adjusting an electrical signal either from the fluid pressure responsive device or the fluid pressure measuring device to a desired value.

1.61 Span:
This subclass is indented under subclass 1.59. Subject matter wherein the pressure responsive device is tested or calibrated for accuracy at at least two pressures.

1.62 Zero:
This subclass is indented under subclass 1.59. Subject matter wherein the pressure responsive device is adjusted or checked for accuracy by checking its response to a reference pressure.

1.63 With reference source or attachment therefor:
This subclass is indented under subclass 1.59. Subject matter including (a) a means for providing a standard or a known pressure during the proving or calibration of either the device which (1) measures fluid pressure or (2) is responsive to fluid pressure or (b) an element adapted to be affixed to a means for providing a standard or a known pressure during the proving or calibrating of the device which either (1) measures pressure or (2) is responsive to fluid pressure.

1.64 Varying:
This subclass is indented under subclass 1.63. Subject matter wherein the provided standard or the known pressure varies during the proving or calibrating of the fluid pressure measuring or the fluid pressure responsive device.

1.65 Dead weight type:
This subclass is indented under subclass 1.57. Subject matter including a reference pressure source comprising a known weight acting as a sole force or pressure on a known area.

1.66 Varying:
This subclass is indented under subclass 1.57. Subject matter including means providing a standard or the known pressure which varies during the proving or calibrating of either the fluid pressure measuring device or the fluid pressure responsive device.

1.67 Using or containing liquid:
This subclass is indented under subclass 1.66. Subject matter wherein either (a) the apparatus proving or calibrating the fluid pressure measuring device or the fluid pressure responsive device, (b) the pressure measuring means, or (c) the fluid pressure responsive means uses or includes a liquid.

1.68 With piston and cylinder:
This subclass is indented under subclass 1.57. Subject matter including a cylindrical solid element movable in and snugly fitted in a cylindrical housing and wherein either (a) the apparatus for proving or calibrating the fluid pressure measuring device or the fluid pressure responsive device, (b) the device for measuring the fluid pressure, or (c) the device responsive to the fluid pressure includes the solid element and the cylindrical housing.

1.69 Using or containing liquid:
This subclass is indented under subclass 1.57. Subject matter wherein either (a) the apparatus proving or calibrating the fluid pressure measuring device or the fluid pressure responsive device, (b) the pressure measuring means, or (c) the fluid pressure responsive means uses or includes a liquid.

1.71 Pressure activated device:
This subclass is indented under subclass 1.57. Subject matter wherein the pressure responsive device which is being proven or calibrated performs a nonpressure function in response to pressure.

1.72 Valve:
This subclass is indented under subclass 1.71. Subject matter wherein the pressure activated device comprises a body that regulates the flow of gases, liquids, or loose materials through structure, as a pipe, or through an aperture by opening, closing, or obstructing a port or a passageway or movable control element of such body.

1.73 Liquid level or volume measuring apparatus:
This subclass is indented under subclass 1.01. Subject matter wherein either (a) the apparatus for proving or calibrating the device or (b) the device being proven or calibrated measures either (1) a height of liquid contained in a body or (2) an amount of material contained in a body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
149, for volume measuring, per se.
290+, for liquid level measuring or testing, per se.

1.74 Volumetric dispenser (e.g., pipette):
This subclass is indented under subclass 1.73. Subject matter wherein either (a) the apparatus for proving or calibrating the device or (b) the device being proven or calibrated deals out a fixed amount of a content of a body in portions.

1.75 Angle, direction, or inclination:
This subclass is indented under subclass 1.01. Subject matter wherein either (a) the apparatus for proving or calibrating the device or (b) the device being proven or calibrated (1) measures the figure formed by two lines diverging from a common point (i.e., angle), (2) a position to which motion or another position is referred (i.e., direction), or (3) a deviation from a horizontal or vertical reference point (i.e., inclination).

SEE OR SEARCH CLASS:
33, Geometrical Instruments, appropriate subclasses for instruments for measuring an angle, a direction, or an inclination.

1.76 Compass:
This subclass is indented under subclass 1.75. Subject matter wherein either (a) the apparatus for proving or calibrating the device or (b) the device being proven or calibrated indicates direction (north, south, east or west or combinations thereof).

SEE OR SEARCH CLASS:
33, Geometrical Instruments, appropriate subclasses for instruments for measuring an angle, a direction, or an inclination.

1.77 Gyroscope:
This subclass is indented under subclass 1.75. Subject matter including a spinning mass, usually a disk or wheel, the spin axis of which turns between two low friction supports and maintains its angular orientation with respect to inertial coordinates when not subjected to external torques wherein the spinning mass is either (a) a part of the apparatus for proving or calibrating the device or (b) the device being proven or calibrated.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 5+ for special features of gyroscope, per se, and especially subclass 5.22 as the generic place for gyroscopes combined with other structure.

1.78 Aircraft, inertial navigation, or attitude:
This subclass is indented under subclass 1.75. Subject matter wherein either (a) the apparatus for proving or calibrating the device includes an aircraft or (b) the device being proven or calibrated either (1) is used in inertial navigation (e.g., monitoring aircraft angle, direction, or navigation), (2) is responsive to inertial navigation, or (3) is responsive to attitude.

SEE OR SEARCH THIS CLASS, SUBCLASS:
178+, for navigation testing.

1.79 Displacement, motion, distance, or position:
This subclass is indented under subclass 1.01. Subject matter wherein the device being proven or calibrated measures a vector or magnitude of a vector, the act or process of changing location, the length of a line segment joining two points, or where an object is placed.

1.81 Length, width, or height:
This subclass is indented under subclass 1.79. Subject matter wherein the device being proven or calibrated measures a spatial extent.

1.82 Apparatus for measuring by use of vibration or apparatus for measuring vibration (e.g., acoustic or ultrasonic):
This subclass is indented under subclass 1.01. Subject matter wherein either (a) the apparatus being proven or calibrated undergoes a rapid linear motion about an equilibrium position or (b) the apparatus being proven or calibrated, tested, or adjusted measures a rapid linear motion of a body about an equilibrium position.

1.83 Liquid:
This subclass is indented under subclass 1.82. Subject matter wherein either the (a) apparatus for proving or calibrating the device or (b) the device being proven or calibrated uses or includes a fluid exhibiting a readiness to flow, little or no tendency to disperse, or relatively high incompressibility.

1.84 Rotary or rotor unbalance:
This subclass is indented under subclass 1.82. Subject matter wherein either the (a) apparatus for proving or calibrating the device or (b) the device being proven or calibrated includes either (1) a device undergoing angular motion or (2) an apparatus for determining the amount and/or location of masses or force causing unbalance in rotatable bodies.

SEE OR SEARCH THIS CLASS, SUBCLASS:
66+, for measuring rotor unbalance, per se.
455+, for a propeller rotor unbalance test.

1.85 Seismic (e.g., geophone) or with optical sensor:
This subclass is indented under subclass 1.82. Subject matter wherein either (a) the apparatus for proving or calibrating the device or (b) the device being proven or calibrated includes either (1) a device relating to an earthquake or earth tremor or (2) a device whose optical characteristic changes in response to sensing vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:
653, for a sensing apparatus having an inertial element with a light beam indicator.

SEE OR SEARCH CLASS:
367, Communications, Electrical: Acoustic Wave Systems and Devices, subclass 13 for testing, monitoring, or calibrating acoustic wave systems or devices used for electrical communications.

1.86 Reference standard detail:
This subclass is indented under subclass 1.82. Subject matter including a means for providing reference criterion which is used for or intended to be used for comparison purposes in order to prove, calibrate, test, or adjust the measuring, testing, or condition responsive device and wherein significance is attributed to the means for providing the reference criterion.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 427+ for an electrolytic gas sample sensor, per se, combined with a gas reference material; and subclass 435 for a standard reference electrode in an electrolytic analysis or testing apparatus.
356, Optics: Measuring and Testing, subclass 243 for an apparatus for measuring or testing visible light including structure forming a basis for comparison with a specimen or a portion thereof under test.
436, Chemistry: Analytical and Immunological Testing, particularly subclasses 8+ for a composition for standardization, calibration, simulation, or

processes of use in preparation for chemical testing.

1.87 Centrifuge:
This subclass is indented under subclass 1.01. Subject matter wherein the device being proven or calibrated includes a sample holding device designed to rapidly rotate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.02+, for (a) an apparatus for proving or calibrating a device for measuring or testing a liquid or a liquid suspension of a solid by use of a centrifuge or (b) proving or calibrating a device using a centrifuge for measuring or testing a liquid or a liquid suspension of a solid.
53.01+, for an analysis of a liquid or a liquid suspension of a solid by use of a centrifuge.

1.88 Span or set point adjustment (e.g., zero correction):
This subclass is indented under subclass 1.01. Subject matter wherein the device being proven or calibrated produces an output signal in response to a condition being sensed and wherein the proving, the calibrating, the testing, or the adjustment of the device is made by setting a range of values or a base value for the output.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.34, for volume of flow, speed of flow, volume rate of flow, or mass rate of flow apparatus which proves or calibrates the device by establishing a span or a zero or a volume of flow, speed of flow, volume rate of flow, or mass rate of flow device being proven or calibrated has a span or a zero value.

1.89 Roughness or hardness:
This subclass is indented under subclass 1.01. Subject matter wherein the device being proven or calibrated produces an output signal in response to a condition being sensed and wherein the proving, the calibrating, the testing or the adjustment of the device measures (a) the amount of unevenness of a surface or (b) the amount of resistance of a surface to penetration of an indentor into the surface or the amount of resistance of a surface to scratching.

SEE OR SEARCH THIS CLASS, SUBCLASS:
84+, for measuring or testing hardness, per se.

7 This subclass is indented under the class definition. Subject matter in which a measurement or test is made involving any one or any combination of the operations of abrasion, milling, rubbing, or scuffing, even though the test is employed as an index of another property, e.g., hardness. These are, in general, “wear” tests.

SEE OR SEARCH THIS CLASS, SUBCLASS:
9+, for analogous testing or measuring of frictional resistance, coefficient or characteristic.
862.12+, for torque absorption dynamometers of the frictional drag type.

SEE OR SEARCH CLASS:
277, Seal for a Joint or Juncture, for a generic sealing means or process, subclass 321 for a seal combined with means to indicate wear, proper seating, or presence.
434, Education, Demonstration, and Cryptography, for the demonstration of wear characteristics of materials not involving a measurement or a test feature.

8 This subclass is indented under subclass 7. Subject matter in which any one of the following is the device tested: a wheel tread, tire, vehicle track or roadway.

SEE OR SEARCH THIS CLASS, SUBCLASS:
146+, for testing the same devices in other ways.

9 This subclass is indented under the class definition. Subject matter for measuring or determining the frictional drag or resistance between solid bodies when moved relative to one another.

SEE OR SEARCH THIS CLASS, SUBCLASS:

7+, for testing or measuring by abrasion, milling, rubbing, or scuffing, i.e., "wear" tests.

862.11, through 862.18, for torque measuring dynamometers e.g., pony brakes.

10 This subclass is indented under subclass 9. Subject matter in which the effect of a lubricant upon the frictional drag between relatively movable solid bodies is determined, there being means for applying or maintaining the supply of lubricant.

(1) Note. These tests are usually termed tests of the lubricant.

SEE OR SEARCH THIS CLASS, SUBCLASS:

7+, for "wear" tests involving application of a lubricant.

32+, for determination of specific gravity or density of lubricants.

53.01, for determination of viscosity of lubricants and other miscellaneous tests of lubricants.

SEE OR SEARCH CLASS:

434, Education and Demonstration, and Cryptography, subclass 388, for lubricant demonstration devices not involving measuring or testing features.

11.01 TESTING IMPACT DELIVERING DEVICE (E.G., A HAMMER):

This subclass is indented under the class definition. Subject matter comprising an apparatus or method for testing a device which delivers an impact while in use.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1.08+, for proving or calibrating a device responsive to force, torque, work, or mechanical power.

12.01+, for testing by impact.

112+, for power plant or unit efficiency measuring.

167, for projectile testing, per se.

488+, for speed or acceleration measuring, per se.

862.381+,for force measuring, per se.

SEE OR SEARCH CLASS:

346, Recorders, subclasses 7 and 129 for a record tracer movement responsive to inertial or mass inclination.

374, Thermal Measuring and Testing, subclasses 31+ for calorimetry, per se.

11.02 Shot peener:

This subclass is indented under subclass 11.01. Subject matter wherein the device being tested is a means for providing an acceleration to a pellet for the purpose of impacting.

SEE OR SEARCH THIS CLASS, SUBCLASS:

7+, for testing by abrasion, milling, rubbing, or scuffing, per se.

37.5, for measuring dimension, size, and shape using fluid pressure.

104, for surface testing or measuring, per se.

760+, for testing for specimen stress or strain, or testing by stress or strain application.

11.03 Pile driving hammer:

This subclass is indented under subclass 11.01. Subject matter wherein the device being tested comprises an impact hammer for driving a columnar structure into the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

12.01+, for testing by impact, per se.

82, for an impactor for testing hardness.

84, for testing soil hardness by driving a pile into soil.

488+, for speed and acceleration measuring, per se.

SEE OR SEARCH CLASS:

72, Metal Deforming, subclass 53 for metal deforming by shot blasting.

405, Hydraulic and Earth Engineering, subclasses 232+ for a process or an apparatus for installing a pile.

11.04 TESTING OF SHOCK ABSORBING DEVICE (E.G., AUTOMOBILE SHOCK

ABSORBER, GUN RECOIL APPARATUS, ETC.):
This subclass is indented under the class definition. Subject matter comprising an apparatus or method for testing a device whose function while it is in use is to absorb shock.

SEE OR SEARCH THIS CLASS, SUBCLASS:
12.01+, for testing by shock.
79, for testing for hardness by observing rebound.
112+, for a power plant or unit efficiency measurement.

SEE OR SEARCH CLASS:
105, Railway Rolling Stock, subclass 392.5 for a shock absorber for a railway vehicle.
188, Brakes, subclasses 266+ for a fluid-type shock absorber for a railway vehicle.
213, Railway Draft Appliances, subclass 1 for a one-shot shock absorber and subclass 32 for a draft gear assembly, per se.
248, Supports, appropriate subclass for support-type shock absorbers.
267, Spring Devices, appropriate subclass for spring-type shock absorbers.
340, Communications: Electrical, subclasses 500+ for an electrical indicator which produces a humanly perceptible signal in response to the attainment of a predetermined condition; particularly, subclass 665 for a predetermined mechanical force.

11.05 Torsional vibration damper:
This subclass is indented under subclass 11.04. Subject matter wherein the device being tested is used to lessen or reduce the amplitude of torsional vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:
574, for using vibration for testing for mechanical impedance, per se.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, appropriate subclass for subject matter of that class type combined with vibration dampers.
188, Brakes, subclasses 378+ for vibration dampers, per se.

11.06 Railway draft gear:
This subclass is indented under subclass 11.04. Subject matter wherein the device being tested transmits pull from one railway car to another railway car.

SEE OR SEARCH CLASS:
213, Railway Draft Appliances, subclass 1 for a one-shot shock absorber and subclass 32 for a draft gear assembly, per se.

11.07 In situ vehicle suspension:
This subclass is indented under subclass 11.04. Subject matter wherein the device being tested is a structure which suspends a vehicle body on its running gear.

SEE OR SEARCH CLASS:
280, Land Vehicles, subclass 784 for a vehicle frame having an impact shock absorber.

11.08 By applying reciprocating or oscillating motion:
This subclass is indented under subclass 11.07. Subject matter wherein the testing is done by applying a periodic motion to the device.

SEE OR SEARCH THIS CLASS, SUBCLASS:
570+, for vibration testing, per se.

SEE OR SEARCH CLASS:
280, Land Vehicles, subclass 784 for a vehicle frame having an impact shock absorber.

11.09 By applying reciprocating or oscillating motion:
This subclass is indented under subclass 11.04. Subject matter wherein the testing is done by applying a back-and-forth periodic motion to the device.

SEE OR SEARCH THIS CLASS, SUBCLASS:
570+, for vibration testing, per se.

12.01 TESTING BY IMPACT OR SHOCK:
This subclass is indented under the class definition. Subject matter comprising an apparatus or method for testing a specimen by subjecting it to one or more sudden blows.

SEE OR SEARCH THIS CLASS, SUBCLASS:
11.01, for testing an impact delivering device.
11.04, for the testing of a shock absorbing apparatus.
35.14+, for testing a body by measuring the effect of an explosion on the body.
78+, for hardness testing.
161, for spring testing, per se.
167, for testing ordnance or projectile.
570+, for testing by vibration, per se.
788+, for loading a specimen to determine shear or strain.
862+, for measuring a force or a force component.

SEE OR SEARCH CLASS:
116, Signals and Indicators, subclass 32 for a collision released identification tag, per se, and subclass 203 for a mechanical indicator, per se, which provides a humanly perceptible signal in response to the presence or absence of an impact.
173, Tool Driving or Impacting, appropriate subclasses for an impacting device, per se.
188, Brakes, appropriate subclasses for an internal resistance motion retarder, per se.
251, Valves and Valve Actuation, appropriate subclasses for a fluid actuated valve, per se.
267, Spring Devices, subclasses 136+ for a resilient shock or vibration absorber, per se.
340, Communications: Electrical, for an electrical indicator or alarm which provides a humanly perceptible signal in response to a predetermined force.

12.02 Resilient ball (e.g., golf ball, baseball, etc.):
This subclass is indented under subclass 12.01. Subject matter wherein the specimen being tested is an elastic spherical body usually used in games or sports.

SEE OR SEARCH THIS CLASS, SUBCLASS:
79, for hardness testing by measuring rebound.
167, for projectile testing, per se.
865.3, for the testing of a body by subjecting it to motion, per se.

SEE OR SEARCH CLASS:
124, Mechanical Guns and Projectors, appropriate subclass for mechanical guns and projectors.

12.03 Typewriting ribbon or carbon paper:
This subclass is indented under subclass 12.01. Subject matter wherein the specimen being tested is either a typewriter ribbon or carbon paper.

(1) Note. Carbon paper is used in the popular sense of the word to mean that type of paper which transfers a surface coating when pressed against a surface, as by a typewriter key.

SEE OR SEARCH THIS CLASS, SUBCLASS:
150, for testing of a coating, per se.
159, for a filament testing, per se.

12.04 Accelerated or decelerated specimen (e.g., propelled or dropped specimen support carriage):
This subclass is indented under subclass 12.01. Subject matter wherein either the specimen or the specimen and its support is subjected to a sudden change in velocity.

SEE OR SEARCH THIS CLASS, SUBCLASS:
167, for projectile testing, per se.
788, for applying a load to a specimen in order to test for stress or strain.
865.3, for testing by imparting motion to a specimen.

12.05 Particle or projectile specimen:
This subclass is indented under subclass 12.04. Subject matter wherein the specimen is either a particle or a projectile.

SEE OR SEARCH THIS CLASS, SUBCLASS:

167, for other types of testing of projectiles.

570+, for applying a load to a specimen in order to test for stress or strain.

865.3, for testing by imparting motion to a specimen.

12.06 Dropped:

This subclass is indented under subclass 12.04. Subject matter wherein the change in velocity of the specimen is caused by dropping the specimen or the specimen and its support onto a fixed surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:

79, for testing for hardness using rebound.

760+, for applying a load to a specimen in order to test for stress or strain.

865.3, for testing by imparting motion to a specimen.

12.07 By hydraulic or pneumatic forces:

This subclass is indented under subclass 12.04. Subject matter wherein the change in velocity of the specimen is caused by either (a) liquid pressure or (b) air pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

82, for hydraulically driven impact-type hardness testing.

167, for other types of testing of projectiles.

760+, for applying a load to a specimen by hydraulic or pneumatic loading means in order to test for stress or strain.

865.3, for testing by imparting motion to a specimen.

SEE OR SEARCH CLASS:

124, Mechanical Guns and Projectors, subclass 73 for fluid pressure actuated guns and projectors.

251, Valves and Valve Actuation, appropriate subclass for valve and fluid actuated valves, per se.

406, Conveyors: Fluid Current, appropriate subclass for a fluid current conveyor, per se.

12.08 Specimen directly subjected to a fluid pressure pulse or wave:

This subclass is indented under subclass 12.01. Subject matter wherein the source of the blow to the specimen is a fluid pressure pulse or wave.

SEE OR SEARCH CLASS:

406, Conveyors: Fluid Current, appropriate subclass for a fluid current conveyor, per se.

12.09 Specimen impactor detail:

This subclass is indented under subclass 12.01. Subject matter wherein significance is attributed to the device which subjects a specimen to a blow.

12.11 Particle or projectile:

This subclass is indented under subclass 12.09. Subject matter wherein the impactor is either a particle or a projectile.

12.12 Reciprocating or oscillating:

This subclass is indented under subclass 12.09. Subject matter wherein the impactor moves towards and away from the specimen in such a fashion so as to apply periodic blows to the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:

570+, for vibration testing, per se.

12.13 Dropped:

This subclass is indented under subclass 12.09. Subject matter wherein the impactor is released above the specimen and accelerated by gravity until it strikes the specimen.

12.14 Pivoted:

This subclass is indented under subclass 12.13. Subject matter wherein the impactor swings about a fixed axis.

19.01 GAS CONTENT OF A LIQUID OR A SOLID:

This subclass is indented under the class definition. Subject matter comprising a process or an apparatus for determining the nature or amount of gas in a substance other than gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23.2+, for a process or apparatus for analyzing gas.

73+, for a process or apparatus for determining the moisture content of materials.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, for processes of gas separation, per se (i.e., not combined with analysis steps).

96, Gas Separation: Apparatus, for apparatus for gas separation, per se (i.e., not combined with analysis means).

204, Chemistry: Electrical and Wave Energy, subclasses 400+ for an apparatus which utilizes electrolytic action for analysis or testing.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 68+ for an apparatus which utilizes a chemical reaction to determine the gas content of a liquid or solid.

436, Chemistry: Analytical and Immunological Testing, for a process which utilizes a chemical reaction to determine the gas content of a liquid or a solid, particularly subclass 68 for determining the gas content of blood.

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

19.02 By gas chromatography:

This subclass is indented under subclass 19.01. Subject matter wherein the effluent of a mixture of gases, which has contacted a solvent or sorbent which separates the mixture into fractional components, is successively tested to determine the quantity, quality or identity of a component of the effluent.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23.35+, for gas analysis using gas chromatography, and particularly subclass 23.4 for a gas detector which uses gas chromatography to analyze gas.

53.01+, for liquid testing, (e.g., liquid chromatography).

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, subclasses 82+ for processes of gas separation, per se (i.e., not combined with analysis steps), using chromatography.

96, Gas Separation: Apparatus, subclasses 101+ for apparatus for gas separation, per se (i.e., not combined with analysis means), of the chromatographic type.

204, Chemistry: Electrical and Wave Energy, subclasses 400+ for electrochemical gas sensors, per se.

210, Liquid Purification or Separation, subclasses 660+ for a process of removing a constituent from a liquid by sorption, particularly subclasses 656+ for selective sorptions (e.g., chromatography) subclasses 85+ for a liquid separator with recorder or register and subclasses 263+ for a liquid separator utilizing a bed of particulate material.

324, Electricity: Measuring and Testing, particularly subclasses 464+ for analyzing gas using ionization effects, and appropriate subclasses for testing gas by measuring impedance, admittance, and related quantities.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for an apparatus utilizing a chemical reaction to analyze a gas, particularly subclass 89 for gas chromatography.

436, Chemistry: Analytical and Immunological Testing, appropriate subclasses for a process of gas analysis which utilizes a chemical reaction to

determine the gas content of a liquid or a solid, and particularly subclass 68 for determining the gas content of blood, and subclasses 161+ for chromatography.

19.03 By vibration:

This subclass is indented under subclass 19.01. Subject matter wherein the liquid or solid is subjected to vibratory forces to determine its gas content.

SEE OR SEARCH THIS CLASS, SUBCLASS:

24.01+, for detection of gas, per se, by measuring the effect of the gas being tested on vibration.

570+, for testing, per se, using vibration.

861.18, for measuring the volume or rate of flow of fluent material by sensing vibration.

19.04 By rate of flow of the gas:

This subclass is indented under subclass 19.01. Subject matter wherein the gas content of the liquid or solid is determined by measuring the rate of flow of the gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1.16+, for calibration of flow meters.

155, for determining fluid flow in bore holes.

170.07, and 170.11, for determining the rate of flow and direction of flow of fluid in meteorology and oceanology.

181+, for determining the speed of a craft with respect to a fluid.

861+, for measuring the flow of fluent material, per se.

SEE OR SEARCH CLASS:

48, Gas: Heating and Illuminating, subclasses 180.1+ for metering and mixing two gases where one is a fuel.

116, Signals and Indicators, for nonelectrical means for giving an alarm upon occurrence of fluid flow.

128, Surgery, subclasses 630+ for flow-measuring means with structure particularly adapted for placement on or in a living body.

137, Fluid Handling, subclasses 98+ for a self-proportioning flow system; and subclasses 624.11+ for a programmed or timed valve which meters fluid merely by timing the interval between opening and closing of the valve.

175, Boring or Penetrating the Earth, subclass 48 for measuring the rate of flow drilling fluid.

222, Dispensing, particularly subclasses 14+, 59+ and 71+ for volume or rate of flow-measuring means having dispensing features or which are used in dispensing combinations.

250, Radiant Energy, particularly subclasses 258, 259+, 302+, 356.1, and 432+ for miscellaneous radiant energy responsive devices.

324, Electricity: Measuring and Testing, subclass 306 for flow-measuring means responsive to nuclear induction.

340, Communications: Electrical, subclasses 606+ for electric means for giving a humanly perceptible indication or signal in response to a predetermined condition, such as flow of a fluid.

356, Optics: Measuring and Testing, subclasses 27+ for flow-measuring means employing lasers.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 21 for a system utilizing a pulse counter to measure fluid flow.

700, Data Processing: Generic Control Systems or Specific Applications, subclasses 282 through 285 for flow control.

19.05 By pressure of the gas:

This subclass is indented under subclass 19.01. Subject matter wherein the gas content of the liquid is determined by measuring the pressure of the gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:

24.04, for measuring vapor pressure of gas by vibration.

25.04, for measuring vapor pressure of gas by measuring a thermal property of the gas.

29.01+, for determining the vapor pressure of gas being tested.

31.04, for analyzing gas by pressure measurement, per se.
37+, for a testing apparatus or process for subjecting a specimen directly to fluid pressure (positive or negative) to determine a property of the specimen.
78+, for a device for measuring hardness as an index of fluid pressure, particularly subclass 80 for a tonometer and subclass 81 for a tire hardness gauge.
115, for a process or an apparatus which measures the pressure within an engine to determine its efficiency.
299+, for a hydrostatic pressure type of liquid level or depth gauge.
384, for a barometer.
700+, for measurement of the pressure of fluent material.
861.42+, for a pressure differential measuring device for determining volume or rate of flow.

SEE OR SEARCH CLASS:
128, Surgery, subclasses 672+ for a blood pressure measuring device.
138, Pipes and Tubular Conduits, subclasses 26+, for a device of that class type combined with pressure compensator.
200, Electricity: Circuit Makers and Breakers, subclasses 81+ for a fluid pressure operated switch.
374, Thermal Measuring and Testing, subclasses 201+ for an expanding fluid type thermometer.

19.06 Of a beverage:
This subclass is indented under subclass 19.05. Subject matter wherein the gas content of a potable liquid (i.e., a liquid suitable for consumption by a human being) is determined.

19.07 Of metal:
This subclass is indented under subclass 19.01. Subject matter wherein the substance whose gas content is being determined is a metal.

19.08 Of concrete, mortar, or plastic while in a fluent state:
This subclass is indented under subclass 19.01. Subject matter wherein the substance whose gas content is being determined is concrete, mortar, or plastic while capable of flowing.

19.09 Of mud:
This subclass is indented under subclass 19.01. Subject matter wherein the substance whose gas content is being determined is a mixture of soil with a liquid.

19.1 Of a liquid:
This subclass is indented under subclass 19.01. Subject matter wherein the substance whose gas content is being determined is a substance which exhibits a characteristic readiness to flow, little or no tendency to disperse, and relatively high incompressibility.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19.06, for determining the gas content of a beverage by measuring the pressure of the gas.
53.01+, for testing of a liquid or liquid suspension of solids.

19.11 Lubricant:
This subclass is indented under subclass 19.1. Subject matter wherein the liquid whose gas content is being determined is a substance capable of reducing friction, heat and wear when introduced as a film between solid surfaces.

19.12 Particular separator:
This subclass is indented under subclass 19.01. Subject matter wherein significance is attributed to means for separating the gas from the liquid or solid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
31.07, for a particular separator used in gas analysis, per se.
863.21+, for a sampler, per se, which separates constituents of the sample.

SEE OR SEARCH CLASS:
95, Gas Separation: Processes, for processes of gas separation, per se (i.e., not combined with analysis steps).
96, Gas Separation: Apparatus, for apparatus for gas separation, per se (i.e., not combined with analysis means).

23.2 GAS ANALYSIS:

This subclass is indented under the class definition. Subject matter comprising a process or an apparatus for detecting or measuring the composition of, or some constituent of, a gas or gaseous mixture.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 253+ for the detection of a gas within or emanating from the earth by invisible radiation emanating from the gas naturally or as a result of irradiation by invisible radiation, subclasses 336.1+ for testing of a gas by utilizing an electric signalling device detecting radiation induced or emitted naturally, or detecting infrared, ultraviolet, X-ray, or gamma radiation or neutrons modified by the gas.

324, Electricity: Measuring and Testing, appropriate subclasses for testing and electrical property of a gas.

338, Electrical Resistors, subclasses 34+ for a resistor, per se, which is responsive to the condition of a gas wherein no quantitative measurements of the gas are disclosed.

340, Communications: Electrical, subclasses 632+ for an electrical indicator providing a humanly perceptible signal representing a predetermined condition of a gas.

356, Optics: Measuring and Testing, subclasses 402+ for gas analysis utilizing a colorimeter to determine the shade or color of the gas.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for an apparatus utilizing a chemical reaction to analyze gas.

436, Chemistry: Analytical and Immunological Testing, subclass 68 for a process which utilizes a chemical reaction to analyze gas.

23.21 With compensation detail (for error or drift correction, etc.):

This subclass is indented under subclass 23.2. Subject matter including means for making a correction for an undesirable variation in a condition within an apparatus or in a test result due to such condition.

23.22 For gas chromatography:

This subclass is indented under subclass 23.21. Subject matter in which the effluent of a mixture of gases, which has contacted a solvent or sorbent which separates the mixture into fractional components, is successively tested to determine the quantity, quality or identify of a component of the effluent.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23.35, through 23.4, for a gas analysis detector, per se, which may be used in gas chromatography.

53.01+, for liquid testing (e.g., liquid chromatography).

863+, for sample preparation or sampling, per se.

SEE OR SEARCH CLASS:

95, Gas Separation: Processes, subclasses 82+ for processes of gas separation, per se (i.e., not combined with analysis steps), using chromatography.

96, Gas Separation: Apparatus, subclasses 101+ for apparatus for gas separation, per se (i.e., not combined with analysis means), of the chromatographic type.

204, Chemistry: Electrical and wave Energy, subclasses 400+ for an electrochemical gas sensor, per se.

210, Liquid Purification or Separation, subclasses 660+ for a process of removing a constituent from a liquid by sorption, particularly subclasses 656+ for selective sorptions (e.g., chromatography), subclasses 85 for a liquid separator with recorder or register, and subclasses 263+ for a liquid separator utilizing a bed of particulate material.

324, Electricity: Measuring, and Testing, particularly subclasses 464+ for analyzing gas using ionization effects, and appropriate subclasses for testing gas by measuring impedance, admittance, and related quantities.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for an apparatus utilizing a chemical reaction to analyze a gas, particularly subclass 89 for gas chromatography.

436, Chemistry: Analytical and Immunological Testing, particularly subclass 68 for a process utilizing a chemical reaction for determining the gases in the blood, and subclasses 161+ for chromatography.

23.23 Baseline drift correction circuitry:
This subclass is indented under subclass 23.22. Subject matter which includes circuitry for correcting a systematic shift in the spectra of the chromatogram.

23.24 Rate of flow:
This subclass is indented under subclass 23.22. Subject matter wherein the condition being corrected or adjusted is the rate of flow of the gas being tested or of the carrier gas.

23.25 Temperature:
This subclass is indented under subclass 23.22. Subject matter wherein the condition being corrected or adjusted is the temperature of the gas or the chromatography.

SEE OR SEARCH CLASS:

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

23.26 Gradient:
This subclass is indented under subclass 23.25. Subject matter wherein the condition being corrected or adjusted is the temperature variations along the column or columns of the chromatography.

23.27 Pressure:
This subclass is indented under subclass 23.22. Subject matter wherein the condition being corrected or adjusted is the pressure of the gas effluent or of the carrier gas.

23.28 For density or specific gravity:
This subclass is indented under subclass 23.21. Subject matter wherein the condition being corrected or adjusted affects the determination of the mass per unit volume of the gas or the ratio of the density of the gas to the density of some substance taken as a standard when both densities are obtained by weighing in air.

23.29 Pressure:
This subclass is indented under subclass 23.28. Subject matter wherein the condition being corrected or adjusted is the pressure of the gas being measured or tested, which pressure is used to determine the density or specific gravity of the gas.

23.3 Breath analysis:
This subclass is indented under subclass 23.2. Subject matter wherein the gas being tested is exhaled by a human being or other animal.

SEE OR SEARCH CLASS:

128, Surgery, subclasses 717+ for breath analyzing inside the body.

340, Communications: Electrical, subclasses 632+ for a humanly perceptible indication of a predetermined condition of the breath.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 84+ for a breath analyzer utilizing a chemical change to analyze air exhaled from a human being or other animal.

436, Chemistry: Analytical and Immunological Testing, appropriate subclasses for a process of gas analysis which utilizes a chemical reaction, particularly subclass 132 for ethanol determination, and subclass 900 for a cross-reference art collection of breath testing processes.

23.31 Gas of combustion:
This subclass is indented under subclass 23.2. Subject matter wherein the gas being tested is the product of a combustion process.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 632+ for a humanly perceptible indication of a predetermined condition of a gas of combustion.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 94+ for a detector, per se, of combustible gas.

23.32 Air-fuel ratio:
This subclass is indented under subclass 23.31. Subject matter wherein the ratio of the amount of air to the amount of fuel in the gas of combustion is determined.

SEE OR SEARCH CLASS:
123, Internal-Combustion Engines, subclasses 434+ and particularly subclasses 672+ for measuring the composition of exhaust gas and utilizing the measurement to control the air-fuel ratio.

23.33 Solid content:
This subclass is indented under subclass 23.32. Subject matter wherein the nature or amount of particulate matter in the gas of combustion is determined.

23.34 Odor:
This subclass is indented under subclass 23.2. Subject matter wherein stimulation of the olfactory organ of an animal is used to detect or measure the gas.

23.35 Gas chromatography:
This subclass is indented under subclass 23.2. Process or apparatus in which the effluent of a mixture of gases, which has contacted a solvent or sorbent which separates the mixture into fractional components, is successively tested to determine the quantity, quality or identity of a component of the effluent.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19.02, for a gas chromatography process or apparatus for determining the presence of, or the amount of, gas in a liquid or a solid.
35.05+, for a gas detector, per se, which may be used in gas chromatography.
53.01+, for liquid testing (e.g., liquid chromatography).
863+, for a sampling device, per se.

SEE OR SEARCH CLASS:
95, Gas Separation: Processes, subclasses 82+ for processes of gas separation, per se (i.e., not combined with analysis steps), using chromatography.
96, Gas Separation: Apparatus, subclasses 101+ for apparatus for gas separation, per se (i.e., not combined with analysis means), of the chromatographic type.
204, Chemistry: Electrical and Wave Energy, subclasses 400+ for electrochemical gas sensors, per se.
210, Liquid Purification or Separation, subclasses 660+ for a process of removing a constituent from a liquid by sorption, particularly subclasses 656+ for selective sorptions (e.g., chromatography), subclasses 85+ for a liquid separator with recorder or register and subclasses 263+ for a liquid separator utilizing a bed of particulate material.
324, Electricity: Measuring and Testing, particularly subclasses 464+ for gas analysis using ionization effects, and appropriate subclasses for testing gas by measuring impedance, admittance, and related quantities.
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 50+ for an apparatus utilizing a chemical reaction to analyze a gas, particularly subclass 89 for gas chromatography.
436, Chemistry: Analytical and Immunological Testing, for a process of gas analysis which utilizes a chemical reaction, particularly subclasses 161+ for chromatography.

23.36 With electrical computer or data processor control:
This subclass is indented under subclass 23.35. Subject matter including a programmable electronic device which can store, retrieve and process data, which device controls the chromatography.

23.37 With spectrometer:
This subclass is indented under subclass 23.35. Subject matter combined with an instrument used to measure the spectral characteristics of light.

23.38 Petrochemical:
This subclass is indented under subclass 23.35. Subject matter in which the gas being tested is a derivative of petroleum.

23.39 Column detail:
This subclass is indented under subclass 23.35. Subject matter comprising detail of a tubular structure which is either packed with a material having a known absorption characteristic and/or is coated with a liquid of a high molecular weight and having known properties.

23.4 Detector detail:
This subclass is indented under subclass 23.35. Subject matter wherein significance is attributed to the sensing means.

23.41 Including sample preparation or sampling:
This subclass is indented under subclass 23.35. Subject matter wherein the sample is treated or modified before being tested, or a predetermined portion of a mass of material is obtained for testing, or a previously obtained sample transported or handled in preparation for analysis, or a previously obtained sample is introduced into an analyzer.

(1) Note. Included here is a liquid sample which is gasified prior to injection into the column.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863+, for sample preparation or sampling, per se.

SEE OR SEARCH CLASS:
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 89 for a sample undergoing a chemical reaction.

23.42 Detail of gas handling means:
This subclass is indented under subclass 23.35. Subject matter wherein significance is attributed to the means for confining, directing, or controlling the flow of gaseous material.

24.01 By vibration:
This subclass is indented under subclass 23.2. Subject matter in which the composition of a gas or a constituent of a gas is determined by detecting or measuring the transmission of vibration through the gas being tested.

24.02 Produced by radiant energy:
This subclass is indented under subclass 24.01. Subject matter wherein the vibration is produced by energy in the form of electromagnetic waves or traveling subatomic, atomic or molecular particles.

24.03 Solid content of gas:
This subclass is indented under subclass 24.01. Subject matter wherein the nature or amount of particulate matter in gas is determined.

24.04 Moisture content or vapor pressure of gas:
This subclass is indented under subclass 24.01. Subject matter wherein the amount of moisture in the gas being analyzed or the pressure of the vapor in the gas is determined.

24.05 Density or specific gravity of gas:
This subclass is indented under subclass 24.01. Subject matter for determining the mass per unit volume of the gas or the ratio of the density of the gas to the density of some substance taken as a standard when both densities are obtained by weighing in air.

24.06 Detector detail:
This subclass is indented under subclass 24.01. Subject matter wherein significance is attributed to the means for sensing the vibration.

25.01 By thermal property:
This subclass is indented under subclass 23.2. Subject matter in which the composition of a gas or a constituent of a gas is determined by detecting or measuring the heat transmitting or heat related properties of the gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:
29.02, for hygrometers utilizing temperature measuring.

25.02 With magnetic property (e.g., paramagnetic gas):
This subclass is indented under subclass 25.01. Subject matter wherein the gas being analyzed produces a modification of the magnetic field of a measuring device.

25.03 Thermoconductivity:
This subclass is indented under subclass 25.01. Subject matter wherein the heat transmitting property of a gas is determined.

25.04 Moisture content or vapor pressure:
This subclass is indented under subclass 25.01. Subject matter wherein the amount of moisture in the gas or the pressure of the vapor in the gas is measured or detected.

25.05 Detector detail:
This subclass is indented under subclass 25.01. Subject matter wherein significance is attributed to the sensing means.

28.01 Solid content of gas:
This subclass is indented under subclass 23.2. Subject matter wherein the nature or amount of particulate matter in gas is determined.

SEE OR SEARCH THIS CLASS, SUBCLASS:
31.01, for measuring other impurities in the air.
170.25, for measuring solid particles originating in the outer space surrounding the Earth.
863.21+, for sampling involving separation of constituents where no testing device is claimed.

SEE OR SEARCH CLASS:
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 1+ for continuous gas or vapor phase colloid system (e.g., smoke, fog, aersol, cloud, mist) or agents for such systems or making or stabilizing such systems or agents subclass 114 for processes of or compositions for or subcombination compositions for the breaking of or inhibiting of colloid systems of conitinuous gas or vapor phase (e.g., fog dispelling, dust suppressing, contrail suppressing); in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

28.02 Particle charging:
This subclass is indented under subclass 28.01. Subject matter wherein the determination is made by measuring a parameter related to electrically charged particles (e.g., the total electrical field produced by the particles being charged).

28.03 Pressure:
This subclass is indented under subclass 28.01. Subject matter wherein the force per unit area applied over a surface by the gas is measured in order to determine the solid content of the gas.

28.04 Separator detail:
This subclass is indented under subclass 28.01. Subject matter wherein significance is attributed to the means separating the solid from the gas.

28.05 Impactor:
This subclass is indented under subclass 28.04. Subject matter wherein separation is accomplished by directing a fluid current of gas containing solid particles toward a solid surface wherein the isolated particles remain on the surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.21+, for subject matter under the class definition for obtaining a predetermined portion of a mass of material being tested including isolation of individual components of the source or sample.

28.06 Fractionalizing:
This subclass is indented under subclass 28.05. Subject matter wherein the particles are distributed on the surface according to size.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.22, for sampling, per se, including isolation of individual components of a source or sample by directing a fluid current containing particles toward a solid surface wherein the isolated particles remain on the surface.

29.01 Moisture content or vapor pressure:
This subclass is indented under subclass 23.2. Subject matter including means for determining the amount of liquid diffused in the gas or the pressure exerted by liquid diffused into the gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:
24.04, for determining the moisture content or vapor pressure of a gas by measuring the transmission of vibration through the gas.
25.04, for determining the moisture content or vapor pressure of a gas by measuring a thermal property of the gas.

29.02 This subclass is indented under subclass 29.01. Subject matter wherein the amount of the liquid is the actual amount of water vapor in a unit volume of air (e.g., the absolute humidity) or the ratio of the amount of water vapor in the air to the amount of water vapor which the air would hold if it were saturated at that temperature (e.g., the relative humidity).

SEE OR SEARCH THIS CLASS, SUBCLASS:
29.01, for other thermal testing of a gas.
73+, for humidity determining means combined with additional apparatus for testing or determining the moisture content of a substance.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, subclasses 61.06+ for humidity controlled electric switches.
236, Automatic Temperature and Humidity Regulation, principally subclass 44 for humidity responsive devices combined with regulating means.
324, Electricity: Measuring and Testing, appropriate subclasses for devices wherein the atmosphere or gas changes in electrical conductance, in response to humidity and such property, is taken as a measure of humidity. Where no electrical property of the material under test is measured, but an additional element is exposed to the material to have its electrical properties affected by a physical property of the separate element measured, the art is in Class 73, Measuring and Testing.
338, Electrical Resistors, subclass 35 for electrical resistors whose resistance value is responsive to humidity or changes in humidity.
361, Electricity: Electrical Systems and Devices, subclass 178 for relays controlled by humidity.
374, Thermal Measuring and Testing, subclass 109 for a measuring device providing a composite indication of temperature and humidity and subclass 142 for the combination of a thermometer and another measuring device wherein the thermometer is not a subcombination of a hygrometer. In the latter case when a thermometer is merely claimed as a subcombination of a hygrometer, the device would be classified in this class (73).

29.03 Pressure:
This subclass is indented under subclass 29.01. Subject matter wherein the pressure of the gas is measured to determine the amount of vapor present in the gas.

29.04 With visual indication:
This subclass is indented under subclass 29.01. Subject matter wherein the determination is made by directly observing the visible effect of a gas on a sensor.

29.05 Detector detail:
This subclass is indented under subclass 29.01. Subject matter wherein significance is attributed to the sensing means.

30.01 Density or specific gravity:
This subclass is indented under subclass 23.2. Subject matter including means for determining the mass per unit volume of the gas or the ratio of the density of the gas to the density of some substance taken as a standard when both densities are obtained by weighing in air.

SEE OR SEARCH THIS CLASS, SUBCLASS:
32, for determining the density or specific gravity of a liquid or solid.

152.05, for determining a characteristic of a formation in a borehole by measuring density.

30.02 By pressure measurement:
This subclass is indented under subclass 30.01. Subject matter wherein pressure is measured in order to determine density or specific gravity of gas.

30.03 By rate of flow:
This subclass is indented under subclass 30.01. Subject matter wherein the density of specific gravity of a gas is determined by measuring the rate of the flow of the gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:
118.2, for the measuring of the air intake of an auxiliary unit of an engine or a motor.
861+, for a device determining the volume of flow, speed, volume rate of flow, or mass rate of flow of fluent material.

30.04 Detector detail:
This subclass is indented under subclass 30.01. Subject matter wherein significance is attributed to the sensing means.

31.01 Ambient air:
This subclass is indented under subclass 23.2. Subject matter wherein the gas being tested is the naturally occurring mixture of gases surrounding the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:
28.01+, for measuring the solid content of air not originating in the outer space surrounding the Earth.

31.02 Impurity:
This subclass is indented under subclass 31.01. Subject matter wherein the mixture is being tested for undesirable content.

31.03 Impurity:
This subclass is indented under subclass 23.2. Subject matter wherein the gas is being tested for undesirable content.

31.04 Pressure:
This subclass is indented under subclass 23.2. Subject matter wherein the force per unit area exerted by the gas on a surface is measured.

31.05 Detector detail:
This subclass is indented under subclass 23.2. Subject matter wherein significance is attributed to the sensing means.

31.06 Semiconductor:
This subclass is indented under subclass 31.05. Subject matter wherein the detector includes semiconductor material.

31.07 Particular separator:
This subclass is indented under subclass 23.2. Subject matter wherein significance is attributed to the means for isolating a constituent of a gaseous mixture.

(1) Note. This subclass does not include chromatographic separation of gases, per se.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19.02, for chromatographic separation of gases whose content in a solid or a liquid is being measured.
19.12, for a particular separator of a gas from a liquid or a solid.
23.35, for chromatographic separation of gases whose composition or constituent is being detected or measured.
863+, for gas sampling, per se.

SEE OR SEARCH CLASS:
95, Gas Separation: Processes, for processes of gas separation, per se (i.e., not combined with analysis steps).
96, Gas Separation: Apparatus, for apparatus for gas separation, per se (i.e., not combined with analysis means).
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 83+ for an apparatus for gas sampling involving the use of sorbents or chemicals wherein a chemical reaction is utilized to analyze the gas.

32 This subclass is indented under the class definition. Subject matter for determining the density and/or specific gravity of liquids or solids.

(1) Note. Included here is an apparatus for measuring density of a liquid suspension of a solid, per se.

SEE OR SEARCH THIS CLASS, SUBCLASS:

30, for determination of the density or specific gravity of gases.

152.05, for determining a characteristic of a formation in a borehole by measuring density.

SEE OR SEARCH CLASS:

702, Data Processing: Measuring, Calibrating, or Testing,, subclass 137 for measuring the density of a substance which involves a computation and only nominal claimed structure to the measuring device.

35.01 ENGINE DETONATION (E.G., KNOCK):
This subclass is indented under the class definition. Subject matter comprising a process or an apparatus for performing a test or measurement by determining or detecting abnormal rapid combustion in an internal combustion engine.

SEE OR SEARCH THIS CLASS, SUBCLASS:

116+, for engine or motor testing, per se, including pressure measuring in an engine or a motor.

570+, for testing (a) by applying vibration to a body or (b) by sensing vibration, per se.

700+, for a fluid pressure gage, per se.

865.6, for testing, per se, in a simulated environment.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclass 425 for engine knock control of ignition timing and subclass 435 for knock control of a pressure responsive charge forming device.

324, Electricity: Measuring and Testing, subclasses 378+ for purely electrical testing of an internal combustion engine ignition system or device.

701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 111 for determining engine knock by use of an electrical computer wherein no more than a nominally recited knock sensor is claimed.

35.02 Fuel rating (e.g., octane rating):
This subclass is indented under subclass 35.01. Subject matter wherein a measurement of a quality of a test fuel is made by detecting an abnormal rapid combustion (e.g. knock) of the test fuel in the engine and comparing the knock of the test fuel with a knock value of a second fuel having a known fuel rating.

SEE OR SEARCH THIS CLASS, SUBCLASS:

53.01+, for liquid analysis, per se.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclasses 575+ for diverse fuel supply for an internal-combustion engine.

261, Gas and Liquid Contact Apparatus, subclass 36.2 for fluid distribution means in a carburetor.

35.03 Combustion signal compared to reference signal varied by a condition of the engine:
This subclass is indented under subclass 35.01. Subject matter including a combustion signal produced by a sensing means whose characteristic changes in response to the combustion and which is compared with a reference signal responsive to a condition of the engine to determine detonation.

(1) Note. A reference signal is presumed to be varied by a condition of the engine unless otherwise stated as being fixed.

(2) Note. The reference signal may be derived from the combustion itself as, for example, by integration.

35.04 Including calculation means:
This subclass is indented under subclass 35.03. Subject matter comprising an element for performing a mathematical computation utilizing the reference signal.

SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 111 for application of an electrical computer or data processing to determine a vehicle engine knock wherein computer detail or data processing detail is recited and wherein no more than a nominally recited sensor is claimed.

35.05 Automatic gain control or feedback control:
This subclass is indented under subclass 35.03. Subject matter including either (a) an amplifier having a gain controlled by some condition of the engine or (b) a circuit arrangement comprising several stages including an earlier stage and a later stage wherein the later stage produces an output signal which is fed to the earlier stage of the arrangement for control purposes.

35.06 Combustion signal compared to a fixed reference signal or utilizing a threshold value:
This subclass is indented under subclass 35.01. Subject matter including a combustion signal produced by a sensing means whose characteristic changes in response to combustion and which is either (a) compared to a predetermined signal or (b) limited to that portion over a predetermined minimum value.

35.07 Specific type of detonation sensor:
This subclass is indented under subclass 35.01. Subject matter comprising a specified sensing means whose characteristic changes in response to detecting detonation and which is intended to produce a signal in response to the change in the characteristic.

SEE OR SEARCH THIS CLASS, SUBCLASS:
866.5, for a probe or a probe mounting, per se.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, appropriate subclass for an electrochemical sensor, per se.
250, Radiant Energy, subclasses 216+ for a photocell, per se.
310, Electrical Generator or Motor Structure, subclasses 328+ for a condition responsive piezoelectric sensor, per se.
336, Inductor Devices, appropriate subclass for a condition responsive inductive sensor, per se.
338, Electrical Resistors, appropriate subclass for a condition responsive resistor, per se.
359, Optics: Systems (Including Communication) and Elements, appropriate subclass for an optical element, per se.
361, Electricity: Electrical Systems and Devices, appropriate subclass for a condition responsive capacitor, per se.

35.08 Ionization:
This subclass is indented under subclass 35.07. Subject matter wherein the sensing means comprises spaced electrodes between which electrical current passes in proportion to ionization of combustion gases in the engine.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 459+ for an ionization detector, per se.

35.09 Vibration:
This subclass is indented under subclass 35.07. Subject matter wherein the sensing means detects a rapid periodic motion of a body about an equilibrium position, which rapid periodic motion of the body is caused by detonation.

(1) Note. An acoustic detector for knock sensing is included here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
570+, for other testing by vibration.

35.11 Piezoelectric:
This subclass is indented under subclass 35.09. Subject matter wherein the sensing means comprises a pressure responsive material

which generates an electric signal in response to vibration.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 329 for a vibration responsive piezoelectric detector, per se.

35.12 Pressure:
This subclass is indented under subclass 35.07. Subject matter wherein the sensing means detects a rapid fluctuation in pressure caused by detonation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
115, for measuring pressure in an engine.
700+, for a fluid pressure gage, per se.

35.13 Piezoelectric:
This subclass is indented under subclass 35.12. Subject matter wherein the sensing means comprises pressure responsive material which generates an electrical signal in response to the pressure fluctuation.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 338 for a pressure responsive piezoelectric detector, per se.

35.14 EXPLOSIVE:
This subclass is indented under the class definition. Subject matter comprising a process or an apparatus for (a) determining a physical characteristic of a body or material by measuring a disruptive force or a disruptive pressure produced by an explosion of the body or material or (b) testing a body or material by applying a disruptive force or a disruptive pressure due to an explosion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
12.01+, for testing by impact or shock, per se.
167, for ordnance testing especially by measuring pressure in a gun barrel.
700+, for a pressure gage, per se.
865.6, for testing, per se, in a simulated environment.

SEE OR SEARCH CLASS:
102, Ammunition and Explosives, for an explosive, per se.
346, Recorders, subclass 7 for an inertia recorder.

35.15 By time measurement (e.g., burning rate, detonation velocity):
This subclass is indented under subclass 35.14. Subject matter wherein the explosion produces a traveling wavefront and the determination of a parameter of the explosion is made by measuring the time required for the wave front in the explosion to proceed from one point to another.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 160+ for electrical speed determining by measuring time between the occurrence of electrical pulses.
368, Horology: Time Measuring Systems or Devices, for a time measuring system and device and especially, subclasses 89+ for an interval timer, per se.

35.16 Electric sensor:
This subclass is indented under subclass 35.14. Subject matter comprising a sensing means for producing an electrical signal response to a disruptive force or a disruptive pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
866.5, for a probe or a probe mounting, per se.

SEE OR SEARCH CLASS:
250, Radiant Energy, for a photocell, per se.
310, Electrical Generator or Motor Structure, subclasses 311+ for a condition responsive piezoelectric sensor, per se.
336, Inductor Devices, appropriate subclasses for a condition responsive inductive sensor, per se.
338, Electrical Resistors, subclasses 13+ for a condition responsive resistor, per se.

356, Optics: Measuring and Testing, appropriate subclass for condition responsive devices measuring visible light.
359, Optics: Systems (Including Communication) and Elements, appropriate subclass for an optical element, per se.
361, Electricity: Electrical Systems and Devices, subclasses 280+ for a condition responsive capacitor, per se.

35.17 Safety feature or containment structure: This subclass is indented under subclass 35.14. Subject matter including means for either (a) protecting a person from the effects of the explosive during testing or (b) restricting effects of the explosion to a predetermined space during testing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
571, for a test chamber for vibration testing, per se.
865.6, for a test chamber, per se.

SEE OR SEARCH CLASS:
102, Ammunition and Explosives, subclass 331 for a blasting charge case, per se.
109, Safes, Bank Protection or a Related Device, appropriate subclasses for a safety structure, per se.
220, Receptacles, appropriate subclass for container structure, per se, and in particular subclasses 88.1+ for a fire preventing attachment for a receptacle, per se.

36 This subclass is indented under the class definition. Subject matter for testing illuminating fluids to determine flash point, vapor pressure and end point.

SEE OR SEARCH THIS CLASS, SUBCLASS:
35.02, for measuring engine knock or detonation.
35.14+, for testing of an explosive.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclass 8 for flammability testing, and subclasses 16+ for transformation point determination, in general.

37 This subclass is indented under the class definition. Subject matter for subjecting a specimen directly to fluid pressure (positive or negative) to determine properties of the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.16+, for proving or calibrating volume or rate of flow meters and elements thereof.
1.57+, for proving or calibrating pressure responsive devices and gauges.
12.01+, for testing by impact or shock where the impact or shock is transmitted by a fluid.
807, and 838+, for the use of fluids to determine the bursting strength of sheet material.

SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclass 90 for test plug closures for conduits.
141, Fluent Material Handling, With Receiver or Receiver Coacting Means, for processes and apparatus for filling of receivers with gases, liquids, or fluent solids, or for evacuating receivers, particularly subclasses 4+ and 65+ for gas filling or evacuating.
445, Electric Lamp or Space Discharge Component or Device Manufacturing, for processes and apparatus for gas filling and/or evacuation of lamp and discharge device envelopes in connection with other manufacture or repair operations.
700, Data Processing: Generic Control Systems or Specific Applications, subclass 301 for pressure control.

37.5 This subclass is indented under subclass 37. Subject matter for checking dimensions, shape or size of an object, or the spacing of selected portions thereof, having at least one unit for the direct application of fluid pressure thereto and utilizing the escape of fluid about the specimen as an index of its dimension, shape, size or spacing.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, subclasses 556+ and 700+ for processes and apparatus for determining size or dimension by means of a mechanical contact or feeler which in turn influences the fluid flow, pressure or volume of indicating means.

37.6 This subclass is indented under subclass 37.5. Subject matter in which the object is in motion during the test.

37.7 This subclass is indented under subclass 37.6. Subject matter in which the object under test is a sheet, cable or filament.

SEE OR SEARCH THIS CLASS, SUBCLASS:
159, and see the search notes thereto, for other sheet or filament tests.

SEE OR SEARCH CLASS:
226, Advancing Material of Indeterminate Length, subclasses 10+ for fluid actuated material detectors for control of means which advance material of indefinite length and subclass 22 for pneumatic detectors to sense the lateral position of material.

37.8 This subclass is indented under subclass 37.5. Subject matter for making measurements of each of two correlated objects or two portions of the same object.

37.9 This subclass is indented under subclass 37.5. Subject matter for measurement of size of bores and similar concave openings in specimens.

38 This subclass is indented under subclass 37. Subject matter for determining through the direct application of fluid under pressure the porosity (i.e., volume of interstices) of solids, the fineness of powdered materials, or action of filters; also, the determining of permeability (i.e., the passage or diffusibility of fluids through a specimen).

SEE OR SEARCH THIS CLASS, SUBCLASS:
152.05, for determining a characteristic of a formation in a borehole by measuring permeability or porosity.

39 This subclass is indented under subclass 37. Subject matter, for the testing of the operating or control mechanism of fluid pressure operated brakes (e.g., air or hydraulic types for motor vehicles, trains, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
7, for testing the wear surfaces of brakes by abrasion, milling, rubbing or scuffing.
121+, for other types of brake testing.
862.09+, particularly subclasses 862.09+ for dynamo-meters having brakes.

SEE OR SEARCH CLASS:
188, Brakes, particularly subclasses 141 and 151+ for fluid pressure types.
303, Fluid-Pressure and Analogous Brake Systems,

40 This subclass is indented under subclass 37. Subject matter for testing or determining leakage of a specimen or body.

(1) Note. The combination of means for testing specimens with means to reject those specimens which fail to pass the test is in Class 209, Classifying, Separating, and Assorting Solids, subclasses 509+ except where the test is a leakage test.

SEE OR SEARCH CLASS:
48, Gas: Heating and Illuminating, subclasses 193+ for detecting and preventing leakage from gas mains.
137, Fluid Handling, subclass 15.11 for a process of detecting or repairing a leak of a pipe, joint, valve, or tank.
138, Pipes and Tubular Conduits, subclass 90 for closure plugs useful in connection with leakage tests of pipes.
209, Classifying, Separating, and Assorting Solids, see Note 1.
374, Thermal Measuring and Testing, subclasses 4+, for leakage testing by measuring thermal parameters.

40.5 This subclass is indented under subclass 40. Subject matter for testing fluid operative systems or fluid handling conduits while in their operative assembly or position.

SEE OR SEARCH CLASS:

48, Gas: Heating and Illuminating, subclass 193, for means associated with a gas main to detect or indicate leaks without positive means to create a condition whereby leakage is produced in a defective pipe or joint; and subclass 195 for the preparation of odorous material and/or the insertion thereof into a gas main.

166, Wells, subclass 179 and the subclasses here noted for packer or plug devices in wells which are inherently capable of use as fluid pressure leakage testers.

40.7 This subclass is indented under subclass 40. Subject matter wherein a probe gas, smoke, vapor or powder is applied to a specimen and its escape or penetration is detected.

41 This subclass is indented under subclass 40. Subject matter wherein the article under test (usually a can or other receptacle) is moved by a conveyor during or through the test operation.

41.2 This subclass is indented under subclass 41. Subject matter including immersing the article in a liquid.

41.3 This subclass is indented under subclass 41.2. Subject matter including means for segregating or discarding a defective article (e.g., the operator presses a button to reject a defective specimen).

41.4 This subclass is indented under subclass 41.3. Subject matter automatically responsive to a defective condition of the article.

45 This subclass is indented under subclass 41. Subject matter including means for segregating or discarding a defective article.

SEE OR SEARCH THIS CLASS, SUBCLASS:

41.3, for similar structure combined with immersion testing.

45.1 This subclass is indented under subclass 45. Subject matter responsive to a defective condition of the article.

SEE OR SEARCH THIS CLASS, SUBCLASS:

41.4, for similar structure combined with immersion testing.

45.2 This subclass is indented under subclass 45.1. Subject matter controlled or operated by electric or electromagnetic means.

45.3 This subclass is indented under subclass 45.1. Subject matter wherein the article is sustained against a test head by vacuum unless leakage of the article destroys the vacuum and permits the article to fall by gravity.

45.4 This subclass is indented under subclass 45.1. Subject matter relating to presealed containers.

45.5 This subclass is indented under subclass 40. Subject matter including immersing the specimen in a liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

41.2+, for immersion test with conveyor means for moving the specimen through the liquid.

45.6 This subclass is indented under subclass 45.5. Subject matter for testing a pneumatic inner tube, casing, or tubeless tire.

45.7 This subclass is indented under subclass 45.6. Subject matter relating to mesh structure for inclosing the tire to prevent it from bursting under pressure.

45.8 This subclass is indented under subclass 45.5. Subject matter relating to a radiator.

46 This subclass is indented under subclass 40. Subject matter for testing or determining leakage between parts mechanically fitted together and capable of being separated without

destruction (e.g., faucets, separable pipe joints having interfitted parts, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
37, and 40, for fluid pressure testing of rivets, welded seams, etc., for various purposes including leakage.

SEE OR SEARCH CLASS:
277, Seal for a Joint or Juncture, for a generic sealing means or process, subclass 320 for a seal combined with means to indicate fluid leakage.

47 This subclass is indented under subclass 46. Subject matter for leakage testing of engine heads, i.e., any one or any combination of valve, piston or piston ring.

SEE OR SEARCH THIS CLASS, SUBCLASS:
119+, for miscellaneous tests of engine parts.

48 This subclass is indented under subclass 46. Subject matter for leakage testing of tire valves.

49 This subclass is indented under subclass 40. Subject matter for testing of pneumatic tubeless tires, inner tubes or casings.

SEE OR SEARCH THIS CLASS, SUBCLASS:
45.6, for testing such articles by immersion.

49.1 This subclass is indented under subclass 40. Subject matter for testing for leakage of a pipe section.

SEE OR SEARCH THIS CLASS, SUBCLASS:
46, for similar testing of a separable joint.
49.5+, for strength testing of pipe.

49.2 This subclass is indented under subclass 40. Subject matter for testing a receptacle.

49.3 This subclass is indented under subclass 49.2. Subject matter the receptacle being a presealed container.

SEE OR SEARCH THIS CLASS, SUBCLASS:
45.4, for testing for leakage of a sealed receptacle on a conveyor and with automatic discard means.
52, for other testing of a sealed receptacle.

49.4 This subclass is indented under subclass 37. Subject matter wherein a test liquid pressure is induced by a single stroke ram or plunger.

49.5 This subclass is indented under subclass 37. Subject matter for testing pipe.

SEE OR SEARCH THIS CLASS, SUBCLASS:
49.1, for testing for leakage of a pipe section.

49.6 This subclass is indented under subclass 49.5. Subject matter including power operated means for closing or sealing the pipe ends.

49.7 This subclass is indented under subclass 37. Subject matter for testing of a motor auxiliary or part.

SEE OR SEARCH THIS CLASS, SUBCLASS:
118, for other testing of auxiliary units.
119, for other testing of motor parts.

49.8 This subclass is indented under subclass 37. Subject matter relating to a clamp, plug or other sealing feature.

SEE OR SEARCH THIS CLASS, SUBCLASS:
49.6, for power operated means for sealing ends of a pipe under test.

SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclass 90 for a test plug closure for a conduit.

52 This subclass is indented under the class definition. Subject matter for testing of sealed receptacles (usually cans). Test is usually for spoilage of contents, presence of foreign matter therein, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37+, particularly subclasses 45.4 and 49.3, for testing of sealed receptacles with extraneously applied fluid pressure.

824, for testing of sealed receptacles by rotating squeezing elements.

53.01 LIQUID ANALYSIS OR ANALYSIS OF THE SUSPENSION OF SOLIDS IN A LIQUID:

This subclass is indented under the class definition. Subject matter comprising a process or an apparatus for detecting or determining the composition of, a constituent of, or a property of a liquid or a liquid suspension of a solid.

(1) Note. Determining is considered to include measuring.

SEE OR SEARCH THIS CLASS, SUBCLASS:

10, for testing the effect of a lubricant on frictional resistance or coefficient.

32, for determining the specific gravity or the density of a liquid or a liquid suspension of a solid wherein the density measuring is not used to further determine some other property of the liquid or the liquid suspension.

35.02, for measuring engine knock or detonation in order to determine a fuel rating.

152.42+, for determining a characteristic of a borehole, a casing, or a drill rigging by analyzing a fluid.

169, for determining the physical characteristic of dough.

170.17+, for a rain gauge.

290+, for a liquid level gauge.

592, for liquid leakage or liquid location detection by using vibration.

700+, for a fluid pressure gauge.

861+, for measuring the volume or the rate of flow of a liquid.

SEE OR SEARCH CLASS:

128, Surgery, subclasses 630+ for testing liquids wherein the test is conducted within a living body.

204, Chemistry: Electrical and Wave Energy, appropriate subclasses for electrolytic sensor, per se.

250, Radiant Energy, appropriate subclasses for using invisible light to test liquids and, in particular, subclasses 301+ for methods of determining oil presence, contamination, or concentration using radiant energy; subclasses 306+ for inspection of liquids by charged particles, subclasses 336.1+ for invisible radiant energy signalling of conditions of liquids and subclasses 573+ for optical or pre-optical systems having a liquid in the path there of wherein the modification of or the emission of radiant energy resulting from the irradiation of the liquid is tested.

340, Communications: Electrical, subclasses 603+ for a humanly perceptible indication of a predetermined condition of a liquid.

356, Optics: Measuring and Testing, appropriate subclass for determining a property of a liquid by measuring visible light.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, appropriate subclass for an apparatus for testing a liquid wherein a chemical reaction is involved.

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for colloid systems or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

53.02 Butter fat content:

This subclass is indented under subclass 53.01. Subject matter wherein the constituent is butter fat.

53.03 Paper or wood suspension (e.g., paper or wood pulp):

This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring either the degree to which paper pulp or wood pulp relinquishes its water content or the percentage of water content relinquished.

SEE OR SEARCH THIS CLASS, SUBCLASS:

29.02+, for determining the moisture content of a gas.

73+, for determining the moisture content of solid or the absorptive characteristic of material for a liquid.

SEE OR SEARCH CLASS:

162, Paper Making and Fiber Liberation, subclass 258 for a device for regulating the ratio of liquid to fiber of pulp and subclass 263 for the combination of means for testing or permitting the examination of water in liquid laid fibrous product and a structure or mechanism for producing and/or treating water or liquid laid fibrous products.

53.04 By measuring fluid flow characteristic (e.g., by volume or rate of flow or by change in fluid level):

This subclass is indented under subclass 53.03. Subject matter wherein the determination is made by measuring a parameter which is characteristic of the liquid being in motion.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1.16+, for proving or calibrating volume of flow, speed of flow, volume rate, or flow or mass rate of flow.

1.73+, for proving or calibrating a liquid level or volume measuring apparatus.

54.13, for determining viscosity by measuring a time interval of travel or flow rate using an orifice, nozzle, or extrusion means wherein there is disclosed detail of a means whose optical character changes due to a change in a physical phenomenon associated with the liquid whose viscosity is being measured.

54.19, for detail of a timing means in a device wherein viscosity is determined by gravity movement of an object in a liquid.

61.64+, for determining settling or filtering ability by measuring volumetric or flow or sedimentation rate.

61.73, for utilizing flow effect to measure settling or filtering ability.

152.21+, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a flow of a fluid during drilling.

170.11+, for determining the direction and rate of flow of a fluid in meteorology and oceanology.

178+, for the speed of a craft with respect to a fluid.

861+, for measuring the volume or the rate of flow of liquid, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, appropriate subclass for nonelectrical means for giving an alarm upon the occurrence of a predetermined condition of a fluid.

128, Surgery, subclasses 668+ for measuring blood flow in the body wherein there is disclosed structure for placement in a living body.

137, Fluid Handling, subclasses 98+ for a self-proportioning flow system and subclasses 624.11+ for a programmed or timed valve which meters fluid merely by timing the interval between opening and closing of the valve.

175, Boring or Penetrating the Earth, appropriate subclass for measuring the rate of flow of drilling fluid combined with a device of that class type.

222, Dispensing, particularly subclasses 14, 59, and 71 for volume or rate of flow-measuring means having dispensing features or which are used in dispensing combinations.

250, Radiant Energy, particularly subclasses 258, 259+, 356.1, and 432 for miscellaneous radiant energy responsive devices.

324, Electricity: Measuring and Testing, subclass 306 for flow-measuring means responsive to nuclear induction.

340, Communications: Electrical, subclasses 606+ for electrical means for giving a humanly perceptible indication or signal in response to a predetermined condition, such as the flow of fluid.

356, Optics: Measuring and Testing, subclasses 27+ for flow measuring means employing a laser.

368, Horology: Time Measuring Systems or Devices, subclasses 89+, for time interval measuring, per se.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 21 for a system utilizing a pulse counter to measure fluid flow.

700, Data Processing: Generic Control Systems or Specific Applications, subclasses 282 through 285 for flow control.

53.05 Lubricant testing:
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring the capability of a substance to reduce friction, heat, and wear when it is introduced as a film between two relatively movable solid surfaces.

SEE OR SEARCH THIS CLASS, SUBCLASS:

10, for an apparatus or a process for determining the effect of a lubricant upon the frictional drag between two relatively movable solid surfaces.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 301 for an apparatus or method for utilizing invisible radiant energy in testing for the presence of, the concentration of or contamination in oil.

356, Optics: Measuring and Testing, subclass 70 for determining the contamination of oil by measuring a characteristic of electromagnetic wave energy in the visible range.

53.06 By analyzing a characteristic of a measuring surface:
This subclass is indented under subclass 53.05. Subject matter wherein determination is made by analyzing or observing the effect of the lubricant upon a surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:

104, for surface inspection or testing, per se.

53.07 By solid content:
This subclass is indented under subclass 53.05. Subject matter wherein the determination is made by measuring an amount of particulate matter in the liquid.

54.01 Viscosity:
This subclass is indented under subclass 53.01. Subject wherein the determination is of the resistance of the liquid to change in shape or a force within the liquid that opposes motion therein (e.g. flow, usually by internal force reaction or energy absorption).

SEE OR SEARCH THIS CLASS, SUBCLASS:

822, for viscosity measurement in a solid by compressional testing.

843, for viscosity measurement in a solid by shear testing using a rotary element.

862.08+, for torque measurement, per se.

862.38+, for force measurement, per se.

54.02 Combined with other measuring means:
This subclass is indented under subclass 54.01. Subject matter including another type of measuring process or apparatus.

54.03 Of concrete (e.g., slump indicator):
This subclass is indented under subclass 54.01. Subject matter wherein the liquid is a mixture of cement, sand and gravel.

54.04 Friction tube (e.g., capillary):
This subclass is indented under subclass 54.01. Subject matter wherein the determination is made by using a small slender tubular conduit wherein the surface of the liquid in contact with the conduit forms an elevation or a depression due to either the molecular attrac-

tion of the molecules of the liquid to each other or the attraction of the molecules of the liquid to the molecules of the surface of the tube.

54.05 Plural tubes:
This subclass is indented under subclass 54.04. Subject matter including more than one conduit.

54.06 By pressure measuring:
This subclass is indented under subclass 54.05. Subject matter wherein the determination includes measuring the force, per unit area, of the fluid moving through the conduit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
54.14, for determining viscosity by measuring pressure of the liquid flowing through an orifice, nozzle, or extrusion means.
61.47, for measuring pressure in order to determine the liquid constituent of a liquid mixture.
61.73, for measuring pressure of a liquid in order to determine its solid content.
61.78, for measuring pressure to determine the content or effect of a constituent of a liquid mixture.
64.46, for measuring differential pressure to determine vapor pressure.
64.51, for measuring pressure to determine surface tension.
700+, for liquid pressure measurement, per se.

54.07 By time interval of travel or flow rate measuring:
This subclass is indented under subclass 54.04. Subject matter wherein the determination is made by measuring the volume of or the mass rate of flow of the liquid or the time elapsed for the liquid to move a predetermined distance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.16+, for proving or calibrating volume of flow, speed of flow, volume rate, or flow or mass rate of flow.
53.04, for utilizing flow characteristics to measure a property of a paper or pulp suspension.
54.13, for determining viscosity by measuring a time interval of travel or flow rate using an orifice, nozzle, or extrusion means wherein there is disclosed detail of a means whose optical character changes due to a change in a physical phenomenon associated with the liquid whose viscosity is being measured.
54.19, for detail of a timing means in a device wherein viscosity is determined by gravity movement of an object in a liquid.
61.64+, for the utilization of flow properties in order to determine settling or filtering ability.
61.73, for utilization of flow characteristic to measure the solid content of a liquid suspension.
152.29+, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a rate of flow of a fluid, per se.
170.11+, for determining the direction and rate of flow of a fluid in meteorology and oceanology.
178+, for the speed of a craft with respect to a fluid.
861+, for measuring the volume or the rate of flow of liquid, per se.

SEE OR SEARCH CLASS:
116, Signals and Indicators, appropriate subclass, for nonelectrical means for giving an alarm upon the occurrence of a predetermined condition of a fluid.
128, Surgery, subclasses 668+ for measuring blood flow in the body wherein there is disclosed structure for placement in a living body.
137, Fluid Handling, subclasses 98+ for a self-proportioning flow system and subclasses 624.11+ for a programmed or timed valve which meters fluid merely by timing the interval between opening and closing of the valve.
175, Boring or Penetrating the Earth, appropriate subclass for measuring the rate of flow of drilling fluid combined with a device of that class type.
222, Dispensing, particularly subclasses 14, 59, and 71 for volume of rate of flow-measuring means having dispensing features or which are used in dispensing combinations.

324, Electricity: Measuring and Testing, subclass 306 for flow-measuring means responsive to nuclear induction.

340, Communications: Electrical, subclasses 606+ for electrical means for giving a humanly perceptible indication or signal in response to a predetermined condition, such as the flow of fluid.

356, Optics: Measuring and Testing, appropriate subclasses for flow measuring devices of the optical type including no manipulation other than that necessary for an optical test.

368, Horology: Time Measuring Systems or Devices, subclasses 89+, for time interval measuring, per se.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 21 for a system utilizing a pulse counter to measure fluid flow.

700, Data Processing: Generic Control Systems or Specific Applications, subclass 281 for control of fluid level or volume, subclasses 282-285 for flow control.

54.08 Including a photocell:
This subclass is indented under subclass 54.07. Subject matter including means having an electrical characteristic which changes in response to light.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.13, for determining viscosity by measuring a time interval of travel or flow rate using an orifice, nozzle, or extrusion means wherein there is disclosed detail of a means whose optical character changes due to a change in a physical phenomenon associated with the liquid whose viscosity is being measured.

866.5, for a sensor, per se.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 200+ for photocell detectors, per se.

54.09 By pressure measuring:
This subclass is indented under subclass 54.04. Subject matter wherein the determination is made by measuring the force per unit area of the liquid moving through the conduit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.06, for measuring viscosity by pressure difference measuring using plural friction tubes.

54.14, for determining viscosity by measuring pressure of the liquid flowing through an orifice, nozzle, or extrusion means.

61.47, for measuring pressure in order to determine the liquid constituent of a liquid mixture.

61.73, for measuring pressure of a liquid in order to determine its solid content.

61.78, for measuring pressure to determine the content or effect of a constituent of a liquid mixture.

64.46, for measuring differential pressure to determine vapor pressure.

64.51, for measuring pressure to determine surface tension.

700+, for liquid pressure measurement, per se.

54.11 Orifice, nozzle, or extrusion means:
This subclass is indented under subclass 54.01. Subject matter wherein the determination is made by utilizing the reaction of the liquid to flowing through an orifice, a nozzle, or an extrusion means.

54.12 Plural fluids (e. g., comparison):
This subclass is indented under subclass 54.11. Subject matter wherein the determination is made by measuring reactions of plural liquids.

54.13 By time interval of travel or flow rate measuring:
This subclass is indented under subclass 54.11. Subject matter wherein the determination is made by measuring the volume or the mass rate of flow or the time elapsed for the liquid to move a predetermined distance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1.16+, for proving or calibrating volume of flow, speed of flow, volume rate, or flow or mass rate of flow.

53.04, for utilizing flow characteristics to measure a property of a paper or pulp suspension.

54.07, for time interval of travel or rate of flow measuring using friction tubes to determine viscosity.

54.19, for detail of a timing means in a device wherein viscosity is determined by gravity movement of an object in a liquid.

61.64+, for the utilization of flow properties in order to determine settling or filtering ability.

61.73, for utilization of flow characteristic to measure the solid content of a liquid suspension.

152.21, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a rate of flow of a fluid during drilling.

152.29, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a rate of flow of a fluid, per se.

170.11+, for the determining the direction and rate of flow of a fluid in meteorology and oceanology.

178+, for the speed of a craft with respect to a fluid.

861+, for measuring the volume or the rate of flow of liquid, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, appropriate subclass, for nonelectrical means for giving an alarm upon the occurrence of a predetermined condition of a fluid.

128, Surgery, subclasses 668+ for measuring blood flow in the body wherein there is disclosed structure for placement in the living body.

137, Fluid Handling, subclasses 98+ for a self-proportioning flow system and subclasses 624.11+ for a programmed or timed valve which meters fluid merely by timing the interval between opening and closing of the valve.

175, Boring or Penetrating the Earth, appropriate subclass for a device for measuring the rate of flow of drilling fluid in combination with an art device of that class type.

222, Dispensing, particularly subclasses 14, 59, and 71 for volume of or rate of flow-measuring means having dispensing features or which are used in dispensing combinations.

324, Electricity: Measuring and Testing, subclass 306 for flow-measuring means responsive to nuclear induction.

340, Communications: Electrical, subclasses 606+ for electrical means for giving a humanly perceptible indication or signal in response to a predetermined condition, such as the flow of fluid.

356, Optics: Measuring and Testing, appropriate subclass for an optical measuring of fluid flow utilizing visible light but having no other manipulation recited other than that for use in an optical measurement of that class.

368, Horology: Time Measuring Systems or Devices, subclasses 89+ for time interval measuring, per se.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 21 for a system utilizing a pulse counter to measure fluid flow.

700, Data Processing: Generic Control Systems or Specific Applications, subclass 281 for control of fluid level or volume, subclasses 282-285 for flow control.

54.14 By force, pressure, or displacement measuring:

This subclass is indented under subclass 54.11. Subject matter wherein the determination is made by measuring either the force, pressure, or displacement force used to move or extrude the liquid or the pressure of the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61.47, for measuring pressure in order to determine the liquid constituent of a liquid mixture.

61.73, for measuring pressure of a liquid in order to determine its solid content.
61.78, for measuring pressure to determine the content or effect of a constituent of a liquid mixture.
64.46, for measuring differential pressure to determine vapor pressure.
64.51, for measuring pressure to determine surface tension.
700+, for liquid pressure measurement, per se.
862.08+, for torque measuring, per se.
862.38+, for measuring force, per se.

54.15 Gravity movement of an object in a liquid (e. g., a bubble):
This subclass is indented under subclass 54.01. Subject matter wherein the determination is made by measuring rate at which an object rises (usually a bubble) or sinks in the liquid.

54.16 With detail of temperature or pressure regulating or compensating means:
This subclass is indented under subclass 54.15. Subject matter wherein significance is attributed to means for controlling, regulating, or compensating for a thermal effect or pressure on the liquid.

54.17 Using a reference fluid:
This subclass is indented under subclass 54.15. Subject matter wherein the determination is made by comparing the time of flight of an object through the liquid being tested with the time of flight of same or a second identical object through a liquid of a known standard viscosity.

54.18 With means for restoring an object to its initial starting position (e.g., magnetic or fluid means):
This subclass is indented under subclass 54.15. Subject matter including means for returning the object to its original position after the completion of each test.

54.19 Including detail of a timing detection circuit:
This subclass is indented under subclass 54.15. Subject matter wherein significance is attributed to an electrical circuit for detecting the time of flight of the object in the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
54.13, for determining viscosity by measuring a time interval of travel or flow rate using an orifice, nozzle, or extrusion means wherein there is disclosed detail of a means whose optical character changes due to a change in a physical phenomenon associated with the liquid whose viscosity is being measured.

SEE OR SEARCH CLASS:
368, Horology: Time Measuring Systems or Devices, subclasses 89+ for time interval measuring, per se.

54.21 Including an object concentricity guide means:
This subclass is indented under subclass 54.15. Subject matter including means for maintaining a constant gap between the container for the liquid and the falling object.

54.22 Adhesion between wetted surfaces:
This subclass is indented under subclass 54.01. Subject matter wherein the determination is made by measuring the molecular attraction of the liquid to closely adjacent wetted surfaces between which it is located.

54.23 Force reactance to member driven therein:
This subclass is indented under subclass 54.01. Subject matter wherein the determination is made by measuring the force reaction of the liquid to a member (e.g., a disc, an impeller, a resonator, etc.) driven therein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
54.31+, for measuring the driving force of a rotationally driven member in order to determine viscosity.
64.49, for determining the surface tension by measuring force.
862.08, for torque measuring, per se.
862.38+, for force measuring, per se.

54.24 By vibration:
Subject matter under 54.23 wherein the determination is made by subjecting the member to mechanical vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.03, for measuring the gas content of a liquid by measuring the effect of the liquid on vibration.

24.01, for utilization of vibration to analyze gas.

40.05+, for acoustic detection of liquid leakage utilizing pressurized fluid.

54.41, for utilizing vibration to test the viscosity of a liquid.

61.45, for determining a multiphase liquid constituent of a liquid mixture measuring vibration.

61.49, for utilizing vibration to determine the liquid constituent of a liquid mixture.

61.75, for measuring the solid components of a liquid utilizing vibration.

61.79, for utilizing vibration to determine the effect of the content of a liquid.

64.42, for testing of a gelling or coagulation property of a liquid utilizing vibration.

64.53, for testing a liquid or a liquid suspension of a solid by utilizing vibration.

592, for detecting liquid leakage and location by utilizing vibration.

54.25 Dampening effect (e.g., frequency, amplitude, speed, or power measurement):
This subclass is indented under subclass 54.24. Subject matter wherein the determination is made by measuring a power, force, or current required to maintain a predetermined vibrational frequency or amplitude or change in frequency or amplitude of a vibrator driven by a constant force.

54.26 With detail of a drive means or a detecting means:
This subclass is indented under subclass 54.25. Subject matter wherein significance is attributed to a circuitry or other means used to vibrate the member or to the means which measure the vibrational effect of the member.

54.27 With detail (e.g., circuitry) of a drive means or a detecting means:
This subclass is indented under subclass 54.24. Subject matter wherein significance is attributed to a circuitry or other means used to vibrate the member or to the means which measure the vibrational effect of the member.

54.28 Rotationally driven member:
This subclass is indented under subclass 54.23. Subject matter wherein the member is subjected to rotational motion of more than 360 degrees.

(1) Note. Oscillations of less than 360 degrees are considered vibrations.

54.29 Comparator:
This subclass is indented under subclass 54.28. Subject matter wherein the determination is made by comparing measurements of a member rotating in a first liquid with the same or an identical member rotating in a second liquid.

54.31 By measuring the driving force or the speed of the driven member:
This subclass is indented under subclass 54.28. Subject matter wherein the determination is made by measuring the drive current or voltage for maintaining the member rotating at a constant speed or by measuring a speed of the driven member when driven by a constant force.

54.32 By measuring an opposed drag force:
This subclass is indented under subclass 54.28. Subject matter wherein the determination is made by measuring a force exerted on a secondary member due to a viscous drag force.

54.33 By measuring angular displacement:
This subclass is indented under subclass 54.32. Subject matter wherein the determination is made by measuring the amount of movement imparted to the secondary member due to movement of the rotationally driven member.

54.34 By measuring a counterbalance or restoring force:
This subclass is indented under subclass 54.32. Subject matter wherein the determination is made by measuring the force is which is necessary to maintain stationary a secondary member which is displaced by a viscous drag force caused by the rotation of the driven member.

54.35 Including detail of a motor drive, a stator, or a housing structure of a motor:
This subclass is indented under subclass 54.28. Subject matter wherein significance is attributed to either a means for converting energy to

a form which results in the movement of the driven member, a stationary part of such means or an enclosure for such means.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, appropriate subclass for electric motor structure or housing, per se.

318, Electricity: Motive Power Systems, appropriate subclass for a drive circuit for a motor or motor control, per se.

54.36 Penetrometer:

This subclass is indented under subclass 54.23. Subject matter wherein the determination is made by measuring the depth of or the rate of penetration of a member driven into the liquid with a predetermined force or by measuring a characteristic of the predetermined force on a member driven therein.

54.37 By movement or displacement between shearing surfaces:

This subclass is indented under subclass 54.23. Subject matter wherein the determination is made by measuring the relative movement between adjacent or parallel surfaces when subjected to a predetermined force for a predetermined time.

54.38 Detector detail:

This subclass is indented under subclass 54.23. Subject matter wherein significance is attributed to a sensing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862+, for a force responsive sensors or a torque responsive sensor.

866.5, for a sensing means, per se.

54.39 Shearing torque between parallel surfaces:

This subclass is indented under subclass 54.01. Subject matter wherein the determination is made by measuring the force which is necessary to shear a film of liquid disposed between closely adjacent relatively slidable surfaces.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.24+, for similar subject matter wherein a reaction force is measured.

54.41 Vibration:

This subclass is indented under subclass 54.01. Subject matter wherein the determination is made by measuring the effect of the liquid or the suspension being tested on vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.03, for measuring the gas content of a liquid by measuring the effect of the liquid on vibration.

24.01, for utilization of vibration to analyze gas.

40.05+, for acoustic detection of liquid leakage utilizing pressurized fluid.

54.24, for determining viscosity of a liquid by measuring the force reactance to a member vibrated therein.

61.45, for determining a multiphase liquid constituent of a liquid mixture measuring vibration.

61.49, for utilizing vibration to determine the liquid constituent of a liquid mixture.

61.75, for measuring the solid components of a liquid utilizing vibration.

61.79, for utilizing vibration to determine the effect of the content of a liquid.

64.42, for testing of a gelling or coagulation property of a liquid utilizing vibration.

64.53, for testing a liquid or a liquid suspension of a solid by utilizing vibration.

592, for detecting liquid leakage and location by utilizing vibration.

54.42 Thermal:

This subclass is indented under subclass 54.01. Subject matter wherein the determination is made by measuring a heat or a temperature related property.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61.46, and 61.76+, for determining content or the effect of the constituent of a liquid mixture by means of a thermal measurement.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, subclass 43 for determining the inherent thermal properties, per se, of a liquid, subclass 54 for thermal measurement

of liquid volume and subclass 139 for measuring the temperature of a liquid metal.

54.43 With detail of a pressure or a temperature regulating means:
This subclass is indented under subclass 54.01. Subject matter wherein significance is attributed to a means for controlling temperature or pressure within the apparatus for analyzing the liquid or the liquid suspension.

60.11 Cleaning or foaming ability:
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring either the ability of the liquid or the liquid suspension to remove undesirable matter from a surface or the ability of liquid or the liquid suspension to foam bubbles.

SEE OR SEARCH CLASS:
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for colloid systems or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

61.41 Content or effect of a constituent of a liquid mixture:
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by detecting or measuring the amount of or the presence of a constituent of a liquid mixture, the ratio of one constituent to at least another constituent, or the effect of a constituent of a liquid mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:
23.2+, for similar processes and apparatus for gas analysis, particularly subclasses 23.35+ for gas chromatography and subclasses 28.01+ for determining the solid content of a gas.
64.41+, for tests of gelling or coagulation even though this effect may be disclosed as being caused by the presence of some constituent.
863.21, for samplers, per se, which isolate particulate matter from a liquid for latter analysis or inspection.

SEE OR SEARCH CLASS:
62, Refrigeration, subclasses 58 and 123+ for processes and apparatus, per se, for fractionally solidifying by freezing and separation.
210, Liquid Purification or Separation, appropriate subclasses, for the separation of a solid from a liquid.

61.42 Metallic particle constituent:
This subclass is indented under subclass 61.41. Subject matter wherein the determination being made is of a liquid containing metallic particles.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclass 204 for determining magnetic properties of a liquid or a liquid mixture.

61.43 Liquid constituent of a liquid mixture:
This subclass is indented under subclass 61.41. Subject matter wherein the determination is made by measuring or detecting the amount, ratio, presence, or effect of one or more constituents of a mixture of liquids.

61.44 Plural liquid constituent (e.g., multiphase liquid):
This subclass is indented under subclass 61.43. Subject matter wherein the determination is made by measuring or detecting the amount, ratio, presence, or effect of plural liquid constituents of a liquid mixture.

SEE OR SEARCH CLASS:
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for colloid systems or agents for such sys-

tems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

61.45 By vibration:

This subclass is indented under subclass 61.44. Subject matter wherein the determination is made by detecting or measuring the effect of the liquid on vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.03, for measuring the gas content of a liquid by measuring the effect of the liquid on vibration.

24.01, for utilization of vibration to analyze gas.

40.05+, for acoustic detection of liquid leakage utilizing pressurized fluid.

54.24, for determining viscosity of a liquid by measuring the force reactance to a member vibrated therein.

54.41, for utilizing vibration to test the viscosity of a liquid.

61.49, for utilizing vibration to determine the liquid constituent of a liquid mixture.

61.75, for measuring the solid components of a liquid utilizing vibration.

61.79, for utilizing vibration to determine the effect of the content of a liquid.

64.42, for testing of a gelling or coagulation property of a liquid utilizing vibration.

64.53, for testing a liquid or a liquid suspension of a solid by utilizing vibration.

592, for detecting liquid leakage and location by utilizing vibration.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for colloid systems or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

61.46 By thermal measurement:

This subclass is indented under subclass 61.43. Subject matter wherein the determination is made by measuring a heat or a temperature related property.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.42, for a thermal measurement of the viscosity of a liquid.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, appropriate subclass for thermal measuring and testing, per se, or temperature measuring, per se.

61.47 By pressure measurement:

This subclass is indented under subclass 61.43. Subject matter wherein the determination is made by measuring the force per unit area of the liquid or the liquid mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.14, for determining viscosity of a liquid flowing through an orifice, nozzle, or extrusion means by measuring pressure.

61.73, for measuring pressure in order to determine the solid content of a liquid mixture.

61.78, for measuring pressure to determine the content or effect of a constituent of a liquid mixture.

64.46, for measuring differential pressure to determine vapor pressure.

64.51, for measuring pressure to determine surface tension.

700+, for liquid pressure measurement, per se.

61.48 By optical irradiation:
This subclass is indented under subclass 61.43. Subject matter wherein the determination is made by measuring the effect of the sediment on visible light.

SEE OR SEARCH CLASS:
250, Radiant Energy, appropriate subclasses for a photocell, per se, and for analyzing a liquid utilizing invisible light which is modified by transmission through or emission by the liquid being tested wherein the modified light is tested.
356, Optics: Measuring and Testing, appropriate subclass for an optical measuring of fluid using visible light and involving no manipulation other than that necessary to perform the optical test.

61.49 By vibration:
This subclass is indented under subclass 61.43. Subject matter wherein the determination is made by measuring of detecting the effect of the liquid on vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19.03, for measuring the gas content of a liquid by measuring the effect of the liquid on vibration.
40.05+, for acoustic detection of liquid leakage utilizing pressurized fluid.
54.24, for determining the viscosity of a liquid by measuring the force reactance of the liquid to the member vibrated therein.
54.41, for utilizing vibration to test the viscosity of a liquid.
61.45, for determining a multiphase liquid constituent of a liquid mixture by utilizing vibration.
61.75, for utilizing vibration to measure the solid content of a liquid mixture.
61.79, for utilizing vibration to measure the content or the effect of a constituent of a liquid mixture.
64.42, for utilization of vibration for detecting gelling or coagulation characteristics of a liquid.
64.49, for determining surface tension by utilizing vibration.
64.53, for testing a liquid or a liquid suspension of a solid by utilizing vibration.
592, for utilizing vibration to test for liquid leakage or a pipe flaw.

61.51 Buoyant detector:
This subclass is indented under subclass 61.43. Subject matter wherein the detector floats on the surface of the liquid.

61.52 Chromatography:
This subclass is indented under subclass 61.43. Subject matter wherein the determination is made by successively testing the effluence of a mixture of liquids, which has contacted a solvent or sorbent which separates the mixture into fractional components in order to determine the quantity, quality or identity of a component of the effluent.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19.1, for a gas chromatographic process or apparatus for determining the presence of or the amount of gas in a liquid.
23.35, for the analysis of gas by chromatography.
863+, for liquid sampling, per se.

SEE OR SEARCH CLASS:
204, Chemistry: Electrical and Wave Energy, subclasses 400+ for electrolytic analysis and testing apparatus.
205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 775+ for electrolytic analysis or testing processes.
210, Liquid Purification or Separation, subclasses 85+ for a liquid separator with a recorder, subclass 198.2 for a device for removing a constituent from a liquid by sorption combined with means to add treating material, subclasses 263+ for a liquid separator utilizing a bed of particulate material and subclasses 660+ for a process of removing a constituent from a liquid by sorption.

324, Electricity: Measuring and Testing, particularly subclasses 459+ for liquid analysis using ionization effects and appropriate subclasses for testing a liquid by measuring an electrical property of the liquid.

356, Optics: Measuring and Testing, subclasses 409+ for a process of liquid chromatography wherein a liquid substance, a solute in a solvent, or a miscible liquid is examined by transmission of light to furnish a quantitative or qualitative determination with respect to a chemical composition of the liquid analyzed in the absence of a color development.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 70 for chromatos:graphic analysis of a liquid utilizing a chemical reaction.

436, Chemistry: Analytical and Immunological Testing, subclass 161 for a process or composition in which the results of a chemical reaction is subjected to a chromatographic separation or analysis.

61.53 Column detail:

This subclass is indented under subclass 61.52. Subject matter wherein significance is attributed to a tubular structure which is either packed with a material having a known absorption characteristic or is coated with a liquid of a high molecular weight and having known properties.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23.39, for column detail of gas chromatography in gas analysis.

61.54 Paper or thin layer type:

This subclass is indented under subclass 61.52. Subject matter wherein the sorbent is a paper or other thin layer material.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, subclass 198.3 for liquid separation using the layer chromatography.

436, Chemistry: Analytical and Immunological Testing, subclass subclass 162 for subject of that class type utilizing paper or thin layer plate chromatography.

61.55 Including sampling, sample handling, or sample preparation:

This subclass is indented under subclass 61.52. Subject matter combined with means for obtaining a predetermined amount of a liquid to be tested, for treating a liquid sample in preparation for its analysis or for isolating individual components of a liquid prior to analysis thereof.

(1) Note. “Sampling” includes: (a) Transporting or handling previously obtained samples of liquid in preparation for analysis. or (b) Introducing previously obtained liquid samples in preparation for analysis. or (c) The preparation of a liquid sample prior to the analysis thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23.41, for a chromatographic gas analyzer including sample preparation or sampling.

23.42, for a chromatographic gas analysis including detail of gas handling.

61.59, for a liquid analyzer using chromatography and including detail of sampling, sample handling or sample preparation.

155, for the measurement of liquid flow characteristics in a well bore utilizing sampling.

170.29+, for the measurement of an oceanographic phenomena combined with sampling the ocean.

863+, for liquid sampling, per se.

SEE OR SEARCH CLASS:

4, Baths, Closets, Sinks, and Spittoons, appropriate subclass for a urine sampler combined with toilet or means to attach the sampler to the toilet.

23, Chemistry: Physical Processes, for a sampling process wherein a step of causing or promoting a chemical reaction, or regulating or controlling a chemical reaction are claimed.

128, Surgery, appropriate subclasses for body fluid samplers having means to contact the human body.

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, appropriate subclass, in particularly subclasses 21+, 29+, 110, and 130 for a device or method of filling a receiver which is not part of a sampling system.

159, Concentrating Evaporators, subclass 30 for a combination of a concentrating vessel with means for withdrawing a quantity of liquid for examination.

166, Wells, in particularly subclasses 107+, 142+, 162+, and 264 for an apparatus or method for sampling well fluids.

210, Liquid Purification or Separation, subclasses 513+ for gravitational separators and especially subclasses 514+ for milk and cream separators.

222, Dispensing, appropriate subclass for subject of that class type which may include an apparatus or process for obtaining a predetermined portion of material from a mass but not for testing purposes.

250, Radiant Energy, subclass 288 for mass spectrometers with sample supply.

356, Optics: Measuring and Testing, subclasses 36+ for subject matter of that class type including sample preparation and subclasses 244+ for sample holders.

374, Thermal Measuring and Testing, subclass 140 for a molten metal lance which may include a sample chamber and subclass 157 a thermometer combined with a sample cup.

417, Pumps, appropriate subclass for sampling pumps, per se.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for a sampler wherein means for causing, promoting, regulating, or controlling a chemical reaction is claimed.

435, Chemistry: Molecular Biology and Microbiology, subclasses 309.1+ for inoculators, streakers, or samplers adapted for use with microorganisms and enzymes; and subclass 288.6 for a microorganism or enzyme measuring and testing apparatus, including a column separation means.

604, Surgery, subclass 181 for syringes.

61.56 Detail of fluid handling means (e.g., valve, control, etc.):

This subclass is indented under subclass 61.52. Subject matter wherein significance is attributed to the means for confining, directing, or controlling the flow of liquid material.

SEE OR SEARCH CLASS:

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, appropriate subclass, in particularly subclasses 21+, 29+, 110, and 130 for a device or method of filling a receiver which is not part of a sampling system.

159, Concentrating Evaporators, subclass 30 for a combination of a concentrating vessel with means for withdrawing a quantity of liquid for examination.

210, Liquid Purification or Separation, subclasses 513+ for gravitational separators and especially subclasses 514+ for milk and cream separators.

222, Dispensing, appropriate subclass for subject of that class type which may include an apparatus or process for obtaining a predetermined portion of material from a mass but not for testing purposes.

61.57 With detail of compensation or regulating means:

This subclass is indented under subclass 61.52. Subject matter wherein significance is attributed to means for controlling a condition within the apparatus or making a correction in a test result due to such condition.

61.58 Detector detail:

This subclass is indented under subclass 61.52. Subject matter wherein significance is attributed to a sensing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61.61, for a sensing means for detecting liquid constituents of a liquid mixture, per se.

866.5, for a sensing means, per se

61.59 With detail of sampling, sample handling, or sample preparation:

This subclass is indented under subclass 61.43. Subject matter combined with sampling means wherein significance is attributed to means for obtaining a predetermined amount of a liquid to be tested, for treating a liquid sample in preparation for its analysis or for isolating individual components of a liquid prior to analysis thereof.

(1) Note. "Sampling" includes: (a) Transporting or handling previously obtained samples of liquid in preparation for analysis. or (b) Introducing previously obtained liquid samples in preparation for analysis. or (c) The preparation of a liquid sample prior to the analysis thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.23+, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a flow of a fluid, utilizing sampling.

170.29+, for the measurement of an oceanographic phenomena combined with sampling the ocean.

863+, for liquid sampling, liquid sample handling, or liquid sample preparation, per se.

SEE OR SEARCH CLASS:

4, Baths, Closets, Sinks, and Spittoons, appropriate subclasses for a urine sampler, combined with toilet or means to attach the sampler to the toilet.

23, Chemistry: Physical Processes, appropriate subclasses for a sampling process wherein a step of causing or promoting a chemical reaction, or regulating or controlling a chemical reaction are claimed.

128, Surgery, subclasses 185+ for body fluid samplers having means to contact the human body.

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, appropriate subclass, in particularly subclasses 21+, 29+, 110, and 130 for a device or method of filling a receiver which is not part of a sampling system.

159, Concentrating Evaporators, subclass 30 for a combination of a concentrating vessel with means for withdrawing a quantity of liquid for examination.

166, Wells, in particularly subclasses 107+, 142+, 162+, and 264 for an apparatus or method for sampling well fluids.

210, Liquid Purification or Separation, subclasses 513+ for gravitational separators and especially subclasses 514+ for milk and cream separators.

222, Dispensing, appropriate subclass for subject of that class type which may include an apparatus or process for obtaining a predetermined portion of material from a mass but not for testing purposes.

250, Radiant Energy, subclass 288 for mass spectrometers with sample supply.

356, Optics: Measuring and Testing, subclasses 36+ for subject matter of that class type including sample preparation and subclasses 244+ for sample holders.

374, Thermal Measuring and Testing, subclass 140 for a molten metal lance which may include a sample chamber and subclass 157 a thermometer combined with a sample cup.

417, Pumps, for sampling pumps, per se.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, appropriate subclass for a sampler wherein means for causing, promoting, regulating or controlling a chemical reaction is claimed.

435, Chemistry: Molecular Biology and Microbiology, subclasses 309.1+ for inoculators, streakers, or samplers adapted for use with microorganisms and enzymes.

604, Surgery, subclass 181 for syringes.

61.61 Detector detail:

This subclass is indented under subclass 61.52. Subject matter wherein significance is attributed to a sensing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61.58, for a sensing means for chromatographic determination of content or the effect of a constituent of a liquid mixture.

866.5, for a sensing means, per se.

61.62 Depositing characteristic:

This subclass is indented under subclass 61.41. Subject matter wherein the determination is made by measuring the ability of the constituent of a liquid to form a deposit or a coating on a surface (e.g., slime or seal).

SEE OR SEARCH THIS CLASS, SUBCLASS:

86, for tests for treating a nonliquid specimen to determine the effect of a liquid on brittleness or erosion resistance.

SEE OR SEARCH CLASS:

252, Compositions, subclasses 175+ for scale inhibiting compositions.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 53 for corrosion testing apparatus.

510, Cleaning Compositions for Solid Surfaces, Auxiliary Compositions Therefor, or Processes of Preparing the Compositions, for cleaning compositions, including detergents, for solid surfaces and subclasses 245+ for scale removing compositions.

61.63 Settling or filtering ability:

This subclass is indented under subclass 61.41. Subject matter wherein the determination is made by detecting or measuring a characteristic associated with the tendency of the sediment to settle at the bottom of the liquid or a characteristic associated with resistance offered by the mixture when passing through material.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for colloid systems or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

61.64 By volume or flow rate:

This subclass is indented under subclass 61.63. Subject matter wherein the determination is made by measuring the volume of flow, the speed, the volume rate of flow or mass rate of flow of the liquid mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1.16+, for proving or calibrating volume of flow, speed of flow, volume rate, or flow or mass rate of flow.

1.73+, for proving or calibrating a liquid level or volume measuring apparatus.

53.04, for a property of a paper or wood suspension by measuring flow characteristic.

54.13, for determining viscosity by measuring a time interval of travel or flow rate using an orifice, nozzle, or extrusion means wherein there is disclosed detail of a means whose optical character changes due to a change in a physical phenomenon associated with the liquid whose viscosity is being measured.

54.19, for detail of a timing means in a device wherein viscosity is determined by gravity movement of an object in a liquid.

61.73, for utilizing flow effect to measure solid components of a liquid suspension.

152.18+, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a flow of a fluid or by analyzing a fluid.

170.11+, for determining the direction and rate of flow of a fluid in meteorology and oceanology.

178+, for determining the speed of a craft with respect to a fluid.

861+, for measuring the volume or the rate of flow of liquid, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, appropriate subclasses, for nonelectrical means for giving an alarm upon the occurrence of a predetermined condition of a fluid.

128, Surgery, subclasses 668+ for measuring blood flow in the body wherein there is disclosed structure for placement in the living body.

137, Fluid Handling, subclasses 98+ for a self-proportioning flow system and subclasses 624.11+ for a programmed or timed valve which meters fluid merely by timing the interval between opening and closing of the valve.

175, Boring or Penetrating the Earth, appropriate subclasses for measuring the rate of flow of drilling fluid combined with a device of that class.

222, Dispensing, particularly subclasses 14, 59, and 71 for volume or rate of flow-measuring means having dispensing features or which are used in dispensing combinations.

250, Radiant Energy, particularly subclasses 258, 259+, 356.1, and 432 for miscellaneous radiant energy responsive devices.

324, Electricity: Measuring and Testing, subclass 306 for flow-measuring means responsive to nuclear induction.

340, Communications: Electrical, subclasses 606+ for electrical means for giving a humanly perceptible indication or signal in response to a predetermined condition, such as the flow of fluid.

356, Optics: Measuring and Testing, appropriate subclass for an optical measuring of fluid flow not involving nonoptical measuring or testing beyond that found in Class 356.

368, Horology: Time Measuring Systems or Devices, subclasses 89+ for time interval measuring, per se.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 21 for a system utilizing a pulse counter to measure fluid flow.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 45 through 49 for an application of computers or data processing in fluid flow studying.

61.65 Sedimentation rate:

This subclass is indented under subclass 61.63. Subject matter wherein the determination is made by measuring the rate at which the sediment settles to the bottom of the liquid.

61.66 With means for accelerating solids (e.g., particles):

This subclass is indented under subclass 61.65. Subject matter including means for imparting an increase in the rate at which the sediment settles.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for colloid systems or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

61.67 By pressure measurement:

This subclass is indented under subclass 61.65. Subject matter wherein the determination is made by measuring pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.14, for determining viscosity of a liquid flowing through an orifice, nozzle, or extrusion means by measuring pressure.

61.47, for measuring pressure in order to determine the liquid constituent of a liquid mixture.
61.73, for measuring pressure of a liquid in order to determine its solid content.
61.78, for measuring pressure to determine the content or effect of a constituent of a liquid mixture.
64.46, for measuring differential pressure to determine vapor pressure.
64.51, for measuring pressure to determine surface tension.
700+, for liquid pressure measurement, per se.

61.68 Including detail of fluid handling means, sampling, sample handling, or sample preparation:

This subclass is indented under subclass 61.65. Subject matter combined with sampling means wherein significance is attributed to means for obtaining a predetermined amount of a liquid to be tested, for treating a liquid sample in preparation for its analysis or for isolating individual components of a liquid prior to analysis thereof and/or to means for confining, directing, or controlling the flow of liquid material.

(1) Note. "Sampling" includes: (a) Transporting or handling previously obtained samples of liquid in preparation for analysis; or (b) introducing previously obtained liquid samples in preparation for analysis; or (c) the preparation of a liquid sample prior to the analysis thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
23.41, for a chromatographic gas analyzer including sample preparation or sampling.
23.42, for a chromatos:graphic gas analysis including detail of gas handling.
61.59, for a liquid analyzer using chromatography and including detail of sampling, sample handling, or sample preparation.
152.18+, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a flow of a fluid, utilizing sampling.
170.29+, for the measurement of an oceanographic phenomena combined with sampling the ocean.
863+, for sampling, per se.

SEE OR SEARCH CLASS:
4, Baths, Closets, Sinks, and Spittoons, appropriate subclass for a urine sampler, combined with toilet or means to attach the sampler to the toilet.
23, Chemistry: Physical Processes, for a sampling process wherein a step of causing or promoting a chemical reaction, or regulating or controlling a chemical reaction are claimed.
128, Surgery, subclasses 185+ for body fluid samplers having means to contact the human body.
137, Fluid Handling, for valves, per se.
141, Fluent Material Handling, With Receiver or Receiver Coacting Means, appropriate subclasses, in particularly subclasses 21+, 29+, 110, and 130 for a device or method of filling a receiver which is not part of a sampling system.
159, Concentrating Evaporators, subclass 30 for a combination of a concentrating vessel with means for withdrawing a quantity of liquid for examination.
166, Wells, in particularly subclasses 107+, 142+, 162+, and 264 for an apparatus or method for sampling well fluids.
210, Liquid Purification or Separation, subclasses 513+ for gravitational separators and especially subclasses 514+ for milk and cream separators.
222, Dispensing, appropriate subclasses for subject of that class type which may include an apparatus or process for obtaining a predetermined portion of material from a mass but not for testing purposes.
250, Radiant Energy, subclass 288 for mass spectrometers with sample supply.
356, Optics: Measuring and Testing, subclasses 36+ for subject matter of that class type including sample preparation and subclasses 244+ for sample holders.

374, Thermal Measuring and Testing, subclass 140 for a molten metal lance which may include a sample chamber and subclass 157 a thermometer combined with a sample cup.

417, Pumps, appropriate subclasses for sampling pumps, per se.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, appropriate subclasses for a sampler wherein means for causing, promoting, regulating or controlling a chemical reaction is claimed.

435, Chemistry: Molecular Biology and Microbiology, subclasses 309.1+ for inoculators, streakers, or samplers adapted for use with microorganisms and enzymes.

604, Surgery, subclass 181 for syringes.

61.69 By optical measurement:

This subclass is indented under subclass 61.65. Subject matter wherein the determination is made by measuring the effect of the sediment on light.

SEE OR SEARCH CLASS:

250, Radiant Energy, appropriate subclasses for a photocell, per se, and for analyzing a liquid utilizing invisible light which is modified by transmission through or emission by the liquid being tested wherein the modified light is tested.

356, Optics: Measuring and Testing, subclass 436 for measuring visible light transmission or absorption of a liquid wherein the test involves no manipulation other than that involved in optical testing.

61.71 For measuring solid components (e.g., particles):

This subclass is indented under subclass 61.41. Subject matter wherein the determination is made by measuring or detecting the identity of, the amount of or the effect of a solid constituent of the liquid mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:

865.5, for measuring particle size, per se.

SEE OR SEARCH CLASS:

356, Optics: Measuring and Testing, subclasses 335+ for determining particle size by measuring scattered visible light and subclass 544 for measuring visible light transmission to inspect or to study a suspension of particles in a liquid.

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for colloid systems or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

61.72 By separation and subsequent measurement (e.g., by weighing, X-ray or microscope, etc.):

This subclass is indented under subclass 61.71. Subject matter including means for isolating the solid from the liquid and wherein the determination is made subsequent to the isolation.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, appropriate subclass, for the separation of liquid components, per se.

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for colloid systems or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), in

each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

61.73 By flowing through barrier or restriction and measuring flow effect (e.g., pressure, volume of or rate of flow):

This subclass is indented under subclass 61.71. Subject matter wherein the isolation is made by means of an element located in a flow path of the liquid and the determination is made by measuring the effect of the movement of the liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1.16+, for proving or calibrating volume of flow, speed of flow, volume rate, or flow or mass rate of flow.

53.04, for determining paper and wood suspension properties by measuring flow characteristic.

54.13, for determining viscosity by measuring a time interval of travel or flow rate using an orifice, nozzle, or extrusion means wherein there is disclosed detail of a means whose optical character changes due a change in a physical phenomenon associated with the liquid whose viscosity is being measured.

54.19, for detail of a timing means in a device wherein viscosity is determined by gravity movement of an object in a liquid.

61.64+, for determining settling or filtering ability by measuring volume or flow rate of the liquid or the liquid mixture.

152.18+, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a flow of a fluid or by analyzing a fluid.

170.11+, for the determining the direction and rate of flow of a fluid in meteorology and oceanology.

178+, for the speed of a craft with respect to a fluid.

861+, for measuring the volume or the rate of flow of liquid, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, appropriate subclass, for nonelectrical means for giving an alarm upon the occurrence of a predetermined condition of a fluid.

128, Surgery, subclasses 668+ for measuring blood flow in the body wherein there is disclosed structure for placement in a living body.

137, Fluid Handling, subclasses 98+ for a self-proportioning flow system and subclasses 624.11+ for a programmed or timed valve which meters fluid merely by timing the interval between opening and closing of the valve.

175, Boring or Penetrating the Earth, for measuring the rate of flow of drilling fluid combined with a device of that class type.

222, Dispensing, particularly subclasses 14, 59, and 71 for volume of rate of flow-measuring means having dispensing features or which are used in dispensing combinations.

250, Radiant Energy, particularly subclasses 258, 259+, 320+, 356.1, and 432 for miscellaneous radiant energy responsive devices.

324, Electricity: Measuring and Testing, subclass 306 for flow-measuring means responsive to nuclear induction.

340, Communications: Electrical, subclasses 606+ for electrical means for giving a humanly perceptible indication or signal in response to a predetermined condition, such as the flow of fluid.

356, Optics: Measuring and Testing, appropriate subclass for an optical measuring of liquid flow not involving nonoptical measuring or testing.

368, Horology: Time Measuring Systems or Devices, subclasses 89+, for time interval measuring, per se.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 21 for a system utilizing a pulse counter to measure fluid flow.

700, Data Processing: Generic Control Systems or Specific Applications, subclass 281 for control of fluid level or volume, and subclasses 282-285 for flow control.

61.74 Thermal:
This subclass is indented under subclass 61.73. Subject matter wherein the determination is made by measuring a heat or a temperature related property.

SEE OR SEARCH THIS CLASS, SUBCLASS:
54.42, for determining viscosity by making thermal measurement.
61.46, and 61.76+, for a thermal measurement of content or the effect of the constituent of a liquid mixture.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclass 43 for determining the inherent thermal properties, per se, of a liquid, subclass 54 for thermal measurement of liquid volume and subclass 139 for measuring the temperature of a liquid metal.

61.75 Vibration:
This subclass is indented under subclass 61.71. Subject matter wherein the determination is made by measuring the effect of the suspension being tested on vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19.03, for measuring the gas content of a liquid by measuring the effect of the liquid on vibration.
24.01, for utilization of vibration to analyze gas.
40.05+, for acoustic detection of liquid leakage utilizing pressurized fluid.
54.24, for determining viscosity of a liquid by measuring the force reactance to a member vibrated therein.
54.41, for determining viscosity by utilizing vibration.
61.45, for determining a multiphase liquid constituent of a liquid mixture measuring vibration.
61.49, for utilizing vibration to determine the liquid constituent of a liquid mixture.
61.79, for utilizing vibration to determine the effect of the content of a liquid.
64.42, for testing of a gelling or coagulation property of a liquid utilizing vibration.
592, for detecting liquid leakage and location by utilizing vibration.

61.76 By thermal measurement:
This subclass is indented under subclass 61.41. Subject matter wherein the determination is made by measuring a heat or temperature related property.

SEE OR SEARCH THIS CLASS, SUBCLASS:
54.42, for determining viscosity by measuring heat transmitting or heat related properties.
61.46, and 61.74, for the thermal measurement of the liquid content of a liquid mixture.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclass 54 for thermal measurement of a liquid volume and subclass 139 for measuring the temperature of molten metal.

61.77 Vaporization (e.g., evaporation, distillation, etc.):
This subclass is indented under subclass 61.76. Subject matter wherein the property being tested is the rate at which a liquid turns into a vapor or the heat required to change a liquid into a vapor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
36, for an end point test of hydrocarbons.
61.46, and 61.74, for thermal measuring of the liquid content of a liquid mixture.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclasses 16+ for a test to determine a thermal characteristic of a specimen or the temperature at which the specimen changes its physical state.

61.78 By pressure measurement:
This subclass is indented under subclass 61.41. Subject matter wherein the determination is made by measuring force per unit area.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.14, for determining viscosity of a liquid flowing through an orifice, a nozzle or an extrusion means by measuring pressure.

61.47, for measuring pressure in order to determine the liquid constituent of a liquid mixture.

61.73, for measuring pressure of a liquid in order to determine its solid content.

64.47, For measuring differential pressure to determine vapor pressure.

64.51, for measuring pressure to determine surface tension.

700+, for liquid pressure measurement, per se.

61.79 By vibration:

This subclass is indented under subclass 61.41. Subject matter wherein the determination is made by utilizing vibration in order to measure or detect the content of or the effect of a constituent of a liquid mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.03, for measuring the gas content of a liquid by measuring the effect of the liquid on vibration.

24.01, for utilization of vibration to analyze gas.

40.05+, for acoustic detection of liquid leakage utilizing pressurized fluid.

54.24, for determining viscosity of a liquid by measuring the force reactance to a member vibrated therein.

54.41, for utilizing vibration to test the viscosity of a liquid.

61.45, for determining a multiphase liquid constituent of a liquid mixture measuring vibration.

61.49, for utilizing vibration to determine the liquid constituent of a liquid mixture.

61.75, for measuring the solid components of a liquid utilizing vibration.

64.42, for testing of a gelling or coagulation property of a liquid utilizing vibration.

64.53, for testing a liquid or a liquid suspension of a solid by utilizing vibration.

592, for detecting liquid leakage and location by utilizing vibration.

64.41 Gelling or coagulation:

This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring or detecting the ability of the liquid to coagulate, to form a clot, or to form a stiffened or solid colloid-like mass.

SEE OR SEARCH CLASS:

516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, appropriate subclasses for colloid systems or agents for such systems or making or stabilizing such systems or agents, subclasses 113+ for compositions for or subcombination compositions for or breaking of or inhibiting of colloid systems (e.g., foam breaking, emulsion breaking, dispersion inhibiting, suspension settling, gel breaking, smoke suppressing, coagulating, flocculating), in each instance, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

64.42 By vibration:

This subclass is indented under subclass 64.41. Subject matter wherein the property is being determined by the effect of the liquid upon vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.03, for measuring the gas content of a liquid by measuring the effect of the liquid on vibration.

40.05+, for acoustic detection of liquid leakage utilizing pressurized fluid.

64.53, for testing a liquid or a liquid suspension of a solid by utilizing vibration.

54.41, for the utilization of vibration to test the viscosity of a liquid.

61.45, for the utilization of vibration for determining a multiphase constituent of a liquid mixture.

61.49, for the utilization of vibration to determine the content or the effect of a constituent of a liquid mixture.

61.75, for the utilization of vibration to measure the solid content of a liquid mixture.

61.79, for the utilization of vibration to measure the content or the effect of a constituent of a liquid mixture.
592, for the utilization of vibration to test for liquid leakage or a pipe flaw.

64.43 By optical measurement:
This subclass is indented under subclass 64.41. Subject matter wherein the determination is made by measuring or detecting the effect of the liquid on light.

SEE OR SEARCH CLASS:
250, Radiant Energy, appropriate subclass, for a photocell, per se, and subclasses 574+ for an optical or preoptical system having a liquid in the path thereof wherein the modification of or the emission of the radiant energy resulting from the irradiation of the liquid is tested.
356, Optics: Measuring and Testing, subclass 436 for measuring visible light transmission or absorption of a liquid wherein the test involves no manipulation other than that involved in optical testing.

64.44 Vapor-liquid ratio:
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring the ratio of the amount of vapor above a confined liquid to the volume of the confined liquid.

64.45 Vapor pressure:
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring the pressure of the vapor of a liquid above a confined body of liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
54.14, for determining viscosity of the liquid flowing through an orifice, nozzle, or extrusion means by measuring pressure.
61.47, for measuring pressure in order to determine the liquid constituent of a liquid mixture.
61.73, for measuring pressure of a liquid in order to determine its solid content.
61.78, for measuring pressure to determine the content or effect of a constituent of a liquid mixture.
64.46, for measuring differential pressure to determine vapor pressure.
64.51, for measuring pressure to determine surface tension.
700+, for liquid pressure measurement, per se.

64.46 Differential pressure:
This subclass is indented under subclass 64.45. Subject matter wherein the determination is made by utilizing plural pressures.

64.47 Osmotic pressure (e.g., diffusion characteristic):
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring the pressure due to diffusion of the liquid through a material (e.g., through a member which is selective to one constituent of a liquid; the art term for the member being semi-permeable member).

SEE OR SEARCH THIS CLASS, SUBCLASS:
54.14, for determining viscosity by measuring pressure of the liquid flowing through an orifice, nozzle, or extrusion means.
61.73, for measuring pressure of a liquid in order to determine its solid content.
61.78, for measuring pressure to determine the content or effect of a constituent of a liquid mixture.
64.51, for measuring pressure to determine surface tension.
700+, for liquid pressure measurement, per se.

64.48 Surface tension:
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring the contractile strength of the elastic skin effect at the surface of a body of liquid.

64.49 By force or torque:
This subclass is indented under subclass 64.48. Subject matter wherein the determination is made by measuring the force or the torque required to immerse the member into or to sep-

arate the member from the liquid surface or the force exerted upon a member by the liquid.

64.51 By pressure:
This subclass is indented under subclass 64.48. Subject matter wherein the determination is made by measuring a force per unit area.

SEE OR SEARCH THIS CLASS, SUBCLASS:
54.14, for determining viscosity by measuring pressure of the liquid flowing through an orifice, nozzle or extrusion means.
61.47, for measuring pressure in order to determine the liquid constituent of a liquid mixture.
61.73, for measuring pressure of a liquid in order to determine its solid content.
61.78, for measuring pressure to determine the content or effect of a constituent of a liquid mixture.
64.46, for measuring differential pressure to determine vapor pressure.
700+, for liquid pressure measurement, per se.
862+, for a dynamometer responsive to force or torque.

64.52 Liquid droplet:
This subclass is indented under subclass 64.48. Subject matter wherein the determination is made by measuring a characteristic of liquid drops produced by flowing a liquid through an orifice.

64.53 By vibration:
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring the effect of the liquid on vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19.03, for measuring the gas content of a liquid by measuring the effect of the liquid on vibration.
24.01, for utilization of vibration to analyze gas.
40.05+, for acoustic detection of liquid leakage utilizing pressurized fluid.
54.24, for determining viscosity of a liquid by measuring the force reactance to a member vibrated therein.
54.41, for utilizing vibration to test the viscosity of a liquid.
61.45, for determining a multiphase liquid constituent of a liquid mixture measuring vibration.
61.49, for utilizing vibration to determine the liquid constituent of a liquid mixture.
61.75, for measuring the solid components of a liquid utilizing vibration.
61.79, for utilizing vibration to determine the effect of the content of a liquid.
64.42, for testing of a gelling or coagulation property of a liquid utilizing vibration.
592, for detecting liquid leakage and location by utilizing vibration.

64.54 Molecular weight:
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by measuring the sum of the atomic weight of a molecule's constituent atoms.

64.55 Interface:
This subclass is indented under subclass 53.01. Subject matter wherein the determination is made by detecting or measuring a property of the section along a fluid flow where liquid of a first kind immediately followed by a liquid of a second kind meets.

64.56 Sampler, constituent separation, sample handling, or sample preparation:
This subclass is indented under subclass 53.01. Subject matter combined with means for obtaining a predetermined amount of a liquid to be tested, for treating a liquid sample in preparation for its analysis or for isolating individual components of a liquid prior to analysis thereof.

(1) Note. “Sampling” includes: (a) Transporting or handling previously obtained samples of Liquid in preparation for analysis, or (b) introducing previously obtained liquid samples in preparation for analysis, or (c) the preparation of a liquid sample prior to the analysis thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23.41, for a chromatographic gas analyzer including sample preparation or sampling.

23.42, for a chromatographic gas analysis including detail of gas handling.

61.59, for a liquid analyzer using chromatography and including detail of sampling, sample handling, or sample preparation.

155, for the measurement of liquid flow characteristics in a well bore utilizing sampling.

170.29+, for the measurement of an oceanographic phenomena combined with sampling the ocean.

863+, for liquid sampling, liquid handling or liquid sample preparation, per se.

SEE OR SEARCH CLASS:

4, Baths, Closets, Sinks, and Spittoons, appropriate subclasses for a urine sampler, combined with toilet or means to attach the sampler to the toilet.

23, Chemistry: Physical Processes, appropriate subclasses for a sampling process wherein a step of causing or promoting a chemical reaction, or regulating or controlling a chemical reaction are claimed.

128, Surgery, appropriate subclasses 185+ for body fluid samplers having means to contact the human body.

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, appropriate subclass, in particularly subclasses 21+, 29+, 110, and 130 for a device or method of filling a receiver which is not part of a sampling system.

159, Concentrating Evaporators, subclass 30 for a combination of a concentrating vessel with means for withdrawing a quantity of liquid for examination.

166, Wells, in particularly subclasses 107+, 142+, 162+, and 264 for an apparatus or method for sampling well fluids.

210, Liquid Purification or Separation, subclasses 513+ for gravitational separators and especially subclasses 514+ for milk and cream separators.

222, Dispensing, appropriate subclass for subject of that class type which may include an apparatus or process for obtaining a predetermined portion of material from a mass but not for testing purposes.

250, Radiant Energy, subclass 288 for mass spectrometers with sample supply.

356, Optics: Measuring and Testing, subclasses 36+ for subject matter of that class type including sample preparation and subclasses 244+ for sample holders.

374, Thermal Measuring and Testing, subclass 140 for a molten metal lance which may include a sample chamber and subclass 157 a thermometer combined with a sample cup.

417, Pumps, appropriate subclasses for sampling pumps, per se.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for a sampler wherein means for causing, promoting, regulating, or controlling a chemical reaction is claimed.

435, Chemistry: Molecular Biology and Microbiology, subclasses 309.1+ for inoculators, streakers, or samplers adapted for use with micro-organisms and enzymes; and subclass 288.6 for a micro-organism or enzyme measuring and testing apparatus including a column separation means.

604, Surgery, subclass 181 for syringes.

65.01 CENTER OF GRAVITY; TURNING MOMENT; METACENTRIC HEIGHT:

This subclass is indented under the class definition. Subject matter comprising an apparatus or method for determining (a) the point at which the entire weight of a body (e.g., a crank or a craft) may be considered as concentrated so that if supported at such a point the body would remain in equilibrium in any position, or (b) the ratio of the torque, applied to a rigid body free to rotate about a given axis, to the angular acceleration thus produced about that axis, or (c) the point of intersection of a vertical

line through the center of buoyancy of a floating body with a vertical line through a new center of buoyancy when the body is displaced.

(1) Note. This subclass covers determination of mass distribution and balance of all bodies save rotors.

SEE OR SEARCH THIS CLASS, SUBCLASS:
66+, for rotor balancing.
172, for weight distribution on the human foot.

SEE OR SEARCH CLASS:
701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 124 for an electrical processing or data processing system used in the determination of weight distribution of a body where only the nominal structure of a sensor is recited.

65.02 Spherical specimen:
This subclass is indented under subclass 65.01. Subject matter wherein the body is bounded by a surface, all points of which are at an equal distance from a point constituting its center.

65.03 Ball driving sporting implement (e.g., golf club, baseball bat, etc.):
This subclass is indented under subclass 65.01. Subject matter wherein the body comprises a device for imparting motion to a spherical element used in recreation.

65.04 Watercraft (e.g., metacentric height):
This subclass is indented under subclass 65.01. Subject matter wherein the body is a craft for water transport.

65.05 Air or space vehicle:
This subclass is indented under subclass 65.01. Subject matter wherein the body is a structure for (a) navigation of the air or (b) orbiting the Earth or traveling beyond the Earth's atmosphere.

65.06 Electric sensor:
This subclass is indented under subclass 65.05. Subject matter including means whose electron flow or electron storage characteristic changes in response to the determination being made.

SEE OR SEARCH THIS CLASS, SUBCLASS:
65.09, for an electric sensor, per se, for determining the center of gravity, a turning moment, or a metacentric height.
866.5, for a probe or probe mounting, per se.

SEE OR SEARCH CLASS:
250, Radiant Energy, appropriate subclasses for a light responsive sensor, per se.
310, Electrical Generator or Motor Structure, subclasses 311+ for a piezoelectric sensor, per se.
338, Electrical Resistors, subclasses 2+ for a strain gauge, per se, and subclasses 13+ for a condition responsive resistor, per se.
361, Electricity: Electrical Systems and Devices, subclasses 280+ for a capacitor-type sensor, per se.

65.07 Dynamic:
This subclass is indented under subclass 65.01. Subject matter wherein the determination is made by providing motion to the body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
570+, for vibration testing, per se.

65.08 Torsional oscillation:
This subclass is indented under subclass 65.07. Subject matter wherein one part of the body swings about a longitudinal axis while the other part of the body is held fast or turned in the opposite direction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
570+, for vibration testing, per se.

65.09 Electric sensor:
This subclass is indented under subclass 65.01. Subject matter including means whose electron flow or electron storage characteristic changes in response to the determination being made.

SEE OR SEARCH THIS CLASS, SUBCLASS:
65.06, for an electric sensor for determining the center of gravity, a turning

moment, or a metacentric height of an air or space vehicle.

866.5, for a probe or probe mounting, per se.

SEE OR SEARCH CLASS:

250, Radiant Energy, appropriate subclasses for a light responsive sensor, per se.

310, Electrical Generator or Motor Structure, subclasses 311+ for a piezoelectric sensor, per se.

338, Electrical Resistors, appropriate subclasses 2+ for a strain gauge resistor, per se, and subclasses 13+ for a condition responsive resistor, per se.

361, Electricity: Electrical Systems and Devices, subclasses 280+ for a capacitor-type sensor, per se.

66 This subclass is indented under the class definition. Subject matter for determining the amount and/or location of masses or forces causing unbalance in rotatable bodies. The combination of a balance testing device with means to correct for the unbalance is classified with the latter. However, methods of testing for unbalance which broadly recite the additional step of adding or removing material in accordance with the indicated unbalance are found here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

147, for devices for testing the aerodynamic balance of propellers and helicopter rotor blades.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 572+ for miscellaneous rotor structures including those having balancing means.

82, Turning, for the combination of balancing by turning.

123, Internal-Combustion Engines, subclasses 192.1+, for compensating devices for engines, e.g., crank shafts.

219, Electric Heating, for combinations of balancing by electric welding.

408, Cutting by Use of Rotating Axially Moving Tool, subclass 2 for balancing by drilling.

451, Abrading, for the combination of balancing by abrading.

73 This subclass is indented under the class definition. Subject matter for the determination of either the moisture content of materials (e.g., paper, wood, grain, etc.) or the absorptive characteristics of materials for water or other liquids.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19, for determination of gas content of materials.

29, for determination of the moisture content of gases.

61.41, for determination of moisture or water content of liquids.

335+, for hygrometers and hygrostats.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, appropriate subclasses for means and methods of moisture content determination by electrical apparatus which measures an electrical characteristic such as capacity or conductivity of the medium in which the moisture exists; note particularly subclasses 664+, 689 and 694+.

74 This subclass is indented under subclass 73. Subject matter for determination of moisture content by bringing the specimen (usually sand) up to the saturation point while measuring the required addition (residual capacity) as criterion.

75 This subclass is indented under subclass 73. Subject matter in which the heat conductivity of the specimen is the criterion for determining moisture content.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, subclasses 43+.

76 This subclass is indented under subclass 73. Subject matter for determination of moisture content of materials wherein the moisture is extracted, collected, and measured as an index.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, and see the notes thereto for drying and extraction of liquids from solids in general.

77 This subclass is indented under subclass 73. Subject matter for determination of moisture content of materials wherein wet and dry bulb temperature readings are employed, as criteria.

SEE OR SEARCH THIS CLASS, SUBCLASS:

338+, for wet and dry responsive element hygrometers and hygrostats, per se.

78 This subclass is indented under the class definition. Subject matter for direct measurement of the hardness of materials.

SEE OR SEARCH THIS CLASS, SUBCLASS:

7, where abrasive or milling characteristic is employed as an index of hardness.

12.01+, for other tests in which the specimen is subjected to one or more sudden blows.

104, for durability of cutting edges as an index of hardness.

821, for tests of the crushing point of material, sometimes erroneously designated as “hardness”.

SEE OR SEARCH CLASS:

100, Presses, appropriate subclasses for presses not elsewhere provided for.

79 This subclass is indented under subclass 78. Subject matter wherein hardness is measured or determined by either dropping an object on the specimen and observing rebound, or by dropping the specimen upon an anvil and observing rebound.

81 This subclass is indented under subclass 78. Subject matter wherein hardness is measured in terms of its resistance to a penetrator or to indentation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

78+, for resistance to drilling as index of hardness.

700+, for fluid pressure gauges, other than those which measure the hardness of the tire as an index of fluid pressure which are in this subclass (81).

82 This subclass is indented under subclass 81. Subject matter for measurement of hardness of materials wherein a penetrator or indentor is impelled against the specimen under a predetermined force.

83 This subclass is indented under subclass 81. Subject matter wherein a penetrator or indentor is urged into the specimen with successive minor (to penetrate the skin) and major loads. Usually the penetration measurement begins with the major load.

84 This subclass is indented under subclass 81. Subject matter for determining, through resistance to a penetrator, the load sustaining or bearing capacity of soil or foundations.

85 Penetrator elements or points, per se, or holders therefor employed by the apparatus or processes of subclasses 81+.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 189+.

279, Chucks or Sockets, for pertinent subclass(es) as determined by schedule review.

86 This subclass is indented under the class definition. Subject matter for treating specimens with fluids to determine the effect of such fluids on the brittleness or the erosion resistant properties of such specimens.

SEE OR SEARCH THIS CLASS, SUBCLASS:

87, for determination of the instant brittleness rating of a specimen, as compared with embrittlement which is the aging of the material to brittleness.

SEE OR SEARCH CLASS:
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 53 for corrosion testing apparatus.

87 This subclass is indented under the class definition. Subject matter for determining the degree of brittleness or ductility of a specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
788+, for mere determination of strength of materials, as compressive strength, tensile strength, flexing, bending or folding strength, bursting or rupture strength of sheet material, etc.

104 This subclass is indented under the class definition. Subject matter for testing surfaces and cutting edges for defects. The surface inspection includes such variations as soft spots, cracks, fissures and other flaws not elsewhere classified.

SEE OR SEARCH THIS CLASS, SUBCLASS:
40+, for leakage tests.
53.06, for lubricant testing by analyzing characteristics of a measuring surface.
64.48, for measuring the surface tension of a liquid.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 302+ for methods of using fluorescent and radioactive tracer material to detect flaws.
324, Electricity: Measuring and Testing, subclasses 213 and 216 for flaw detection by magnetic tests.
356, Optics: Measuring and Testing, subclass 2 for contour plotting, subclass 69 for cutting blade sharpness tests, and subclass 600 for flatness testing.
374, Thermal Measuring and Testing, subclasses 4+ for detection of flaws or leaks by thermal effects.
378, X-Ray or Gamma Ray Systems or Devices, subclasses 58+ for flaw analysis.

105 This subclass is indented under subclass 104. Subject matter for testing of surfaces for roughness.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, for the measurement of surface contour and depth of valleys.
356, Optics: Measuring and Testing, subclasses 445+ for light reflection tests including glass and light diffusion tests.

112 This subclass is indented under the class definition. Subject matter for determining the working efficiency (input vs. output) of power plants or units thereof, such as condensers.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862+, for dynamometers.

113 This subclass is indented under subclass 112. Subject matter for measuring fuel consumption over selected period of operation or distance traveled.

114 This subclass is indented under subclass 113. Subject matter for indicating at any given instant or for an immediately elapsed period or distance the rate of fuel consumption per mile.

SEE OR SEARCH CLASS:
235, Registers, subclasses 61+ for “miles per gallon” calculators, where the characteristics of the devices which respond to engine or vehicle operation or to fuel feed are not claimed, though they may be included by name or type as operators of the calculator.

115 This subclass is indented under subclass 112. Subject matter utilizing the pressure within an engine as a factor of its performance or efficiency.

SEE OR SEARCH CLASS:
346, Recorders, appropriate subclass.

116 This subclass is indented under the class definition. Subject matter for performing a test on a motor or engine to determine a distinguishing, operational characteristic.

SEE OR SEARCH THIS CLASS, SUBCLASS:
35.01+, for testing characteristics of motor fuels in engines.
112+, for power unit efficiency tests.
570+, for performing similar disparate test utilizing vibrational characteristics.
700+, for a gauge for checking compression in an engine.
862+, for horsepower tests, work, torque, or engine loading by a dynamometer.

117 This subclass is indented under subclass 116. Subject matter where the motor drives the vehicle wheels which, in turn, are supported upon rollers or a belt which comprise part of the test means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
123+, for other combinations including a roller or belt wheel support.

117.1 This subclass is indented under subclass 116. Subject matter including an enclosure or a tank which provides controlled simulated conditions.

117.2 This subclass is indented under subclass 116. Subject matter comprising plural means for performing diverse tests on a motor or an engine under operating conditions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
117, for disparate tests while the vehicle wheel is supported on rollers or belt.

117.3 This subclass is indented under subclass 117.2. Subject matter where the tests are made without shutdown of the engine during actual operation or on a test stand.

117.4 This subclass is indented under subclass 116. Subject matter for obtaining a measurement of thrust as developed by a reaction or reciprocating engine during actual use or on a test stand.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.381+,for direct push or pull thrust measurement only.

118.1 Testing auxiliary unit:
This subclass is indented under subclass 116. Subject matter for the testing of auxiliary units of motors and power units, including carburetors, generators, starters, ignition parts, etc.

(1) Note. Ignition testing where the sensing means is mechanical in nature or responsive to pressure is herein included.

SEE OR SEARCH THIS CLASS, SUBCLASS:
49.7, for testing of an auxiliary unit with fluid pressure.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 378+ for ignition system testing to determine electrical properties by electrical means, and subclasses 181+ where electrical timing is involved.
368, Horology: Time Measuring Systems or Devices, subclasses 113+ where electrical timing is involved.

118.2 Intake air flow:
This subclass is indented under subclass 118.1. Subject matter wherein the auxiliary unit is the air intake passage of the engine and the measurement is the airflow rate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861+, for the measurement of volume or rate of flow, per se.

119 This subclass is indented under subclass 116. Subject matter for testing of parts of motors and power apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:
47, for leakage tests for pistons, rings, or valves.
49.7, for testing of a motor part with fluid pressure.

120 This subclass is indented under subclass 119. Subject matter in which a piston ring is the thing tested.

121 This subclass is indented under the class definition. Subject matter for measuring or testing the action of vehicle brakes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
7+, for testing the wear qualities of brake surfaces.
9+, for determining friction qualities.
39, for use of fluid pressure to test fluid pressure brake units or systems.

122 This subclass is indented under subclass 121. Subject matter in which a vehicle wheel engages a yieldably slidable platform and the brake effect is interpreted by the reactive motion of the platform.

123 This subclass is indented under subclass 121. Subject matter wherein vehicle wheels are supported upon a belt or roller during the brake test operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
117, for motor or engine testing involving a roller or belt type of vehicle wheel support.

124 This subclass is indented under subclass 123. Subject matter wherein the vehicle wheels are supported upon rollers or belt, characterized by the fact that the front and rear wheel supports are relatively shiftable.

125 This subclass is indented under subclass 123. Subject matter wherein the vehicle and wheels and/or an inertia member is set in motion to simulate the momentum of the vehicle and the brake test is to overcome the inertia effect.

126 This subclass is indented under subclass 123. Subject matter wherein the vehicle wheels under test while supported upon rollers or belts are driven against the action of the brakes and the driving effort employed is an index of brake condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862+, for dynamometers usable for determining driving effort of brake testers.

127 This subclass is indented under subclass 126. Subject matter comprising a portable roller or belt unit (for disposition under the vehicle wheels seriatim), equipped with means for measuring the driving effort.

SEE OR SEARCH THIS CLASS, SUBCLASS:
130+, for other forms of single wheel drive and torque measuring testers.

128 This subclass is indented under subclass 121. Subject matter comprising devices temporarily applied to vehicle in making road brake test.

129 This subclass is indented under subclass 121. Subject matter, in which the brake testing arrangement is incorporated into the vehicle as a permanent part thereof.

130 This subclass is indented under subclass 121. Subject matter for rotating an individual vehicle wheel and measuring the required force.

SEE OR SEARCH THIS CLASS, SUBCLASS:
127, for roller or belt wheel support type.

131 This subclass is indented under subclass 130. Subject matter comprising a torque measuring lever or lever system, said lever having no ground support or reaction means, for measuring the force required to move a vehicle wheel when out of ground contact against the resistance of its applied brake.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.21+,for similar torque measuring levers.

132 This subclass is indented under subclass 121. Subject matter comprising devices for depressing brake pedal with a measured force.

SEE OR SEARCH CLASS:
254, Implements or Apparatus for Applying Pushing or Pulling Force, for such devices without measuring means.

146 This subclass is indented under the class definition. Subject matter for testing of tires, treads or roadways. “Sperry cars” are here included.

SEE OR SEARCH THIS CLASS, SUBCLASS:
8, for tests of such devices by abrasion, milling, rubbing, or scuffing.

146.2 This subclass is indented under subclass 146. Subject matter for testing the degree of inflation of tires, inflation sensing means being installed on vehicle structure, wheel or tire, with indicator means disposed on or within the vehicle or wheel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
78+, for testing tire inflation by its hardness, or by its resistance to indentation.
862.381+,for thrust measuring means, per se.

SEE OR SEARCH CLASS:
116, Signals and Indicators, subclass 34, for mechanical apparatus to indicate merely over or under pressure in tires.
137, Fluid Handling, subclasses 227+ for tire stem inflation means, usually valves, with a gauge or indicator.
152, Resilient Tires and Wheels, subclasses 415+ for a wheel or tire having tire inflating means, with or without pressure indicating or measuring means.

146.3 This subclass is indented under subclass 146.2. Subject matter including a direct fluid pressure sensing unit communicating with the interior of the tire, as through its valve stem.

SEE OR SEARCH THIS CLASS, SUBCLASS:
700+, for fluid pressure gauges of more general utility.

146.4 This subclass is indented under subclass 146.3. Subject matter wherein the reading is transmitted to a distant point, usually to the instrument board of the vehicle.

146.5 This subclass is indented under subclass 146.4. Subject matter wherein the transmission is by electric means.

146.8 This subclass is indented under subclass 146.3. Subject matter wherein the gauge is mounted, or used, on the tire stem, usually as a replacement for a valve cap.

147 This subclass is indented under the class definition. Subject matter in the form of wind tunnels; also means for studying the flow of fluid about plane wings, and the behavior of propellers both for air or water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
116, for motor and engine testing.

148 This subclass is indented under the class definition. Subject matter in the form of basins and tanks for the testing of ship models or ships.

149 This subclass is indented under the class definition. Subject matter for the measurement of the volumetric content of a selected space or zone.

SEE OR SEARCH THIS CLASS, SUBCLASS:
426+, for measuring vessels.

150 This subclass is indented under the class definition. Subject matter for the testing of coating materials (coverage, drying time, aging, weathering, etc., inks, printing and pen; adhesives and plastics) as to all qualities not provided for in preceding subclasses.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 324+ for methods and apparatus for corona irradiation of materials, subclasses 432+ for the irradiation of contained, supported, or transported fluent material, subclasses 453.11+ for the irradiation of supported objects and subclass 493.1 for the irradiation of objects or materials generally.
374, Thermal Measuring and Testing, subclass 7 for determining coating thickness by a thermal measurement.

152.01 BOREHOLE OR DRILLING (E.G., DRILL LOADING FACTOR, DRILLING RATE, RATE OF FLUID FLOW):

This subclass is indented under the class definition. Subject matter comprising a process or an apparatus for determining a physical characteristic of a borehole, a casing, or a drill rigging.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.01+, for gas content measuring, per se, especially subclass 19.09 for measuring the gas content of mud.

23.2+, for gas analysis, per se.

32+, for density measuring, per se.

53.01+, for fluid analysis, per se.

170.01, for fluid flow direction measuring, per se, in a naturally occurring body of water.

861+, for a rate of fluid flow measuring not in a borehole.

863+, for sampling, per se, of mud not in a well and of gas sampling from the soil by means sunk into the ground to a point not far from the surface of the ground, and especially subclass 864.52 for sampling devices comprising a receptacle with suction means.

866, for material analysis, per se.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 304+ for a geometrical indicator for borehole study and especially for a borehole direction or inclination indicator.

116, Signals and Indicators, subclasses 112+ for mechanical indicators of a predetermined fluid flow and subclasses 264+ for a mechanical indicator of the presence or the absence of fluid flow where no measuring transducer is recited.

166, Wells, subclasses 64, 66, and 113 for well structure combined with measuring and testing means wherein more structure than is necessary to perfect the testing is recited, subclass 250.02 for a comprehensive well process combined with permeability determining wherein more well detail than is necessary to determine permeability is recited, and subclass 264 for a well process comprising merely sampling a well fluid.

175, Boring or Penetrating the Earth, subclasses 40+ for a process or means of measuring or testing combined with more than a nominal recitation of an earth boring process or apparatus.

250, Radiant Energy, subclasses 256+ for testing in a well bore by measuring radiant energy.

324, Electricity: Measuring and Testing, subclasses 323+ and 355+ for measuring an electrical property of a borehole, in particular subclasses 366+ for well logging involving measuring an electrical property of borehole formation, and subclass 425 for measuring electrolyte properties, per se.

340, Communications: Electrical, subclasses 853.1+ for well bore telemetry wherein information signals are transmitted to or from means located in a passageway in the earth.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclass 22 for a radar system which is used in geophysical exploration, as for example, radar sets which are lowered down a borehole to determine the size of the borehole.

346, Recorders, appropriate subclasses for recorders for recording the operation of machines and especially subclasses 33+ for a recorder combined with external recorder operating means including a well logging device, and subclasses 112+ for a graph-type recorder.

356, Optics: Measuring and Testing, subclasses 241.1+ for making borehole or drilling study by measuring visible light.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 25+ for the communication of information or intelligence in the form of acoustic waves traveling through earth and detected by electric signal handling means passing through a well bore and providing information pertaining to a characteristic or a location of discontinuities within the

earth, subclasses 81+ for the communication of information or intelligence in a well bore in the form of acoustic waves traveling in a medium in the well bore different from the surrounding earth and providing information pertaining to a characteristic or a location of discontinuities within the earth, and subclasses 86+ for the communication of information or intelligence in the form of acoustic waves traveling through earth detected by electric signal handling means passing through a well bore and providing information pertaining to a characteristic or a location of discontinuities within the earth for electroacoustic borehole testing and wherein the intelligence pertains to the walls of the borehole and is obtained from a device which travels through the passageway and emits acoustic waves into a medium contained within the borehole (e.g., water, air, etc.) which are reflected from the walls back to the device and are detected.

374, Thermal Measuring and Testing, subclass 136 for measuring a temperature at a single location in a well bore.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, appropriate subclass for testing involving a chemical reaction.

435, Chemistry: Molecular Biology and Microbiology, subclass 9 for a process for quantitative or qualitative testing for mineral deposits by use of microorganisms which thrive in the presence of such minerals.

436, Chemistry: Analytical and Immunological Testing, subclasses 25+ for a chemical analysis of a borehole.

152.02 Formation logging (e.g., borehole studies of pressure derivatives or of pressure-temperature derivatives):

This subclass is indented under subclass 152.01. Subject matter wherein the determination of the physical characteristic of earth both below the surface of the earth and along a surface forming the periphery of the borehole is made by measuring a parameter at plural positions within the borehole.

(1) Note. This subclass generally contains subject matter drawn to the measurement of plural kinds of parameters of a formation in a borehole. However, the measurement of a single kind of parameter at plural positions within a borehole, not provided for elsewhere, is also found here. When two parameters of the formation are being measured and one of the parameters is the depth at which a second parameter is being measured, then the subject matter is found where the second parameter is found.

(2) Note. Generally, the devices included here include a process or an apparatus for correlating the measurement of the physical characteristic of the earth with a measured depth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.24, for a flow study involving taking a sample from a formation wall.

152.44, for the identification of a formation from the relative ease with which a drill penetrates the formation.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, appropriate subclasses for instruments, per se, for measuring a distance, an angle, or the like in a well, and in particular subclasses 302 and 304+ for borehole direction or inclination indicators.

181, Acoustics, subclasses 102+ for well logging wherein acoustical waves are transmitted or received for the purpose of identifying geologic or subsurface structure.

324, Electricity: Measuring and Testing, subclasses 366+ for well logging involving measuring electrical properties of earth formations in a well bore.

356, Optics: Measuring and Testing, appropriate subclasses for borehole study by measuring visible light.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 25+ for utilizing traveling stresses in the earth which are detected or generated by electric signal handling means wherein the elec-

tric signal represents communicated information or intelligence regarding a characteristic or location of discontinuities in a formation in a borehole.

374, Thermal Measuring and Testing, subclass 136 for measuring temperature at a single location in a well bore.

435, Chemistry: Molecular Biology and Microbiology, subclass 9 for a process for quantitative or qualitative testing for mineral deposits within a borehole formation by use of enzymes or microorganisms which thrive in the presence of such minerals.

436, Chemistry: Analytical and Immunological Testing, subclasses 25+ for a chemical analysis of a borehole formation.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 6 through 13 for an application of electrical computers and data processing to well logging wherein details of the computer or the data processing system combined with only a nominally recited sensor are recited.

152.03 During drilling:

This subclass is indented under subclass 152.02. Subject matter wherein the determination of the physical characteristic of the borehole is made by making a measurement of the physical condition of the borehole during the formation of or the enlargement of an elongated hole in the earth in situ by dislocating solid material of the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.19+, for determining a physical characteristic of a borehole, a casing, or a drill rigging by measuring a fluid flow during drilling.

152.43+, for making a determination of a physical characteristic of a borehole, a casing, or a drill rigging while drilling.

SEE OR SEARCH CLASS:

175, Boring or Penetrating the Earth, subclass 50 for a process or an apparatus for boring into the earth combined with a measuring or indicating feature and wherein more than a mere step of boring is claimed.

250, Radiant Energy, subclass 254 for an apparatus or a method for making a geological test using radiant energy wherein drilling is involved.

324, Electricity: Measuring and Testing, subclasses 324+ for a purely electrical measurement of a borehole fluid, subclass 356 for measuring an electrical property in a borehole while drilling, subclass 369 for well logging while drilling wherein an electrical property of an earth formation is measured, and subclass 694 for measuring resistance or conductance in order to determine water content.

356, Optics: Measuring and Testing, appropriate subclass for an apparatus or a method for testing drilling mud by measuring visible light.

152.04 By drill mud analysis:

This subclass is indented under subclass 152.03. Subject matter wherein mud is continuously circulated into and out of a borehole and a determination of the physical characteristic of the borehole is made by measuring a condition of, a constituent of, or a composition of the mud while the mud is being circulated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.09, for determining the amount of gas in mud, per se.

61.41+, for the analysis of mud, per se.

SEE OR SEARCH CLASS:

166, Wells, for well mud sampling per se.

250, Radiant Energy, subclasses 253+ for an apparatus or a method of testing drilling mud by measuring invisible radiant energy.

324, Electricity: Measuring and Testing, subclasses 324+ for a purely electrical measurement of a borehole fluid, subclass 356 for measuring an electrical property in a borehole while drilling, subclass 369 for well logging while drilling wherein an electrical property of an earth formation is measured, and subclass 694 for measuring resistance or conductance in order to determine water content.

356, Optics: Measuring and Testing, appropriate subclass for drilling mud analysis by measuring visible light.

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 6 through 13 for the application of an electrical computer or data processing for testing drilling mud wherein computer apparatus detail or data processing combined with only a nominally recited sensor are recited.

378, X-Ray or Gamma Ray Systems or Devices, appropriate subclass for testing drilling mud by measuring a property of an X-ray or a gamma ray.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 68.1 for a chemical apparatus for analyzing a drilling mud involving a chemical reaction.

435, Chemistry: Molecular Biology and Microbiology, subclass 9 for a process for quantitative or qualitative testing for mineral deposits by detecting microorganisms which thrive in the presence of such minerals.

436, Chemistry: Analytical and Immunological Testing, subclasses 25+ for chemical testing of fluids within a borehole, especially subclasses 29+ for petroleum oils or carbonaceous minerals and subclass 30 for testing drilling mud.

152.05 Density, porosity, or permeability:

This subclass is indented under subclass 152.02. Subject matter wherein the determination of the physical characteristic of the formation is made by measuring (a) a mass per unit volume of either a bulk formation of a borehole or of selected constituents of a formation of a borehole, (b) the ratio of a volume of interstices of either a bulk formation of a borehole or of selected constituents of a formation of a borehole to its volume, or (c) a quality of either a bulk formation of a borehole or of selected constituents of a formation of a borehole to be penetrated by a liquid or a gas passing through pores or openings therein.

SEE OR SEARCH THIS CLASS, SUBCLASS:

30.01, for measuring the density of a gas.

32+, for measuring the density of a solid or a liquid.

38, for measuring porosity or permeability by use of fluid pressure.

73+, for measuring the moisture content or absorption characteristic of a material.

152.41, for determination of permeability by the injection of fluid into a formation of a borehole.

SEE OR SEARCH CLASS:

378, X-Ray or Gamma Ray Systems or Devices, appropriate subclass for testing by measuring a property of X-rays or gamma rays and in particular for subclasses 54+ for determining density by measuring a property of X-rays or gamma rays.

152.06 Including oil, gas, or water saturation:

This subclass is indented under subclass 152.05. Subject matter wherein the determination of the characteristic of the borehole includes measuring a maximum impregnation by oil, gas, or water of a bulk formation of a borehole or of selected constituents of a formation of a borehole.

(1) Note. Fluid saturation of the formation zone may be measured directly by radiation, electrical, acoustical, or other means or by comparison tests in which fluid originally occurring in a formation is replaced by fluid having a known makeup.

SEE OR SEARCH THIS CLASS, SUBCLASS:

38, for measuring porosity or permeability by use of fluid pressure.

73+, for measuring the moisture content or absorption characteristic of a material.

152.08+, for determination of a formation logging by measuring oil, gas, or water saturation.

152.41, for determination of saturation by the injection of fluid into a formation of a borehole.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 324+ for a purely electrical measurement of a borehole fluid, subclass 356 for measuring an electrical

property in a borehole while drilling, and subclass 694 for measuring resistance or conductance in order to determine water content.

152.07 By a core sample analysis:
This subclass is indented under subclass 152.05. Subject matter including a sample in the form of an undisturbed portion removed from the formation and wherein the determination of the physical characteristic of the borehole is made by analysis of the portion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152.09, for formation logging by measuring an oil, gas, or water saturation of a core sample.
152.11, for formation logging by measuring a property of a core sample.
864.44+, for sampling, per se, by use of a corer.
866, for the testing of solid material, per se.

SEE OR SEARCH CLASS:
175, Boring or Penetrating the Earth, subclass 58 for a process of obtaining a core sample from a borehole formation and subclass 403+ and the notes there noted for a bit for cutting an earth core.
324, Electricity: Measuring and Testing, subclasses 376+ for a purely electrical measurement of a property of a subsurface core sample.

152.08 Oil, gas, or water saturation:
This subclass is indented under subclass 152.02. Subject matter wherein the determination of the physical characteristic of the borehole is made by measuring the maximum impregnation by gas, water, or oil of a bulk formation of a borehole or of selected constituents of a formation of a borehole.

(1) Note. Fluid saturation of the formation zone may be measured directly by radiation, electrical, acoustical, or other means or by comparison tests in which fluid originally occurring in a formation is replaced by fluid having a known makeup.

SEE OR SEARCH THIS CLASS, SUBCLASS:
38, for measuring porosity or permeability by use of fluid pressure.
73+, for measuring a moisture content or absorption characteristic of a material.
152.06, for a borehole formation logging by density, porosity, and permeability measuring and the measurement of oil, gas, or water saturation.
152.41, for a determination of a borehole physical characteristic by measuring saturation by the injection of fluid into a formation of a borehole.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 324+ for a purely electrical measurement of a borehole fluid, subclass 356 for measuring an electrical property in a borehole while drilling, and subclass 694 for measuring resistance or conductance in order to determine water content.

152.09 By a core sample analysis:
This subclass is indented under subclass 152.08. Subject matter including a sample in the form of an undisturbed portion removed from the formation and wherein the determination of the physical characteristic of the borehole is made by analyzing the portion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152.07, for formation logging by determining the density, the porosity, or the permeability of a core sample.
152.11, for formation logging by measuring a property of a core sample, per se.
864.44+, for sampling, per se, by use of a corer.
866, for the testing of solid material, per se.

SEE OR SEARCH CLASS:
175, Boring or Penetrating the Earth, subclass 58 for a process of obtaining a core sample from a borehole formation and subclasses 403+ and the notes there noted for a bit for cutting an earth core.

324, Electricity: Measuring and Testing, subclasses 376+ for a purely electrical measurement of a property of a subsurface core sample.

152.11 By a core sample analysis:
This subclass is indented under subclass 152.02. Subject matter including a sample in the form of an undisturbed portion removed from the formation and wherein the determination of the physical characteristic of the borehole is made by analysis of the portion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152.07, for formation logging by determining the density, the porosity, or the permeability of a core sample.
152.09, for formation logging by measuring a gas, a water, or an oil saturation of a core sample.
864.44+, for obtaining a core sample, per se.
866, for the testing of solid material, per se.

SEE OR SEARCH CLASS:
175, Boring or Penetrating the Earth, subclass 58 for a process of obtaining a core sample from a borehole formation and subclasses 403+ and the notes there noted for a bit for cutting an earth core.
324, Electricity: Measuring and Testing, subclasses 376+ for a purely electrical measurement of a property of a subsurface core sample.

152.12 Thermal:
This subclass is indented under subclass 152.02. Subject matter wherein the determination of the physical characteristic of the borehole is made by (a) measuring temperature at plural positions within the borehole or (b) measuring temperature related parameters at plural positions within the borehole.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclasses 10+ for temperature gradient measuring, per se; subclasses 29+ for heat flux measuring, per se; subclasses 45+ for thermal testing of a nonthermal property, per se; and subclass 136 for temperature measuring in a well bore wherein no more than one temperature measurement in a well bore is made and no other parameter of the strata or the well bore is measured.

152.13 With heating or cooling:
This subclass is indented under subclass 152.12. Subject matter including means to alter a temperature and wherein (a) the temperature altering means changes a temperature of the apparatus for making the determination of the physical characteristic of the formation or (b) the apparatus for making the determination of the physical characteristic of the formation within the borehole alters the temperature of the borehole.

152.14 With radioactivity measuring:
This subclass is indented under subclass 152.02. Subject matter including plural types of tests and wherein one of the tests makes a determination of a physical characteristic of the borehole, the casing, or the drill rigging by measuring naturally occurring radiation or radiation produced either (a) from a radiation source or (b) as a result of bombardment of elements of the formation by radiation of a different type.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 256+ for a well testing apparatus and method measuring invisible light, subclass 257 for a well testing apparatus and method measuring invisible light and combined with detecting the location of a casing collar, and in particular, subclasses 260 and 269.1+ for a well testing device utilizing detection of radioactivity and not combined with a test other than one measuring invisible light.
378, X-Ray or Gamma Ray Systems or Devices, appropriate subclass for the application of an X-ray or gamma ray system, per se, to testing.

152.15 With vibration measuring:
This subclass is indented under subclass 152.14. Subject matter wherein one of the tests makes a determination of a physical characteristic of the borehole, the casing or the drill rigging by measuring the effect of the borehole,

the casing, or the drill rigging on induced, reflected, or transmitted vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.16, for a formation logging apparatus including plural types of tests, one of which includes measuring vibration.

152.32, for determining a rate of fluid flow within a borehole by measuring the effect of the rate of fluid flow on vibration.

152.47, for making a downhole measurement of a characteristic of a borehole, a casing or a drill rigging by measuring vibration during drilling.

152.57, for determining a condition of a cementing in a borehole, per se, by measuring vibration.

152.58, for determining a physical condition of a borehole, a casing, or a drill rigging by making a measurement of vibration by an instrument located within a borehole.

570+, for measuring and testing, per se, by use of vibration.

SEE OR SEARCH CLASS:

181, Acoustics, subclasses 102+ for acoustic well logging.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 25+ for the communication of information or intelligence in the form of acoustic waves traveling through earth and detected by electric signal handling means passing through a well bore and providing information pertaining to a characteristic or a location of discontinuities within the earth, subclasses 81+ for the communication of information or intelligence traveling through earth in a well bore in the form of acoustic waves traveling in a medium in the well bore different from the surrounding earth and providing information pertaining to a characteristic or a location of discontinuities within the earth, and subclasses 86+ for the communication of information or intelligence in the form of acoustic waves traveling through earth detected by electric signal handling means passing through a well bore and providing information pertaining to a characteristic of the borehole or a location of discontinuities within the earth for electroacoustic borehole testing and wherein the intelligence pertains to the walls of the borehole and is obtained from a device which travels through the passageway and emits acoustic waves into a medium contained within the borehole (e.g., water, air, etc.) which are reflected from the walls back to the device and are detected.

152.16 With vibration measuring:

This subclass is indented under subclass 152.02. Subject matter including plural types of tests and wherein one of the tests makes a determination of a physical characteristic of the borehole, the casing, or the drill rigging by measuring an effect of the borehole, the casing, or the drill rigging on induced, reflected, or transmitted vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.15, for determining a formation logging by plural tests including measurements of radiation and vibration.

152.32, for determining a rate of fluid flow within a borehole by measuring the effect of the rate of fluid flow on vibration.

152.47, for making a downhole measurement of a characteristic of a borehole, a casing, or a drill rigging by measuring vibration during drilling.

152.57, for determining a condition of a cementing in a borehole, per se, by measuring vibration.

152.58, for determining a physical condition of a borehole, a casing, or a drill rigging by making a measurement of vibration by an instrument located within the borehole.

570+, for measuring and testing, per se, by use of vibration.

SEE OR SEARCH CLASS:

181, Acoustics, subclasses 102+ for acoustic well logging.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 25+ for the communication of information or intelligence in the form of acoustic waves traveling through earth and detected by electric signal handling means passing through a well bore and providing information pertaining to a characteristic or a location of discontinuities within the earth, subclasses 81+ for the communication of information or intelligence in a well bore in the form of acoustic waves traveling in a medium in the well bore different from the surrounding earth and providing information pertaining to a characteristic or a location of discontinuities within the earth, and subclasses 86+ for the communication of information or intelligence in the form of acoustic waves traveling through earth detected by electric signal handling means passing through a well bore and providing information pertaining to a characteristic of the well bore or a location of discontinuities within the earth for electroacoustic borehole testing and wherein the intelligence pertains to the walls of the borehole and is obtained from a device which travels through the passageway and emits acoustic waves into a medium contained within the borehole (e.g., water, air, etc.) which are reflected from the walls back to the device and are detected.

152.17 With detail of a borehole wall engaging means:

This subclass is indented under subclass 152.02. Subject matter including a structure engaging a wall of the borehole either for positioning or for maintaining the positioning of the apparatus while the test is being performed and wherein significance is attributed to the structure engaging the wall.

SEE OR SEARCH CLASS:

166, Wells, subclass 241.5 for wall engaging means for well logging devices wherein more well structure is recited than is necessary for perfecting the test.

250, Radiant Energy, subclass 286 for borehole wall engaging means for a well testing apparatus and method.

152.18 Fluid flow measuring or fluid analysis:

This subclass is indented under subclass 152.01. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by either (a) detecting the movement of or the presence of a fluid which has traveled either (1) from the formation into the borehole, (2) from the borehole into the formation, (3) from the outside of the borehole into the borehole, or (d) from inside the borehole to the outside of the borehole; (b) measuring a rate, a direction, or a magnitude of fluid flow either (1) from the formation into the borehole, (2) from the borehole into the formation, (3) from the outside of the borehole into the borehole, or (4) from inside the borehole to the outside of the borehole, or (c) detecting or measuring the presence of or an amount of a constituent of a fluid within the borehole, the ratio of one constituent of the fluid to another constituent of the fluid or the effect of a constituent of the fluid.

(1) Note. Production indices are included here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.1+, for measuring the gaseous content of a liquid.

53.01+, for liquid analysis, per se.

170.01+, for fluid flow direction determination not in a borehole or in a drilling study.

861+, for volume or rate of fluid flow determination, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 112+ for a mechanical alarm, per se, giving a humanly perceptible signal in response to a predetermined fluid flow and subclasses 264 for a mechanical indicator structure, per se, giving a humanly perceptible signal in response to the presence or absence of fluid flow.

166, Wells, appropriate subclass for the combination of a well structure and fluid flow measuring wherein more well structure is recited than that

which is necessary for perfecting the measurement.

175, Boring or Penetrating the Earth, subclass 48 for measurement of or an indication of drilling fluid flow combined with more than a mere boring step or detail of a boring apparatus.

250, Radiant Energy, subclasses 253+ for the testing of well fluid by measuring a property of invisible light and subclass 301 for a method of determining oil presence, contamination, or concentration.

324, Electricity: Measuring and Testing, subclass 306 for measuring a rate of fluid flow by subjecting the fluid to magnetic resonance.

340, Communications: Electrical, subclasses 603+ for an electrical indicator or alarm providing a humanly perceptible signal in response to a predetermined fluid flow and providing no quantitative measurement.

356, Optics: Measuring and Testing, appropriate subclass for testing fluid by measuring a characteristic of visible light.

378, X-Ray or Gamma Ray Systems or Devices, appropriate subclass for fluid analysis by measuring a property of X-rays or gamma rays.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 68.1+ for a chemical apparatus for analyzing a liquid.

435, Chemistry: Molecular Biology and Microbiology, subclass 9 for the detection of the presence of fluids within a borehole by sensing the presence of microorganisms in the vicinity of the fluid.

436, Chemistry: Analytical and Immunological Testing, subclasses 25+ for chemical testing of fluids within a borehole, especially subclasses 29+ for petroleum oils or carbonaceous minerals, and subclass 30 for testing drilling mud.

152.19 During drilling:

This subclass is indented under subclass 152.18. Subject matter wherein the determination of the characteristic of the borehole, the casing, or the drill rigging is made during the process of making or enlarging an elongated hole in the earth in situ by dislocating a solid material in the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.03+, for formation logging during a drilling operation.

152.21, for determining a physical characteristic of a borehole, a casing, or a drill rigging by measuring a fluid flow during drilling.

152.43+, for determining a physical characteristic of a borehole, a casing, or a drill rigging during a drilling operation.

SEE OR SEARCH CLASS:

175, Boring or Penetrating the Earth, subclasses 40+ for a process or an apparatus for boring into the earth combined with a measuring or indicating feature and wherein more than a mere step of boring is claimed.

250, Radiant Energy, subclass 254 for an apparatus or a method for making a geological test using radiant energy wherein drilling is involved.

324, Electricity: Measuring and Testing, subclasses 324+ for a purely electrical measurement of a borehole fluid, subclass 356 for measuring an electrical property in a borehole while drilling, subclass 369 for well logging while drilling wherein an electrical property of an earth formation is measured, and subclass 694 for measuring resistance or conductance in order to determine water content.

356, Optics: Measuring and Testing, appropriate subclass for an apparatus or a method for testing drilling mud by measuring visible light.

436, Chemistry: Analytical and Immunological Testing, subclasses 25+ for a chemical analyzer for conducting a test within the earth's crust.

152.21 Rate of fluid flow:

This subclass is indented under subclass 152.19. Subject matter wherein the determination of the characteristic of the borehole, the casing, or the drill rigging is made by measur-

ing a speed of flow, a volume rate of fluid flow, or a mass rate of fluid flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.07, and 54.13, for determining viscosity by measuring a rate of fluid flow.

61.64, for measuring settling or filtering ability of a constituent of a liquid mixture by measuring a rate of fluid flow.

61.73, for measuring solid components by measuring a rate of fluid flow.

152.29, for measuring a rate of flow of a fluid in a borehole.

170.07, and 170.11+, for fluid flow direction determination not in a borehole or in a drilling study.

861+, for measuring a rate of fluid flow, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 112+ for a mechanical alarm, per se, producing a humanly perceptible signal in response to a rate of fluid flow within a borehole, a casing, or a drill rigging; and subclasses 264+ for a mechanical indicator structure, per se, providing a humanly perceptible signal responsive to a rate of fluid flow within a borehole, a casing, or a drill rigging.

175, Boring or Penetrating the Earth, subclass 48 for measurement or indication of drilling fluid rate of flow combined with more than a mere boring step or details of a boring apparatus.

250, Radiant Energy, subclasses 253+ for determining rate of a fluid flow within a borehole, a casing, or a drill rigging by measuring invisible light.

324, Electricity: Measuring and Testing, subclass 306 for determining a rate of flow of a volume of fluid within a borehole, a casing, or a drill rigging by subjecting the fluid to magnetic resonance, and subclasses 324+ for a determination of a rate of fluid flow within a borehole by making a purely electrical measurement.

340, Communications: Electrical, subclasses 608+ for an electrical indicator providing a humanly perceptible signal in response to a predetermined rate of flow of a fluid flowing within a borehole, a casing, or a drill rigging and not providing a quantitative measurement.

356, Optics: Measuring and Testing, appropriate subclass for determining a rate of flow of a fluid in a borehole, a casing, or a drill rigging by measuring visible light.

378, X-Ray or Gamma Ray Systems or Devices, appropriate subclass for determining the flow rate of a fluid in a borehole, a casing, or a drill rigging by measuring a property of an X-ray or a gamma ray.

152.22 Pressure:

This subclass is indented under subclass 152.19. Subject matter wherein the determination of the characteristic of the borehole, the casing, or the drill rigging is made by measuring pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37, for performing a test by use of fluid pressure.

152.27, for a determination of fluid flow by measuring pressure combined with sampling.

152.51, for a determination of a physical condition of a borehole, a casing, or a drill rigging by measuring pressure.

700, for fluid pressure measuring, per se.

760+, for stress or strain measuring or testing by stress or strain.

862+, for force measuring, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 112+ for a pressure responsive mechanical alarm, per se, providing a humanly perceptible signal in response to a predetermined fluid flow, and subclasses 266+ for a pressure responsive mechanical indicator which provides a humanly perceptible signal in response to the presence or the absence of fluid flow.

166, Wells, subclasses 64, 66, and 113 for detail of a well combined with determination of fluid flow by measuring or detecting pressure wherein more

structure than is necessary to perfect the testing is recited.

175, Boring or Penetrating the Earth, subclasses 48+ for a process or a means of determining fluid flow by measuring or detecting pressure combined with more than a nominal recitation of an earth boring process or apparatus.

340, Communications: Electrical, subclass 611 for an electrical indicator or an electrical alarm which provides a humanly perceptible signal in response to a predetermined fluid flow via monitoring pressure and subclass 626 for an electrical indicator or alarm which provides a humanly perceptible signal in response to the detection of a predetermined pressure.

152.23 With sampling:

This subclass is indented under subclass 152.18. Subject matter including means for obtaining a predetermined portion of the fluid to be tested.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23.41, for sampling combined with a gas analyzer.

61.55, for sampling combined with an apparatus for measuring a content or an effect of a constituent of a liquid mixture.

64.56, for a sampling combined with a liquid analyzer.

152.07, for formation logging by measuring density, porosity, or permeability of a core sample.

152.09, for formation logging by measuring oil, gas, or water saturation of a core sample.

152.11, for formation logging, per se, by a core sample analysis.

863+, for sampling, per se, of mud not in a well and of gas sampling from the soil by means sunk into the ground to a point not far from the surface of the ground and especially subclass 864.52 for sampling devices comprising a receptacle with suction means.

SEE OR SEARCH CLASS:

166, Wells, appropriate subclass, especially subclasses 107+, 142+, and 162+ for the combination of a well structure and fluid flow measuring wherein more well structure is recited than that which is necessary for perfecting the measurement or subclass 264 for sampling well fluids (including gas), per se.

175, Boring or Penetrating the Earth, subclass 48 for measuring or indicating drilling fluid flow combined with more than a mere boring step or detail of a boring apparatus and subclasses 232+, 244+, and 308+ for means to receive and retain a sample from an earth formation, including solid earth, in an earth boring tool.

152.24 From formation wall:

This subclass is indented under subclass 152.23. Subject matter wherein the sample is taken of fluid flowing from the formation into the borehole.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.02, for a borehole study by formation logging.

152.25 With a filter:

This subclass is indented under subclass 152.24. Subject matter including a barrier having interstices, pores, or micropores through which at least part of the fluid flows but which traps some components of the fluid, usually particles.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61.72, for making a determination of solid components of a liquid by separation of the solid from the liquid and subsequent measuring.

863.23, for sampling, per se, combined with using a filter to separate constituents of a sample.

SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, appropriate subclass for a filter, per se.

152.26 With sealing detail:

This subclass is indented under subclass 152.24. Subject matter including means between a sample induction means and the formation wall which prevents the contamination of formation samples with borehole fluids and wherein significance is attributed to the contamination prevention means.

SEE OR SEARCH CLASS:

166, Wells, subclass 100 for a lateral probe or port sealed against a well wall.

277, Joint Packing, appropriate subclass for seals, per se.

152.27 Pressure:

This subclass is indented under subclass 152.23. Subject matter wherein the determination of the characteristic of the borehole is made by measuring pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37, for performing a test by use of fluid pressure.

152.22, for determination of fluid flow during drilling by measuring pressure.

152.51, for a determination of a physical condition of a borehole, a casing, or a drill rigging by measuring pressure.

700, for fluid pressure measuring, per se.

760+, for stress or strain measuring or testing by stress or strain.

862+, for force measuring, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 112+ for a pressure responsive mechanical alarm, per se, providing a humanly perceptible signal in response to a predetermined fluid flow, and subclass 266 for a pressure responsive mechanical indicator which provides a humanly perceptible signal in response to the presence or the absence of fluid flow, in a borehole, a casing, or a drill rigging.

166, Wells, subclasses 64, 66, and 113 for detail of a well combined with determination of fluid flow by measuring or detecting pressure in a borehole wherein more well detail than is necessary to perfect the testing is recited.

175, Boring or Penetrating the Earth, subclasses 40+ for a process or means of determining fluid flow by measuring or detecting pressure combined with more than a nominal recitation of an earth boring process or apparatus.

340, Communications: Electrical, subclass 611 for an electrical indicator or an electrical alarm which provides a humanly perceptible signal in response to a predetermined fluid flow via monitoring pressure in a borehole, a casing, or a drill rigging, and subclass 626 for an electrical indicator or alarm, per se, which provides a humanly perceptible signal in response to the detection of a predetermined pressure in a borehole, a casing, or a drill rigging.

152.28 Downhole:

This subclass is indented under subclass 152.23. Subject matter wherein the apparatus for the determination of a characteristic of the borehole, the casing, or the drill rigging is located within the borehole while the measurement is being made.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.02+, for a downhole formation logging instrument.

152.18, for a downhole fluid flow instrument or a downhole fluid analysis instrument not combined with sampling means.

152.46+, for making a nonfluid flow downhole measurement in a borehole while drilling.

152.55, for making a downhole fluid test, per se, in a borehole.

152.29 Rate of fluid flow:

This subclass is indented under subclass 152.18. Subject matter wherein the determination of the characteristic of the borehole, the casing, or the drill rigging is made by measuring a speed of flow, a volume rate of flow, or a mass rate of flow of a fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.07, and 54.13, for determining viscosity by measuring the rate of fluid flow.

61.64, for measuring settling or filtering ability of a constituent of a liquid mixture by measuring the rate of fluid flow.

61.73, for making a determination of solid components of a liquid by measuring the rate of fluid flow.

152.21, for measuring the rate of flow of a fluid in a borehole while drilling.

170.07, and 170.11+, for fluid flow direction determination not in a borehole or in a drilling study.

861+, for measuring a rate of fluid flow measuring, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 112+ for a mechanical alarm producing a humanly perceptible signal in response to a predetermined rate of fluid flow in a borehole, a casing, or a drill rigging and combined with no measuring means, and subclasses 264+ for a mechanical indicator structure, per se, of the presence or the absence of fluid flow in a borehole, a casing, or a drill rigging.

175, Boring or Penetrating the Earth, subclass 48 for measurement of or indication of rate of flow of drilling fluid combined with more than a mere boring step or details of a boring apparatus.

340, Communications: Electrical, subclasses 608+ for an electrical indicator or alarm providing a humanly perceptible signal in response to a predetermined rate of fluid flow in a borehole, a casing, or a drill rigging and not providing a quantitative measurement.

152.31 Plural diverse measuring:

This subclass is indented under subclass 152.29. Subject matter combined with an apparatus or a process for making a test in addition to a test for the rate of fluid flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:

198+, for fluid rate of flow measuring, per se, combined with other measuring not used in a well bore or drilling study.

152.32 Vibration:

This subclass is indented under subclass 152.29. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring the effect of the rate of fluid flow on vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.15, for determining a formation logging by plural types of tests including measuring radiation and vibration.

152.16, for determining a formation logging by plural types of tests including measuring vibration.

152.47, for making a downhole measurement of a characteristic of a borehole, a casing, or a drill rigging by measuring vibration during drilling.

152.57, for a cementing or casing test within a borehole using vibration.

152.58, for determining a physical condition of a borehole, a casing, or a drill rigging by making a measurement of vibration by an instrument located within the borehole.

570+, for measuring and testing, per se, by use of vibration.

861.18+, for measuring a volume or rate of fluid flow, per se, by measuring vibration.

SEE OR SEARCH CLASS:

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 25+ for the communication of information or intelligence in the form of acoustic waves traveling through earth and detected by electric signal handling means passing through a well bore and providing information pertaining to a characteristic or a location of discontinuities within the earth, subclasses 81+ for the communication of information or intelligence traveling in a well bore in the form of acoustic waves traveling in a medium in the well bore different from the surrounding earth and providing information pertaining to a characteristic or a location of discontinuities within the earth, and subclasses 86+ for the

communication of information or intelligence in the form of acoustic waves traveling through earth detected by electric signal handling means passing through a well bore and providing information pertaining to a characteristic of a well bore or a location of discontinuities within the earth for electroacoustic borehole testing and wherein the intelligence pertains to the walls of the borehole and is obtained from a device which travels through the passageway and emits acoustic waves into a medium contained within the borehole (e.g., water, air, etc.) which are reflected from the walls back to the device and are detected.

152.33 Thermal:
This subclass is indented under subclass 152.29. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring an effect of the rate of flow fluid upon temperature.

SEE OR SEARCH THIS CLASS, SUBCLASS:
170.12, for thermal measurement of fluid flow direction or of fluid flow velocity.
202.5, for thermal sensing of a fluid flow in a proportional flow meter.
204.11+, for a thermal measurement of fluid flow, per se.
861.95, for fluid flow determination by measuring transit time of a thermal tracer or tag.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, appropriate subclass for measuring and testing the thermal effect, per se, of a fluid, particularly subclasses 29+ for heat flow measurement and subclasses 43+ for heat coefficient measuring.

152.34 Rotary:
This subclass is indented under subclass 152.29. Subject matter which includes an element rotatable about an axis due to the flow of the fluid and the determination of the characteristic of the borehole, the casing, or the drill rigging is made by measuring the rate of rotation of the rotary element.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.33, for a device wherein the rotation rate of an element rotated by a flow of a fluid is used to measure swirl rate of a fluid flow.
861.77+, for a meter for measuring a rate of fluid flow including an element rotated by a flow of a fluid and having an electrical circuit and wherein specific details of the circuit are included.
861.79+, for measuring rate of fluid flow, per se, by use of an element rotated by a flow of a fluid whose rate is being measured.

152.35 Magnetic:
This subclass is indented under subclass 152.34. Subject matter wherein motion of the rotary element is detected by sensing magnetic properties or wherein the apparatus includes means having magnetic properties.

152.36 Packer or deflector detail:
This subclass is indented under subclass 152.29. Subject matter including either (a) a means for constraining a stream of the fluid flow to or from a certain stratum and wherein significance is attributed to the constraining means or (b) means for constraining the fluid to flow within a certain flow path within the borehole and wherein significance is attributed to the constraining means.

SEE OR SEARCH CLASS:
166, Wells, subclasses 118+, 142+, and 179 for a packer for fluid handling in a well.

152.37 Steady state fluid flow interruption:
This subclass is indented under subclass 152.18. Subject matter wherein the fluid usually flows at a constant rate and the determination of the characteristic of the borehole, the casing, or the drill rigging is made by interrupting the constant rate of flow of the fluid.

SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclasses 40+ for flow restrictors, per se.

166, Wells, subclass 91.1 for flow restrictors in an aboveground apparatus for a well and subclass 373 for a process of operating a valve, closure, or changeable restrictor in a well.

152.38 Drawdown or shutin test:
This subclass is indented under subclass 152.37. Subject matter wherein a determination of the characteristic of the borehole, the casing, or the drill rigging is made by decreasing a liquid level or completely stopping the flow of the fluid as by the closing of a valve.

SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclasses 40+ for flow restrictors, per se.
166, Wells, subclass 92.1 for well caps or heads, subclasses 95.1 and 97.1 for valves in the well head, and subclasses 316+ and the notes thereunder for valves or restrictors, per se, for a well or well apparatus.
251, Valves and Valve Actuation, appropriate subclass for a valve, per se.

152.39 Fluid injection into formation:
This subclass is indented under subclass 152.18. Subject matter wherein the determination of the characteristic of the borehole, the casing, or the drill rigging is made by forcing the fluid into the formation.

SEE OR SEARCH CLASS:
166, Wells, appropriate subclass for fluid injection into a formation of a well and especially subclasses 252.1+ for well testing by the injection of fluids into the earth in order to produce other fluids.
405, Hydraulic and Earth Engineering, subclasses 263+ for injection of chemicals into the earth.

152.41 Determining permeability or saturation:
This subclass is indented under subclass 152.39. Subject matter wherein the determination of the characteristic of the borehole, the casing, or the drill rigging is made by measuring either (a) a quality of either a bulk formation of a borehole or of selected constituents of a formation of a borehole to be penetrated by a liquid or a gas passing through pores or openings therein or (b) the maximum impregnation by gas, water, or oil of a bulk formation of a borehole or of selected constituents of a formation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
38, for measuring permeability by use of fluid pressure.
73+, for measuring the moisture content or absorption characteristic of a material.
152.05, for determination of a formation logging by measuring permeability.
152.06, for determination of a characteristic of a borehole by formation logging involving measuring permeability and oil, gas, or water saturation.
152.08, for determination of a formation logging by measuring oil, gas, or water saturation.

152.42 Determining relative proportion of fluid constituent:
This subclass is indented under subclass 152.18. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring the amount of a constituent of a fluid within the borehole or a ratio of one constituent of a fluid to another constituent of the fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19.09, for measuring the gas content of drilling mud.
61.43, for liquid analysis for a liquid constituent of a liquid mixture.
863.21+, for the separation of constituents of a liquid sample not in a well.

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, appropriate subclass for the separation of liquid constituents of a mixture.

152.43 During drilling:
This subclass is indented under subclass 152.01. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made during the formation of or the enlargement of an elongated hole in the earth in situ by dislocating a solid material of the earth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

7, for wear testing, per se.

104, for surface testing, per se.

152.03+, for formation logging during a drilling operation.

152.19+, for a determination of fluid flow during drilling.

SEE OR SEARCH CLASS:

175, Boring or Penetrating the Earth, subclass 39 for bit wear signal generating, subclasses 40+ for a process or an apparatus for boring into the earth combined with a measuring or an indicating feature wherein more than a mere step of boring is claimed.

250, Radiant Energy, subclass 254 for an apparatus or a method for making a geological test using radiant energy wherein drilling is involved.

324, Electricity: Measuring and Testing, subclasses 324+ for a purely electrical measurement of a borehole fluid, subclass 356 for measuring an electrical property in a borehole while drilling, subclass 369 for well logging while drilling wherein an electrical property of an earth formation is measured, and subclass 694 for measuring resistance or conductance in order to determine water content.

356, Optics: Measuring and Testing, appropriate subclass for an apparatus or a method for testing drilling mud by measuring visible light.

152.44 Drill depth rate:

This subclass is indented under subclass 152.43. Subject matter wherein the drill rigging includes a drill and the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by either (a) measuring the rate at which the drill cuts through the formation, or (b) periodically measuring the depth of the drill which is utilized to compute the rate at which the drill cuts through the formation.

(1) Note. The identity of the formation can be readily ascertained from the relative ease with which the drill penetrates the formation.

(2) Note. The measurement of the drill depth rate is usually recorded by automatic means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.03, for formation logging while drilling.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 700+ for distance measuring. Note particularly indented subclasses 713+ for sounding-type measuring devices.

175, Boring or Penetrating the Earth, subclass 39 for measuring bit wear and subclass 50 for indicating testing or measuring a condition of a formation in the earth's surface while drilling when more than a mere step in boring is recited or drill structure is recited.

346, Recorders, appropriate subclasses for a recorder for recording the operation of machines and in particular subclasses 33+ for a recorder combined with external recorder operating means including a well logging device and subclasses 112+ for a graph-type recorder.

368, Horology: Time Measuring Systems or Devices, subclasses 89+ for time interval measuring, per se.

152.45 Electronic processing or electronic recording:

This subclass is indented under subclass 152.44. Subject matter including either a device which works by the emission, the behavior, or the effect of electrons and wherein the device either (a) operates on data pertaining to the determination of the characteristic of the borehole, the casing, or the drill rigging, or (b) makes a permanent record of the determination of the characteristic of the borehole, the casing, or the drill rigging.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.53, for an apparatus for making a determination of a characteristic of a borehole, a casing, or a drill rigging by measuring pressure combined with means for recording the determination being made.

152.62, for an apparatus for making a determination of a characteristic of a pump especially adapted for use of a borehole or a drill rigging and including a device for making a record of the determination of the characteristic of the pump.

SEE OR SEARCH CLASS:

346, Recorders, appropriate subclass for a recorder for recording the operation of machines and particularly subclasses 33+ for a recorder combined with external recorder operating means including a well logging means and subclasses 112+ for a graph-type recorder.

360, Dynamic Magnetic Information Storage or Retrieval, appropriate subclass for magnetic storage and retrieval of arbitrarily variable information which is retained in a storage medium by variation of a physical characteristic thereof and wherein relative movement between a storage element and a source of information, a transducer, or a receiver is required.

365, Static Information Storage and Retrieval, appropriate subclass for a recording apparatus not requiring relative movement between a storage element and a source of information, a transducer, or a receiver.

369, Dynamic Information Storage or Retrieval, appropriate subclass for a process of or an apparatus for the storage and retrieval of arbitrarily variable information which is retained in a storage medium by variation of a physical characteristic thereof and wherein relative movement between a storage element and a source of information, a transducer, or a receiver is required.

152.46 Downhole measurement:

This subclass is indented under subclass 152.43. Subject matter wherein the apparatus for the determination of the physical characteristic of the borehole, the casing, or the drill rigging is located within the borehole while the measurement is being made.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.28, for downhole fluid flow measuring combined with sampling.

152.54+, for downhole measuring in a borehole while no drilling is taking place.

SEE OR SEARCH CLASS:

175, Boring or Penetrating the Earth, subclass 45 for a downhole measuring when more than a nominal recitation of a drilling process or structure is recited.

152.47 Vibration:

This subclass is indented under subclass 152.46. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

570+, for measuring and testing, per se, by use of vibration.

152.15, for determining a formation logging by plural tests including measurements of radiation and vibration.

152.16, for determining a formation logging by plural tests including a measurement of vibration.

152.32, for determining a rate of fluid flow within a borehole by measuring the effect of the rate of fluid flow on vibration.

152.57, for a vibration test of cement or a casing within a borehole.

152.58, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring vibration by a device located inside a borehole.

SEE OR SEARCH CLASS:

181, Acoustics, subclasses 119+ for a seismic wave generation means coupled to a fluid.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 25+ for the communication of information or intelligence in the form of acoustic waves traveling through earth and detected by electric signal handling means passing through a

well bore and providing information pertaining to a characteristic or a location of discontinuities within the earth, subclasses 81+ for the communication of information or intelligence in the well bore in the form of acoustic waves traveling in a medium in the well bore different from the surrounding earth and providing information pertaining to a characteristic of the well bore or a location of discontinuities within the earth, and subclasses 86+ for the communication of information or intelligence in the form of acoustic waves traveling through earth and detected by electric signal handling means (a) passing through a well bore and (b) providing information pertaining to a characteristic of a borehole or a location of discontinuities within the earth for electroacoustic borehole testing and wherein the intelligence pertains to the walls of the borehole and is obtained from a device which travels through the passageway and emits acoustic waves into a medium contained within the borehole (e.g., water, air, etc.) which are reflected from the walls back to the device and are detected.

152.48 Force:

This subclass is indented under subclass 152.46. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring an agency or an influence that if applied to a free body results chiefly in acceleration of the body and sometimes in elastic deformation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.49, for a measurement of force to determine a physical condition of a borehole, a casing, or a drill rigging while drilling.

152.59, for the downhole measurement of force to determine a physical condition of a borehole, a casing, or a drill rigging.

760+, for stress or strain measuring or testing by stress or strain.

862+, for force measuring, per se.

152.49 Force:

This subclass is indented under subclass 152.43. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring an agency or an influence that if applied to a free body results chiefly in acceleration of the body and sometimes in elastic deformation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.48, for a downhole measurement of force to determine a physical characteristic of a borehole, a casing, or a drill rigging during drilling.

152.59, for the downhole measurement of force to determine a physical characteristic of a borehole, a casing, or a drill rigging.

760+, for stress or strain measuring or testing by stress or strain.

862+, for force measuring, per se.

152.51 Pressure measurement:

This subclass is indented under subclass 152.01. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37, for performing a test by use of fluid pressure.

152.22, for determination of fluid flow during drilling by measuring pressure.

152.27, for a determination of fluid flow by measuring pressure combined with sampling.

152.55, for a downhole fluid test.

700+, for fluid pressure measuring, per se.

760+, for stress or strain measuring or testing by stress or strain.

862+, for force measuring, per se.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 112+ for a pressure responsive mechanical alarm, per se, providing a humanly perceptible signal in response to a predetermined fluid flow, and subclass 266 for a pressure

responsive mechanical indicator which provides a humanly perceptible signal in response to the presence or the absence of fluid flow.

166, Wells, subclasses 64, 66, and 113 for detail of a well combined with determining fluid flow by measuring or detecting pressure wherein more structure than is necessary to perfect the test is recited.

175, Boring or Penetrating the Earth, subclasses 40+ for a process or means of determining fluid flow by measuring or detecting pressure combined with more than a nominal recitation of an earth boring process or apparatus.

340, Communications: Electrical, subclass 611 for an electrical indicator or an electrical alarm which provides a humanly perceptible signal in response to a predetermined fluid flow via monitoring pressure and subclass 626 for an electrical indicator or alarm, per se, which provides a humanly perceptible signal in response to the detection of a predetermined pressure.

152.52 Plural diverse measurements:

This subclass is indented under subclass 152.51. Subject matter including a process or an apparatus for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a property other than a pressure.

152.53 With recorder:

This subclass is indented under subclass 152.51. Subject matter combined with a means for keeping a permanent record of the characteristic of the borehole, the casing, or the drill rigging.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.45, for an apparatus for making a determination of a characteristic of a borehole, a casing, or a drill rigging combined with an electronic recording means for making a permanent record of the determination.

152.62, for an apparatus for making a determination of a characteristic of a pump especially adapted for use in a borehole or a drill rigging and including means for making a record of the determination of the characteristic of the pump.

SEE OR SEARCH CLASS:

346, Recorders, appropriate subclasses for a recorder for recording the operation of machines, particularly subclasses 33+ for a recorder combined with external recorder operating means including well logging and subclasses 112+ for graph-type recorders.

360, Dynamic Magnetic Information Storage or Retrieval, for magnetic storage and retrieval of arbitrarily variable information which is retained in a storage medium by variation of a physical characteristic thereof and wherein relative movement between a storage element and a source of information, a transducer, or a receiver is required.

365, Static Information Storage and Retrieval, for a recording apparatus not requiring relative movement between a storage element and a source of information, a transducer, or a receiver.

369, Dynamic Information Storage or Retrieval, appropriate subclass for a process of or an apparatus for the storage and retrieval of arbitrarily variable information which is retained in a storage medium by variation of a physical characteristic thereof and wherein relative movement between a storage element and a source of information, a transducer, or a receiver is required.

152.54 Downhole test:

This subclass is indented under subclass 152.01. Subject matter wherein the apparatus for determination of the physical characteristic of the borehole, the casing, or the drill rigging is located within the borehole while the measurement is being made.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.28, for sampling and downhole fluid flow measuring in a borehole while not drilling.

152.46, for downhole measuring (a) involving no fluid flow measuring and (b) taking place while drilling is being done.

152.55 Fluid test:

This subclass is indented under subclass 152.54. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring a property of a liquid, a gas, or a suspension of a solid in a liquid or a gas.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19.01+, for measuring the gas content of a liquid or a solid, per se.

28.01, for measuring the solid content of a gas, per se.

73+, for measuring the moisture content of a material, per se.

152.28, for sampling and downhole fluid flow measuring in a borehole while drilling is not taking place.

290+, for measuring liquid level, per se.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclass 204 for testing magnetic fluid material, subclasses 425+ for measuring electrolytic properties of a fluid, and subclasses 600+ for measuring a property of a fluid material by measuring an impedance or an impedance- related quantity.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 68.1+ for fluid analysis involving a chemical reaction.

436, Chemistry: Analytical and Immunological Testing, subclasses 25+ for chemical testing of fluids within a borehole, especially subclasses 29+ for petroleum oils or carbonaceous minerals and subclass 30 for testing drilling mud.

152.56 Free point or stuck point:

This subclass is indented under subclass 152.54. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring or detecting the point or points at which a drill pipe, casing, or tubing is stuck in a borehole traversing an earth formation.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, appropriate subclass for a determination of positions in a well bore, per se, and subclasses 302 and 304+ for well bore configuration determining, per se.

166, Wells, subclass 255.1 for a comprehensive process wherein a determination of a position of unintentional motionlessness of a drill pipe, casing, or tubing within a borehole wherein more well detail than is necessary for perfecting the test is claimed.

340, Communications: Electrical, subclass 854.2 for well bore telemetry wherein a location of a stuck tool is recorded.

152.57 Casing or cementing:

This subclass is indented under subclass 152.54. Subject matter including (a) a pipe which lines all of or a portion of a wall of the borehole or (b) a cementing of a lining in the borehole and wherein the determination of the characteristic of the borehole is made by measuring a property of the lining or the cementing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.15, for a formation logging apparatus or process for determining a characteristic of the borehole by measuring the effect of cement within a borehole on vibration combined with measuring radioactivity.

152.16, for well logging including plural types of tests including making a determination of a characteristic of a casing by measuring an effect of the casing on vibration and not combined with radioactivity measuring.

SEE OR SEARCH CLASS:

166, Wells, subclass 253.1 for a comprehensive process relating to wells which includes indicating the location, the presence, or the absence of cement wherein more well detail is recited than that which is necessary to perfect the test.

250, Radiant Energy, subclass 257 for a well testing apparatus and method utilizing measurement of radioactivity combined with detection of a casing collar.

340, Communications: Electrical, subclass 854.5 for well bore telemetry wherein either downhole equipment or a transmission link is described to electrically conduct or process information signals which are transmitted through a casing of a borehole to a location above the borehole.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 35+ for the communication of information or intelligence in the form of acoustic waves traveling in the earth which are detected by means which travels through a borehole means generating an electric signal which represents the communicated information or intelligence and wherein the information or intelligence pertains to the borehole itself or to a lining of the borehole.

152.58 Using vibration:

This subclass is indented under subclass 152.54. Subject matter wherein the determination of the characteristic of the borehole, the casing, or the drill rigging is made by measuring the effect of the borehole casing or the drill rigging on vibration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.15, for determining a formation logging by plural tests including measurements of radioactivity and vibration.

152.16, for determining a formation logging by plural tests including a measurement of vibration and no measurement of radioactivity.

152.32, for determining a rate of fluid flow within a borehole by measuring the effect of the rate of fluid flow on vibration.

152.47, for making a downhole measurement of a characteristic of a borehole, a casing, or a drill rigging by measuring vibration during drilling.

152.57, for a downhole vibration test of cement or a casing within a borehole.

570+, for measuring and testing, per se, by use of vibration.

SEE OR SEARCH CLASS:

181, Acoustics, for acoustic exploration within a borehole.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 25+ for the communication of information or intelligence in the form of acoustic waves traveling through earth and detected by electric signal handling means passing through a well bore and providing information pertaining to a characteristic or a location of discontinuities within the earth, subclasses 81+ for the communication of information or intelligence in a well bore in the form of acoustic waves traveling in a medium in the well bore different from the surrounding earth and providing information pertaining to a characteristic of the well bore or a location of discontinuities within the earth, and subclasses 86+ for the communication of information or intelligence in the form of acoustic waves traveling through earth and detected by electric signal handling means (a) passing through a well bore and (b) providing information pertaining to a characteristic of a borehole or a location of discontinuities within the earth for electroacoustic borehole testing and wherein the intelligence pertains to the walls of the borehole and is obtained from a device which travels through the passageway and emits acoustic waves into a medium contained within the borehole (e.g., water, air, etc.) which are reflected from the walls back to the device and are detected.

152.59 By measurement of response due to force:

This subclass is indented under subclass 152.54. Subject matter wherein the determination of the physical characteristic of the borehole, the casing, or the drill rigging is made by measuring a response due to an agency or an influence that if applied to a free body results chiefly in acceleration of the body and sometimes in elastic deformation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.48, for a measurement of force to determine a physical condition of a borehole, a casing, or a drill rigging by use of an apparatus located within a borehole and during the time that drilling is taking place.

152.49, for a measurement of force to determine a physical condition of a borehole, a casing, or a drill rigging while drilling.

862+, for a force measuring apparatus, per se.

152.61 Pump test:

This subclass is indented under subclass 152.01. Subject matter comprising an apparatus or a method for determining a physical characteristic of a pump used (a) for circulating a fluid in a borehole or (b) for circulating a fluid in a drilling operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

168, for a process or an apparatus for making a determination of a characteristic of a pump.

SEE OR SEARCH CLASS:

166, Wells, subclass 54.1 for means separately pumping from plural sources within a well, subclasses 62, 68+, and 105+ for an eduction pump within a well, and subclass 101 for a pump for a well wherein the pump exerts an outward pressure.

417, Pumps, appropriate subclass for a pump inserted in a well, per se.

152.62 With recorder:

This subclass is indented under subclass 152.61. Subject matter combined with a means for keeping a permanent record of the determination of the physical characteristic of the borehole, the casing, or a drill rigging.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.45, for an apparatus for testing a borehole or drilling combined with means for making an electronic recording of a drill depth rate during drilling.

152.53, for an apparatus for testing a borehole or drilling by measuring pressure combined with means for making a record of the test.

SEE OR SEARCH CLASS:

346, Recorders, appropriate subclasses, for a recorder for recording the operation of machines, particularly subclasses 33+ for recorders combined with external recorder operating means including a well logging apparatus and subclasses 112+ for graph-type recorders.

360, Dynamic Magnetic Information Storage or Retrieval, for magnetic storage and retrieval of arbitrarily variable information which is retained in a storage medium by variation of a physical characteristic thereof and wherein relative movement between a storage element and a source of information, a transducer, or a receiver is required.

365, Static Information Storage and Retrieval, for a recording apparatus not requiring relative movement between a storage element and a source of information, a transducer, or a receiver.

369, Dynamic Information Storage or Retrieval, appropriate subclass for a process of or an apparatus for the storage and retrieval of arbitrarily variable information which is retained in a storage medium by variation of a physical characteristic thereof and wherein relative movement between a storage element and a source of information, a transducer, or a receiver is required.

156 This subclass is indented under the class definition. Subject matter directed to the verification of statistical record data, either perforations or markings, against a master record or keyboard setting.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37+, for determination of the presence of perforations in sheet or other material without regard to location by using

fluid under pressure (positive or negative).

157, for similar verification of sprocket apertures in picture films and record strips.

159, for sensing perforations in sheet material without regard to location therein.

SEE OR SEARCH CLASS:

234, Selective Cutting (e.g., Punching), subclass 34 for a selective punching machine provided with verification means.

235, Registers, subclass 431, for calculators that compare two or more sets of data carried upon record cards, etc., and subclasses 439+ for mechanisms for sensing or analyzing data on a record, and see the search notes to such subclasses.

157 This subclass is indented under the class definition. Subject matter for verifying the sprocket apertures of picture films and record strips.

SEE OR SEARCH THIS CLASS, SUBCLASS:

156, for verifying statistical card records and see the notes thereto.

158 This subclass is indented under the class definition. Subject matter for the testing of hoisting cables and ropes, as for testing centers, twist counting, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

760+, particularly subclasses 828+ for stress and strain tests.

159 This subclass is indented under the class definition. Subject matter for testing or inspecting sheet material, woven fabric materials, and fibers.

SEE OR SEARCH THIS CLASS, SUBCLASS:

7, for "wear" tests.

37+, for tests using fluid under pressure (positive or negative) as in determining porosity.

73+, for moisture content or absorption characteristics tests.

150, for fade of dyes and other coating materials caused by fabrics, sheet material, etc.

788+, for stress and strain test including tear flexing, bending, folding, bursting or rupture tests.

SEE OR SEARCH CLASS:

26, Textiles: Cloth Finishing, subclass 70 for cloth inspecting.

356, Optics: Measuring and Testing, subclasses 238.1+ for the inspection of cloth for flaws.

160 This subclass is indented under subclass 159. Subject matter for testing or inspecting of filaments or strands, for defects, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

828+, for tensile testing of a strand.

849, for testing by bending, flexing, or folding.

SEE OR SEARCH CLASS:

28, Textiles: Manufacturing, subclasses 226+, for detecting knots or slubs in threads.

161 This subclass is indented under the class definition. Subject matter involving special adoption to the testing of coil and leaf springs.

SEE OR SEARCH THIS CLASS, SUBCLASS:

808+, for fatigue tests.

818+, for compression tests.

849+, for flexure tests.

162 This subclass is indented under the class definition. Subject matter directed to the testing of toothed gears of all sorts for noise, strength, wear, etc.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclass 179.5 for gauges for determining the form of spur gearing, hobs or spur gear cutters.

163 This subclass is indented under the class definition. Subject matter directed to the testing of coins.

SEE OR SEARCH CLASS:

177, Weighing Scales, subclass 51 for a device for testing the size and weight of a coin.

194, Check-Actuated Control Mechanisms, subclasses 302+ for fraud preventing devices of the type associated with coin controlled apparatus which involve coin testing features, e.g., by testing for size, material or weight.

324, Electricity: Measuring and Testing, appropriate subclasses for testing electrical properties of articles including coins.

453, Coin Handling, subclasses 3+, for coin assorters that separate coins according to size.

164 This subclass is indented under the class definition. Subject matter directed to the testing of miners' lamps.

SEE OR SEARCH THIS CLASS, SUBCLASS:

36, for testing illuminating fluids.

167 This subclass is indented under the class definition. Subject matter for testing of ordnance and projectiles.

SEE OR SEARCH THIS CLASS, SUBCLASS:

11.04+, for testing gun recoil apparatus.

35.14+, for study of explosives and explosive pressures.

78+, for hardness tests.

760+, for stress and strain tests.

SEE OR SEARCH CLASS:

273, Amusement Devices: Games, subclass 404 for bullet traps combined with targets; and subclass 410, for bullet traps used with targets.

168 This subclass is indented under the class definition. Subject matter for testing hydraulic equipment, blowers and pumps.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37+, for testing by fluid pressure.

112+, and 116+, for power plant or unit efficiency and motor or engine testing.

147, for propeller study.

169 This subclass is indented under the class definition. Subject matter for determining the physical characteristics of dough, bread and flour.

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclass 20 for determination of pressures evolved in fermentation of dough.

426, Food or Edible Material: Processes, Compositions, and Products, subclasses 231+ for process of food treating combined with testing or measuring.

170.01 FLUID FLOW DIRECTION (E.G., WIND SOCK, WEATHER VANE, ETC.):

This subclass is indented under the class definition. Subject matter comprising an apparatus or method for determining the direction of flow of fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

170.16+, for meteorological measuring not combined with direction determining.

170.29+, for oceanographic measuring not combined with direction determining.

861+, for the measurement of a rate of fluid flow, per se; especially, subclass 861.85 for an anemometer, per se.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclasses 412+, 422, 439+, and 477+ for a device of that class operated by fluid.

116, Signals and Indicators, subclasses 273+ for mechanical indicators of the presence or absence of fluid flow, as through a pipe, and subclasses 173+ for flags.

446, Amusement Devices: Toys, subclasses 199+ for a fluid operated changing or moving figure or figure part.

170.02 Relative to aircraft or watercraft:

This subclass is indented under subclass 170.01. Subject matter comprising a process or an apparatus for determining the direction of

flow of fluid relative to an aircraft or watercraft.

170.03 Sailboat (e.g., sailing aid):
This subclass is indented under subclass 170.02. Subject matter wherein the watercraft is a sailboat.

SEE OR SEARCH CLASS:
40, Card, Picture, or Sign Exhibiting, subclasses 412+, 422, 439+, and 477 for fluid operated display devices.
116, Signals and Indicators, subclasses 273+ for mechanical indicator of the presence or absence of fluid flow, as through a pipe, and subclasses 173+ for flags.

170.04 Using a drifter or tracer (e.g., smoke):
This subclass is indented under subclass 170.01. Subject matter wherein the determination is made by detecting a body or a substance introduced into and carried by the fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.05, 861.07, for using a tracer or a tag for measuring the volume or rate of flow of a fluid, per se.

170.05 Using a fluid actuated alignment device (e.g., wind sock, weather vane, etc.):
This subclass is indented under subclass 170.01. Subject matter comprising a means responsive to the fluid flow which aligns itself in the direction of flow of the fluid.

170.06 With illumination means or an electro-optical indicator (e.g., beacon or signal lamp):
This subclass is indented under subclass 170.05. Subject matter combined with (a) means for illuminating the alignment device or (b) means responsive to electricity for indicating the fluid flow direction.

SEE OR SEARCH CLASS:
362, Illumination, for an illumination device, per se.

170.07 With velocity determination:
This subclass is indented under subclass 170.05. Subject matter combined with means for determining the rate of flow of the fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
170.11, for fluid flow direction determination combined with velocity determination.
861+, for fluid flow determination, per se; especially, subclass 861.85 for an anemometer for measuring wind velocity.

SEE OR SEARCH CLASS:
446, Amusement Devices: Toys, subclasses 53+ and 119+ for a changing or moving figure or figure part used as a toy.

170.08 Electric sensor:
This subclass is indented under subclass 170.07. Subject matter including means whose electron flow or electron storage characteristic changes in response to the determination being made.

SEE OR SEARCH THIS CLASS, SUBCLASS:
170.09, for fluid flow direction determination means not combined with velocity measuring but having an electric sensor which is responsive to fluid flow direction.
866.5, for a probe or probe mounting, per se.

SEE OR SEARCH CLASS:
250, Radiant Energy, appropriate subclasses for a light responsive sensor, per se.
310, Electrical Generator or Motor Structure, subclasses 311+ for a piezoelectric sensor, per se.
338, Electrical Resistors, subclasses 2+ for a strain gauge resistor, per se, and subclasses 13+ for a condition responsive resistor, per se.
361, Electricity: Electrical Systems and Devices, subclasses 280+ for a capacitor-type sensor, per se.

170.09 Electric sensor:
This subclass is indented under subclass 170.05. Subject matter including means whose electron flow or electron storage characteristic changes in response to the determination being made.

SEE OR SEARCH THIS CLASS, SUBCLASS:

170.08, for a fluid flow device using a fluid actuated alignment means combined with velocity measuring and having an electric sensor.

866.5, for a probe or probe mounting, per se.

SEE OR SEARCH CLASS:

250, Radiant Energy, appropriate subclasses for a light responsive sensor, per se.

310, Electrical Generator or Motor Structure, subclasses 311+ for a piezoelectric sensor, per se.

338, Electrical Resistors, subclasses 2+ for a strain gauge resistor, per se, and subclasses 13+ for a condition responsive resistor, per se.

361, Electricity: Electrical Systems and Devices, subclasses 280+ for a capacitor-type sensor, per se.

170.11 With velocity determination:

This subclass is indented under subclass 170.01. Subject matter including a process or an apparatus for determining the rate of flow of the fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

170.07, for fluid flow direction determination using fluid actuated alignment combined with velocity determination means.

861+, for fluid flow determination, per se; especially, subclass 861.85 for an anemometer for measuring wind velocity.

SEE OR SEARCH CLASS:

446, Amusement Devices: Toys, subclasses 53+, 119+ for a changing or moving figure or figure part which is a toy.

170.12 Thermal:

This subclass is indented under subclass 170.11. Subject matter wherein the determination of the velocity or the direction of fluid flow is made by measuring or sensing a thermal effect caused by the flow of the fluid.

(1) Note. Such measurement often includes determination of the cooling effect upon a heated element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

118.2, for measuring intake air flow in an internal combustion engine.

198, for fluid flow measuring combined with diverse subject matter.

202.5, for thermal sensing of flow including an auxiliary testing of a flow path.

204.11+, for thermal sensing of flow rate.

861.95, for measuring by use of a thermal tracer or tag.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, appropriate subclasses for measuring and testing of a thermal effect, per se; particularly, subclasses 29+ for heat flow measurement and subclasses 43+ for heat flow coefficient measuring.

170.13 Acoustic:

This subclass is indented under subclass 170.11. Subject matter wherein the determination of the velocity or the direction of fluid flow is made by measuring or sensing the effect of the fluid flow on a traveling compressional wave having a frequency within either the sonic or ultrasonic frequency range.

SEE OR SEARCH THIS CLASS, SUBCLASS:

645+, for measuring acoustic parameters, per se.

861.18+, for determining rate of flow, per se, by measuring vibration or acoustic energy.

170.14 Fluid pressure differential:

This subclass is indented under subclass 170.11. Subject matter wherein the determination of the velocity or the direction of fluid flow is made by measuring or sensing a difference in fluid pressure resulting from the velocity of the fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

700+, for fluid pressure measuring, per se.

861.42, for determining a rate of flow, per se, by measuring differential pressure.

170.15 Thrust or drag force:
This subclass is indented under subclass 170.11. Subject matter wherein the determination of the velocity or the direction of fluid flow is made by measuring or sensing the magnitude of a force or a component thereof imparted by the fluid to an object placed in the flow path of the fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862+, for force measuring, per se.

170.16 METEOROLOGY:
This subclass is indented under the class definition. Subject matter comprising an apparatus or method for determining an atmospheric phenomenon or a weather condition.

(1) Note. This subclass generally contains subject matter drawn to the measurement of plural meteorological conditions. However, the measurement of a single meteorological condition, not provided for elsewhere, is also found here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
28.01, for measuring solids in the atmosphere other than micrometeorites.
29.02, for a hygrometer, per se.
31.02, for testing for impurities of the air.
170.01+, for a meteorological apparatus or process combined with wind direction determining.
384+, for a barometer.
861.79, for an anemometer, per se.
863+, for a sampler, per se, which may obtain a sample of the atmosphere.

SEE OR SEARCH CLASS:
116, Signals and Indicators, subclass 69 for a mechanical alarm or indicator, per se, providing a humanly perceptible signal in response to a predetermined rain condition and subclasses 264+ for a mechanical indicator providing a humanly perceptible signal in response to the presence or absence of fluid flow.
244, Aeronautics, subclass 134 for the prevention of ice on aircraft structure.
340, Communications: Electrical, subclasses 580+ for an electrical indicator which produces a humanly perceptible signal in response to the attainment of a predetermined icing condition.
342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclass 26 for weather radar, per se.
374, Thermal Measuring and Testing, appropriate subclass for atmospheric temperature measuring, per se, subclass 109 for temperature combined with another atmospheric condition (e.g., discomfort index, windchill factor) and subclass 143 for significant temperature measuring combined with nonmeteorological pressure measuring.

170.17 Precipitation (e.g., rain gauge):
This subclass is indented under subclass 170.16. Subject matter wherein the atmospheric phenomenon or weather condition to be determined is condensation, formed from a vapor in the atmosphere, which falls through the atmosphere.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863+, for a sampler, per se, which may obtain a sample of the atmosphere.

170.18 With recorder detail:
This subclass is indented under subclass 170.17. Subject matter combined with means for making a permanent record of the precipitation, wherein significance is attributed to the record making means.

SEE OR SEARCH CLASS:
346, Recorders, appropriate subclasses for a recorder, per se.

170.19 With heater or vaporizer:
This subclass is indented under subclass 170.17. Subject matter combined with a device for elevating the temperature of the condensation or for causing the condensation to vaporize.

SEE OR SEARCH CLASS:

219, Electric Heating, appropriate subclasses for an electric heater, per se.

392, Electric Resistance Heating Devices, appropriate subclasses for a heater employing an electric resistor.

432, Heating, for nonelectric heater, per se.

170.21 Sensing accumulated amount (e.g., rain gauge):

This subclass is indented under subclass 170.17. Subject matter wherein the total amount of precipitation falling over a given period of time is determined.

SEE OR SEARCH THIS CLASS, SUBCLASS:

149, for volumetric content measuring, per se.

290+, for a liquid level or depth gauge, per se.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 601+ for an electrical indicator which produces a humanly perceptible signal in response to the attainment of a predetermined meteorological condition.

170.22 Using a float:

This subclass is indented under subclass 170.21. Subject matter wherein the total amount of precipitation is indicated by a device which floats on or in the surface of collected precipitation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

305+, for a float-type liquid level gauge.

170.23 Weight actuated (e.g., tipping bucket):

This subclass is indented under subclass 170.21. Subject matter wherein the total amount of precipitation is determined in response to the weight of the collected precipitation.

170.24 Electric disturbance (e.g., lightning):

This subclass is indented under subclass 170.16. Subject matter wherein the atmospheric phenomenon or weather condition is due to the flow of electrons.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 72+ for measuring electrical potential due to lightning (e.g., a voltmeter in combination with a lightning rod).

340, Communications: Electrical, subclasses 601+ for an electrical indicator which produces a humanly perceptible signal in response to the attainment of a predetermined meteorological condition, including lightning.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclass 26 for weather radar, per se.

170.25 Micrometeorite:

This subclass is indented under subclass 170.16. Subject matter wherein a characteristic of a small solid body originating in outer space is determined.

SEE OR SEARCH THIS CLASS, SUBCLASS:

28.01, for measuring other solid content of air not originating in outer space.

31.02, for measuring impurity of the atmosphere.

865.5, for particle size measuring, per se.

863.21, for sampling, per se, involving separation of constituents.

170.26 Icing condition (e.g., accretion):

This subclass is indented under subclass 170.16. Subject matter wherein the atmospheric phenomenon or weather condition pertains to the formation of ice on a surface when it is exposed to the atmosphere.

SEE OR SEARCH CLASS:

244, Aeronautics, subclass 134 for the prevention of ice on aircraft structure.

340, Communications: Electrical, subclasses 580+ and 962 for an electrical indicator which produces a humanly perceptible signal in response to the attainment of a predetermined icing condition.

170.27 Naturally occurring radiation (e.g., solar radiation):
This subclass is indented under subclass 170.16. Subject matter wherein the atmospheric phenomenon or weather condition is naturally occurring radiant energy.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 72+ for measuring electrical potential due to lightning (e.g., a voltmeter in combination with a lightning rod).
340, Communications: Electrical, subclasses 601+ for an electrical indicator which produces a humanly perceptible signal in response to the attainment of a predetermined meteorological condition.
342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclass 26 for weather radar, per se.

170.28 Using unmanned, self-controlled airborne instrumentation carrier (e.g., radiosonde):
This subclass is indented under subclass 170.16. Subject matter wherein the determination is made by an apparatus having no human in it or controlling it during the time in which the determination is being made, and which is transported by air or is supported wholly by aerodynamic and aerostatic forces.

170.29 OCEANOLOGY (E.G., OCEANS, RIVERS, OR LAKES):
This subclass is indented under the class definition. Subject matter comprising an apparatus or method for determining a physical parameter or phenomenon associated with a naturally occurring body of water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
53.01+, for the analysis or testing of a liquid, per se.
170.01+, for oceanology combined with fluid flow direction determining.
861+, for measuring the rate of fluid flow without direction measurement; especially, subclass 861.85 for anemometers, per se.
863+, for a sampler, per se, which may obtain a sample from a body of water.
866.5, for a probe or probe mounting, per se.

SEE OR SEARCH CLASS:
175, Boring or Penetrating the Earth, subclass 5 for marine platform drilling, per se.
324, Electricity: Measuring and Testing, subclasses 425+ for testing of electrolyte properties of a liquid, per se.
340, Communications: Electrical, subclasses 500+ for an electrical indicator which produces a humanly perceptible signal in response to the attainment of a predetermined condition, particularly subclass 606 for a flow responsive electrical indicator and subclass 618 for a liquid level responsive electrical indicator, and subclasses 850+ for an underwater electrical communication system.
367, Communications, Electrical: Acoustic Wave Systems and Devices, appropriate subclass for an underwater communication employing acoustic waves.
374, Thermal Measuring and Testing, subclass 136 for underwater temperature measuring and subclass 143 for combined temperature and nonmeteorological pressure measuring.
441, Buoys, Rafts, and Aquatic Devices, for a buoy, per se.
700, Data Processing: Generic Control Systems or Specific Applications, subclass 281 for control of fluid level or volume, and subclasses 282-285 for fluid control.

170.31 Surface wave:
This subclass is indented under subclass 170.29. Subject matter wherein the physical parameter or phenomenon is a moving ridge or swell on the surface of the naturally occurring body of water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
148, for a model basin or testing tank, per se.
290+, for liquid level measuring, per se.
861+, for fluid flow rate measuring with direction determination.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 67+ for mechanical alarms providing a humanly perceptible signal in response to a predetermined oceanological condition; particularly, subclass 107 for a signalling device being placed upon a buoy wherein the signal is produced by a wave or current.

338, Electrical Resistors, subclass 4 for a liquid actuated resistor, per se, and subclasses 35+ for a liquid responsive resistor, per se.

361, Electricity: Electrical Systems and Devices, subclass 284 for a liquid level responsive capacitor, per se, and subclass 285 for a fluid flow responsive capacitor, per se.

170.32 Bottom sediment or soil:

This subclass is indented under subclass 170.29. Subject matter wherein the physical parameter or phenomenon is either (a) matter that settles to the bottom of the naturally occurring body of water or (b) soil at the bottom of the naturally occurring body of water.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61.71+, for the testing of sediment other than in a naturally occurring body of water.

151+, for borehole testing, per se.

863+, for a sampler, per se; particularly, subclasses 864.65+ for a sampler which collects a sample of bottom sediment or soil underneath a body of water.

170.33 Towed probe:

This subclass is indented under subclass 170.29. Subject matter wherein a measuring device is pulled through a body of water by a moving craft.

(1) Note. Usually a probe is connected to the moving craft by means of a cable or a rope.

SEE OR SEARCH THIS CLASS, SUBCLASS:

53.01+, for probes for use in liquid analysis, per se.

866.5, for measuring probes, per se.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 311 for a piezo-electric device, per se, responsive to liquid flow or liquid level.

338, Electrical Resistors, subclass 4 for a pressure responsive resistor strain gauge, per se, and subclasses 38+ for other pressure responsive resistors, per se.

361, Electricity: Electrical Systems and Devices, subclass 284 for a liquid level responsive capacitor, per se, and subclass 285 for a liquid flow responsive capacitor, per se.

170.34 Unattached, self-contained probe with buoyancy controlled level of descent:

This subclass is indented under subclass 170.29. Subject matter wherein the depth of travel of an independent probe is regulated by buoyancy.

SEE OR SEARCH THIS CLASS, SUBCLASS:

866.5, for a measuring probe or a probe mounting, per se.

SEE OR SEARCH CLASS:

175, Boring or Penetrating the Earth, subclass 5 for marine platform drilling, per se.

441, Buoys, Rafts, and Aquatic Devices, subclass 33 for a buoy having means to release a sensor.

172 This subclass is indented under the class definition. Subject matter directed to the measurement of the load distribution of an animate body or member thereof.

178 This subclass is indented under the class definition. Instruments peculiarly adapted to use in conducting a craft on or through a fluid medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:

147, for devices for determining the forces on objects such as aerofoils caused by relative motion with respect to fluids in wind tunnels.

227+, for straight-line-light-ray instruments useful in conducting a craft on or through a fluid medium.
300+, for direction indicating instruments responsive to gyroscopic forces or to terrestrial gravitation or magnetism and useful in conducting a craft on through a fluid medium.
466+, and 467, for plotting devices.
490, for a device measuring distance by integrating a speed response and time.
503, for a device indicating velocity with respect to the earth by integrating time and acceleration.
504.02+, for an instrument operated by the combined action of a gyroscope and a speed or acceleration sensor.
504.03, and 514.01+, for means measuring change of orientation by acceleration responsive means.
514.01+, for an accelerometer.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, subclasses 715 and 720 for line and lead type sounding devices.
116, Signals and Indicators, subclass 113 for shoal water alarms, and subclass 27 for nonelectrical submarine signaling devices.
235, Registers, subclass 61 and appropriate indented subclass, particularly subclass subclasses 401 and 402 for bombing calculators incorporating navigation systems.
244, Aeronautics, subclasses 76+ for aircraft control apparatus employing measuring devices.
340, Communications: Electrical, and subclasses 29+ for other nautical signaling systems.
346, Recorders, appropriate subclass.
356, Optics: Measuring and Testing, subclasses 247+ for fiducial instruments involving significant optics or a deflection of the line of sight by reflection or refraction principles.
367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 87+, for acoustic echo navigation systems; and subclasses 118+, for other acoustic navigation systems.
368, Horology: Time Measuring Systems or Devices, for chronometers.
374, Thermal Measuring and Testing, subclass 6 for position determination by thermal measurement.
396, Photography, particularly subclasses 7+ for aerial cameras.
434, Education and Demonstration, subclasses 111, 186, and 239+ for devices for teaching or training in the use of navigating instruments or for such devices when combined with devices for training in the operation of aircraft.
701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 200 for calculations for use in navigation.

179 This subclass is indented under subclass 178. Instruments responsive to atmospheric pressure variations for determining rate of ascent or descent of a craft. The change in pressure may be manifested by flow of fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
384+, for altimeters of barometric pressure type.

180 This subclass is indented under subclass 178. Instruments responsive to relative movement of the craft and the fluid in which it is supported to indicate leeway, angle of incidence or side-slip.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, subclasses 328+ for attitude indicators which are controlled or stabilized by a gyroscope.

181 This subclass is indented under subclass 178. Apparatus responsive to relative motion of a fluid medium and a craft for use in determining the speed of the craft with respect to the fluid medium on which it is supported or in which it is immersed. The speed may be integrated with respect to time in order to obtain the distance traveled.

(1) Note. This subclass includes analogous devices for measuring the relative speed of land vehicles with respect to the air.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861+, for mere flow meters which might be carried on a craft.

182 This subclass is indented under subclass 181. Logs wherein the relative velocity of the craft and the fluid in which it is navigated produces a pressure differential in a device such as a Venturi, flow nozzle, orifice plate, Pitot or like device, which pressure differential is a function of said relative velocity.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.42+, for pressure differential flow meters of general application.

183 This subclass is indented under subclass 182. Logs wherein the pressure differential is integrated with respect to time to determine the total relative distance traveled.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.43+, for pressure differential flow meters of general application having integrating means.

SEE OR SEARCH CLASS:
235, Registers, particularly subclasses 61+ for integrating means, per se.

184 This subclass is indented under subclass 181. Logs comprising a drag device which is immersed in the fluid medium and is towed from the craft. The speed is usually measured by determining the force exerted on the towing line or by the extent of rotation of a rotary device on the drag.

185 This subclass is indented under subclass 184. Logs of the type wherein the drag carries a rotary member which is rotated by the action of the fluid medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.79+, for turbine type meters of general application.

186 This subclass is indented under subclass 181. Logs wherein the speed is determined by measuring the movement of a pivoted or sliding flap or vane placed in and moved by the fluid medium.

SEE OR SEARCH THIS CLASS, SUBCLASS:
184+, for drag type logs.
861.74+, for vane type flow meters of general application.

187 This subclass is indented under subclass 181. Logs wherein a turbine or rotary motor member is rotated by the fluid medium and the number of rotations per unit of time is a measure of the speed of the craft.

SEE OR SEARCH THIS CLASS, SUBCLASS:
185, for rotary drag type logs.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 323.21 for a piezoelectric element forming a resonant structure used to measure a physical parameter or condition.

195 This subclass is indented under subclass 861. Meter systems employing two or more meters. These systems are usually for measuring and comparing two or more flows or for selectively metering small or large flows in meters of different capacity.

SEE OR SEARCH CLASS:
48, Gas: Heating and Illuminating, subclasses 180+ for the mixing of plural gases, one a fuel with means to meter each gas.
137, Fluid Handling, subclasses 98+ for self-proportioning flow systems.

196 This subclass is indented under subclass 195. Systems wherein two or more flows are constantly compared and their ratio indicated, or where comparison is made of the flow of the same stream at two or more points.

SEE OR SEARCH THIS CLASS, SUBCLASS:

357, for flow comparing devices peculiarly adapted to measure temperature by change in flow characteristics of a fluid.

197 This subclass is indented under subclass 195. Systems wherein at least two meters are provided, one sensitive meter for small flows and one meter of large capacity for large flows through the same duct or ducts. There is provided some means to divert the flow to the proper meter under various flow conditions.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 512+, 608+ and 636+ for diverting valves, per se.

198 This subclass is indented under subclass 861. Volume or rate of flow meters combined with structures other than meters and not otherwise classifiable.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.31, for the use of a fluid flowmeter combined with other types of measuring in determining a characteristic of a borehole, a well casing, or a drill rigging.

181+, for ships' logs comprising volume or rate of flow meters.

215+, for Weir meters combined with feed water heater structures.

SEE OR SEARCH CLASS:

137, Fluid Handling, particularly subclasses 98+, 459+, 486+, 494+, and 460 for fluid handling apparatus which includes volume or rate of flow meters.

235, Registers, subclass 61 for meters combined with speedometer means so as to make miles per gallon computations.

251, Valves and Valve Actuation, appropriate subclasses for valves, per se.

374, Thermal Measuring and Testing, subclasses 39+, for heat quantity measuring, devices comprising volume meters.

199 This subclass is indented under subclass 198. Meters having combined therewith means for regulating the pressure of the fluid to the inlet or the pressure drop across the meter; or means for indicating or limiting the demand (rate of flow, maximum or minimum) from the meter.

SEE OR SEARCH THIS CLASS, SUBCLASS:

197, for regulators combined with compound meter structure.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 494+ particularly subclasses 505+ for pressure regulators, per se, not structurally combined with meters.

200 This subclass is indented under subclass 198. Meters combined with liquid and gas separating means whereby gases entrained in a liquid to be metered may be separated therefrom before the liquid enters the meter.

SEE OR SEARCH THIS CLASS, SUBCLASS:

273+, for gas meter casings having provision for collecting drip.

SEE OR SEARCH CLASS:

96, Gas Separation: Apparatus, subclasses 155+ for degasifying means for a liquid.

210, Liquid Purification or Separation, appropriate subclasses for liquid separators, per se.

201 This subclass is indented under subclass 198. Meters combined with housing boxes or means for connecting the meter into a pipe line or meter box. Structure of the meter or meter box, other than a mere conventional statement, must be included.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 315.06 for means to replace a combustible gas or water meter or subclasses 343-382.5 for other fluid handling apparatus casing, support, protector, or static constructional installation.

220, Receptacles, subclasses 3.2+ for receptacles having provision for

extending strands, rods, pipes, etc., through the receptacle wall or for coupling them to the wall.

248, Supports, subclass 317 for meter hanger supports, per se.

285, Pipe Joints or Couplings, subclass 30 for meter connections not limited as above indicated.

202 This subclass is indented under subclass 861. Devices for separating from a main flow a definite proportion thereof and metering such separated portion as a measure of the volume or rate of the main flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:

254, for rotary piston and cylinder meters with a compensating by-pass.

152.29+, for a flowmeter for determining a characteristic of a borehole, a casing, or a drill rigging.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 98+ particularly subclass 101 for flow dividers, per se, which are self-proportioning, and subclasses 599.01-601.21 and 861+ for other flow dividers, per se.

202.5 Thermal sensing of flow:
This subclass is indented under subclass 202. Subject matter in which the rate of flow of a fluid is determined in a separated flow path by a sensed thermal effect caused by such flow.

(1) Note. Such measurement often includes determination of the cooling effect upon a heated element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.33, for a flowmeter for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring a rate of fluid flow responsive to a thermal property of a fluid.

204.11+, for thermal fluid flow measuring, absent a separate flow path.

203 This subclass is indented under subclass 202. Meters wherein the means for proportionally separating the flow to be measured from the main flow comprises a proportioning valve or valves.

204.11 Thermal type:
This subclass is indented under subclass 861. Subject matter in which the rate of flow of a fluid is determined by a sensed thermal effect caused by such flow.

(1) Note. Such measurement often includes determination of the cooling effect upon a heated element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

118.2, for measurement intake air flow in an internal combustion engine.

152.33, for a flowmeter for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring a rate of fluid flow responsive to a thermal property of a fluid.

198, for fluid flow measuring combined with diverse subject matter.

202.5, for thermal sensing of flow including an auxiliary testing flow path.

861.95, for flow measuring by use of a thermal tracer or tag.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, appropriate subclasses for measuring and testing of a thermal effect, per se; particularly subclasses 29+ for heat flow measurement, and subclasses 43+ for heat flow coefficient measurement.

204.12 With conduit extending between heat sinks:
This subclass is indented under subclass 204.11. Subject matter which measures the flow rate of a fluid flowing in a conduit extending between two bodies of fixed temperature.

(1) Note. The conduit is itself often a conductive portion of either a heating or measuring circuit.

204.13 With auxiliary fluid contacting or in heat exchange relation with flow path (e.g., thermodilution):
This subclass is indented under subclass 204.11. Subject matter in which an additional fluid is introduced into the flow path of, or heat

exchange relation with, the fluid being measured, to assist in the measurement.

(1) Note. Included herein is measuring flow of a reference fluid the parameters of which are known and comparison with measurements of the mixture with the fluid being observed.

(2) Note. Neither use of a fluid type thermal sensor, nor a probe cooling fluid, is of itself, basis for classification in this subclass.

SEE OR SEARCH CLASS:
62, Refrigeration, subclass 49 for measuring flow mass of a liquified gas.
128, Surgery, subclasses 691+ for a thermodilution blood flow measuring device.

204.14 Including digital or pulse measuring circuitry:
This subclass is indented under subclass 204.11. Subject matter which includes measuring circuitry which processes a portion of a measuring signal in the form of abrupt variations of an electrical signal level.

SEE OR SEARCH CLASS:
341, Coded Data Generation or Conversion, subclasses 155+ for an analog to digital encoder.
374, Thermal Measuring and Testing, subclasses 170+ for a thermometer having digital signal processing.

204.15 Including detail of feedback or rebalancing circuitry:
Subject matter under 204.11 describing a particular feature of the measuring circuit in which a portion of the circuit output is either (a) fed back to its input, or (b) used to control a circuit or circuit adjusting element which balances a bridge measuring circuit.

204.16 By control of a separate heating or cooling element:
This subclass is indented under subclass 204.15. Subject matter in which a portion of the measuring circuit output is used to control a temperature modifying element distinct from a thermal sensor.

SEE OR SEARCH CLASS:
219, Electrical Heating, subclasses 327+ for a temperature responsive electrical heater.

204.17 With distinct heating circuitry for a self-heated sensor:
This subclass is indented under subclass 204.11. Subject matter having circuitry distinct from measuring circuitry to pass heating current through a thermal sensor.

204.18 Including response characteristic or condition compensation:
This subclass is indented under subclass 204.11. Subject matter in which the measurement is modified so as to suppress the effect of a condition other than flow, or to produce a desired output characteristic.

(1) Note. Circuit arrangements for output linearization are included in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.01+, for flowmeter temperature or density compensation by a distinct output signal

204.19 For temperature:
This subclass is indented under subclass 204.18. Subject matter in which the effect of ambient temperature is suppressed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
204.15, for temperature compensating bridge circuitry having a feedback or rebalancing feature.
861.01+, for flowmeter temperature compensation by a distinct output signal.

204.21 With fluid flow deflector or restrictor (e.g., baffle, constriction):
This subclass is indented under subclass 204.11. Subject matter having an element for modifying the direction, or the cross-section area, of a portion of the fluid flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:

202.5, for a restrictor combined with a testing bypass or shunt.

861.52+, for nonthermal flow measuring with a restrictor in the flow path.

SEE OR SEARCH CLASS:

138, Pipes and Tubular Conduits, subclasses 40+ for a restrictor in a conduit.

204.22 With sensor housing:
This subclass is indented under subclass 204.11. Subject matter including an enclosure which surrounds the sensor.

(1) Note. A conduit for the flowing fluid being measured is not, of itself, a housing for this subclass.

204.23 Having particular electrical heating, cooling, or thermal sensing element:
This subclass is indented under subclass 204.11. Subject matter having a designated electrical thermal modifying or responsive element.

(1) Note. The structure of a sensing element, not designated as part of a measuring system, is classified with such elements.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, appropriate subclasses for thermal measuring system not used for flow measurement.

204.24 Thermoelectric junction:
This subclass is indented under subclass 204.23. Subject matter wherein the temperature sensing or modifying element is a current generating device having a junction of two conductors of different composition.

SEE OR SEARCH CLASS:

136, Batteries: Thermoelectric and Photoelectric, subclasses 200+ for structure of a thermoelectric element.

374, Thermal Measuring and Testing, subclasses 179+ for a thermoelectric thermometer.

204.25 Resistive element:
This subclass is indented under subclass 204.23. Subject matter wherein the sensor or heater is an electrical resistance element.

204.26 With substrate carrier (e.g., thin film):
This subclass is indented under subclass 204.25. Subject matter in which the resistive element is formed as a thin layer which is mounted upon a side of a solid element.

204.27 Wire type (e.g., hot wire):
This subclass is indented under subclass 204.25. Subject matter wherein a thin wire forms both a resistive temperature sensor and a resistance heater.

SEE OR SEARCH THIS CLASS, SUBCLASS:

204.17, for detailed circuitry for passing a heating current through a sensor.

215 This subclass is indented under subclass 861. Meters having means for metering by determining the effect upon a flow in an open channel of a constriction, such as a weir. More than a mere graduated water gate must be included. The term “open channel” is intended to include any flow channel wherein the surface of the liquid above and below the constriction is subjected to the same pressure.

SEE OR SEARCH CLASS:

251, Valves and Valve Actuation, appropriate subclasses for valves and their actuating means for closed conduits.

405, Hydraulic and Earth Engineering, subclasses 87+ for weirs and water gates, per se, with or without adjusting means or graduations and including no meter structure, and subclasses 92+ for water gate structures with regulating means to cause a definite volume of water to pass through an open channel while the head varies.

216 This subclass is indented under subclass 215. Meters wherein the constriction comprises a submerged orifice or discharge nozzle.

(1) Note. For volume or rate of flow meters, Tank type, see Search This Class, Subclass, below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

861, for volume or rate of flow meters, Tank type; meters under subclass 861 wherein the volume of fluent material is measured by the continuous filling and discharging of one or more tanks, buckets or hoppers. The filling and discharging is directly or indirectly controlled by the fluent material being metered.

861.61, for pressure differential type orifice or flow nozzle.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 386+ for tanks provided with automatic control of filling and discharging in response to the liquid level therein wherein structure is claimed that is capable of general fluid feeding and not limited to use as a meter.

177, Weighing Scales, subclasses 18+ for a weigher of that class which also registers the number of fill and discharge cycles.

217 This subclass is indented under subclass 861. Tank type meters wherein the fluent material to be metered is deposited in a rotatable tank or in buckets carried by a drum or wheel which rotates from filling to discharging position in response to gravity or to a power drive when a definite volume has been placed in said tank or bucket.

SEE OR SEARCH CLASS:

177, Weighing Scales, subclasses 83+ for a rotary tank responsive to weight.

218 This subclass is indented under subclass 217. Meters wherein power means is provided to rotate the tank or drum from filling to discharging position, such power means being caused to operate directly or indirectly by the metered fluid or fluent material when the tank is filled.

SEE OR SEARCH CLASS:

177, Weighing Scales, subclass 84 for a weigher having power driven rotary tank responsive to weight in the tank.

219 This subclass is indented under subclass 861. Tank meters wherein the volume is measured in more than one chamber.

220 This subclass is indented under subclass 219. Meters wherein the inlet and discharge valves of the measuring chambers are actuated by pressure of the fluid to be metered when a definite static head of the fluid is accumulated in the respective measuring chambers.

SEE OR SEARCH THIS CLASS, SUBCLASS:

249, 271, for other fluid actuated valve combinations.

221 This subclass is indented under subclass 219. Meters wherein the inlet and discharge valves of the measuring chambers are controlled by a float or floats. This subclass includes tank meters wherein the valves are operated by power means controlled by a float or floats.

222 This subclass is indented under subclass 219. Meters wherein the discharge from each measuring chamber is controlled by one or more siphons.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 123+ for siphons, per se.

223 This subclass is indented under subclass 861. Tank meters having only one measuring chamber.

224 This subclass is indented under subclass 223. Tank meters wherein the inlet and outlet valves of the measuring chamber are controlled by a float or floats. Tank meters having valves actuated by power means controlled by a float or floats are included.

SEE OR SEARCH THIS CLASS, SUBCLASS:

221, for float operated valves for plural measuring chamber type.

225 This subclass is indented under subclass 224. Meters wherein the valves of the measuring chamber are actuated by a force which is stored up and suddenly released through movement of a float or floats.

SEE OR SEARCH THIS CLASS, SUBCLASS:
251, and 270, for trip gear in other combinations.

226 This subclass is indented under subclass 223. Meters wherein the discharge from the measuring chamber is controlled by a siphon.

SEE OR SEARCH THIS CLASS, SUBCLASS:
222, for siphons with plural measuring chambers.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 123+ for siphons, per se.

227 This subclass is indented under subclass 861. Meters not classifiable in any of the above subclasses wherein is provided a means responsive to area of cross section of the fluid flow to be metered, a means responsive to the velocity of said flow and a means for integrating both of said variables to obtain volume.

232 This subclass is indented under subclass 861. Meters wherein the fluid is measured in a continuously operable expansible chamber device. The energy of the fluid is usually employed to expand the measuring chamber or chambers, such expansion being also utilized to drive suitable registering means for totalizing the number of expansions.

(1) Note. In defining expansible chamber meters, the term "cylinder" is used to define an external member in the meter organization which surrounds an internal or piston member which constitutes a relatively moving wall for the expansible chamber, the other wall being formed in whole or in part by the cylinder and the cylinder including the abutment against which the fluid to be metered acts. In meters having two or more internal members, both moved by the fluid to be metered and each external to the other and serving as mutual abutments, the internal members are each considered to be pistons, but where one internal member is movable inside of the other, the inner is considered to be a piston and the outer a moving cylinder. Where the metered fluid acts on a cylinder or piston to rotate one relative to the other, the cylinder abutment is termed an "abutment" and the piston abutment is termed a "vane".

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, and see the reference to Class 73 in section III of the class definition of Class 91 for a statement of the line.
92, Expansible Chamber Devices, appropriate subclasses, for an expansible chamber device. For the line between Class 73 and Class 92, see References to Other Classes of the class definition of Class 92, under SEARCH CLASS 73.
220, Receptacles, subclasses 377+, 602 and 662+ for a receptacle having a transparent sidewall or sidewall portion.
418, Rotary Expansible Chamber Devices, for rotary expansible chamber devices, per se.

233 This subclass is indented under subclass 232. Devices wherein means is provided for manually or automatically varying the ratio of transmission of motion from the expansible chamber means to the indicating or registering means. Such variation is usually for the purpose of correcting the indicated volume for temperature and pressure variations or to change the indication from one system of units to another, such as from U.S. gallons to Imperial gallons, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
227, for area-velocity integrating type.
861.81+, for turbine type with regulating adjustment.

234 This subclass is indented under subclass 232. Meters wherein the fluid to be metered is measured in an expansible chamber which is sealed off by a liquid continuously or at some part of the measuring cycle. These subclasses are not limited to gas meters and include devices for metering liquids of less density than the liquid employed as a seal.

SEE OR SEARCH CLASS:
48, Gas: Heating and Illuminating, subclasses 176+ and 181+ for gas holders and feeders of similar structure.

235 This subclass is indented under subclass 234. Meters wherein a series of measuring chambers are carried by a drum mounted to rotate in a sealing liquid. During continuous rotation of said drum, definite volumes of the fluid to be metered are successively trapped in said compartments by the sealing liquid and then released thereby to an exhaust passage.

SEE OR SEARCH THIS CLASS, SUBCLASS:
217, for the rotary tank or bucket types.

236 This subclass is indented under subclass 234. Meters wherein the bell or chambered drum is mounted in a sealing liquid for oscillation about a pivot. The bell or drum in oscillating forms an expansible chamber or chambers with said sealing liquid wherein successive charges of fluid to be metered are measured.

237 This subclass is indented under subclass 234. Meters wherein the bell is mounted to rectilinearly reciprocate into and out of the sealing liquid to form therewith an expansible measuring chamber for the fluid to be metered.

238 This subclass is indented under subclass 234. Meters wherein a multi-chambered bell is so mounted in the sealing liquid that, when moved, its axis describes continuously the surface of a cone. The compartments of the bell form with the sealing liquid a plurality of expansible measuring chambers for the fluid to be metered.

239 This subclass is indented under subclass 232. Meters employing one or more relatively rectilinearly reciprocating pistons and cylinders, said piston and cylinder structures cooperating to define one or more expansible measuring chambers.

SEE OR SEARCH CLASS:
92, Expansible Chamber Devices, appropriate subclasses for an expansible chamber device of the cylinder and piston type.

240 This subclass is indented under subclass 239. Meters wherein both cylinder and piston reciprocate rectilinearly, the motion of one being transverse to the motion of the other.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclass 173.

241 This subclass is indented under subclass 239. Meters wherein the cylinder is supported for rocking movement, which movement is caused to operate the valves controlling reciprocation of the piston.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 176 and 210+.
92, Expansible Chamber Devices, subclasses 118+ for an expansible chamber device having an oscillating cylinder.

242 This subclass is indented under subclass 239. Meters wherein all events of the metering cycle of the expansible measuring chamber are controlled without the use of a valve distinct from the piston or the piston-rod and the cylinder.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 232+.

243 This subclass is indented under subclass 239. Meters having at least two cylinders, each provided with a piston and a valve or valves for distributing the fluid to be metered to cause the pistons to reciprocate, the valve or valves for one cylinder being moved wholly or partially in consequence of movement of the piston in the other cylinder.

SEE OR SEARCH THIS CLASS, SUBCLASS:
264, for duplex, multiple diaphragm type.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 191+.

244 This subclass is indented under subclass 239. Meters wherein parallel cylinders are provided, each having a piston operating upon a common

wobble plate or cam which controls the distributing valve or valves.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 499+, for parallel cylinder type motors.

245 This subclass is indented under subclass 239. Meters wherein parallel cylinders are provided, each having a piston driving a common shaft extending transversely of the cylinders. The shaft in rotating operates the distributing valves for all the cylinders and usually actuates the register mechanism.

246 This subclass is indented under subclass 245. Meters wherein the transverse shaft actuates a single valve, usually rotary, which controls the induction and eduction to all cylinders.

SEE OR SEARCH THIS CLASS, SUBCLASS:
265+, for rotary valve multiple diaphragm meters.

247 This subclass is indented under subclass 239. Meters having two or more cylinders with their axes radially arranged. Either the cylinders and/or the pistons may be movable.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 491+ for radial cylinder type motors.
92, Expansible Chamber Devices, subclass 148 for an expansible chamber device having a plurality of radially arranged cylinders.

248 This subclass is indented under subclass 239. Meters wherein the piston or piston-rod carries a relatively movable valve for controlling at least one of the admission or exhaust and serves as a seat for the valve or has formed therein some of the distributing passages.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 222+.
417, Pumps, subclasses 523+ and 545+ for expansible chamber type pumps having a valved piston.

249 This subclass is indented under subclass 239. Meters wherein the distributing valve or valves are actuated by pressure of the fluid being metered, although they may be started by the piston in its movement through contact or by means of a pilot valve operated by the piston or rod.

SEE OR SEARCH THIS CLASS, SUBCLASS:
220, and 271, for other fluid actuated valve combinations.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 281+.

250 This subclass is indented under subclass 239. Meters having a distributing valve mechanism actuated by the piston, piston rod, or a part rigidly attached thereto. This subclass includes piston meters wherein the distributing valves are actuated electrically or by other power means under control of the piston in its movement.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 218+.

251 This subclass is indented under subclass 250. Meters wherein the distributing valves are actuated by a force which is stored up and suddenly released through movement of the piston or piston rod.

SEE OR SEARCH THIS CLASS, SUBCLASS:
225, 270, for other combinations with valve trip gear.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 97 and 100 for snap actions, per se.
91, Motors: Expansible Chamber Type, subclass 338.
251, Valves and Valve Actuation, subclass 75 for valve actuation with snap action.

252 This subclass is indented under subclass 232. Piston meters in which the piston and cylinder relatively oscillate about a fixed center to expand the measuring chamber.

SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclasses 339+.
92, Expansible Chamber Devices, subclasses 120+ for an expansible chamber devices having an oscillating piston.
417, Pumps, subclasses 481+ for an expansible chamber type pump having an oscillating pumping member.

253 This subclass is indented under subclass 232. Piston Meters wherein the cylinder and piston relatively rotate about a fixed or movable axis to expand the metering chamber.

SEE OR SEARCH CLASS:
418, Rotary Expansible Chamber Devices, for rotary expansible chamber devices, per se.

254 This subclass is indented under subclass 253. Meters wherein a bypass, usually having a variable restriction, is placed across the metering chamber to compensate for losses caused by leakage, viscosity changes, etc.

255 This subclass is indented under subclass 253. Meters in which the piston rotates relatively to its axis while the axis moves in an orbit. This subclass also includes meters wherein a point on the piston constantly faces the same direction while the axis rotates.

SEE OR SEARCH CLASS:
418, Rotary Expansible Chamber Devices, subclasses 54+ for rotary expansible chamber devices in which the working.

256 This subclass is indented under subclass 255. Meters having a plurality of stationary abutments for cooperation with the piston.

257 This subclass is indented under subclass 255. Meters having a single stationary abutment for cooperation with the piston.

258 This subclass is indented under subclass 257. Meters wherein the axis of the piston during the orbital movement describes a conical surface. This subclass includes meters commonly termed “disk type”.

SEE OR SEARCH CLASS:
418, Rotary Expansible Chamber Devices, subclasses 49+ for rotary expansible chamber devices having a mutating working member.

259 This subclass is indented under subclass 253. Rotary piston meters wherein the piston is provided with one or more vanes which slidably project from the piston to engage the cylinder wall.

SEE OR SEARCH CLASS:
418, Rotary Expansible Chamber Devices, subclasses 259+ for rotary expansible chamber devices having positively actuated vanes and subclass 270 for similar devices having movable vanes.

260 This subclass is indented under subclass 253. Rotary piston meters wherein the piston is provided with one or more hinged vanes which are extended to engage the cylinder wall and may be collapsed against the piston in passing the cylinder abutment.

SEE OR SEARCH CLASS:
418, Rotary Expansible Chamber Devices, subclasses 259+ for rotary expansible chamber devices having positively actuated vanes and subclass 270 for similar devices having movable vanes.

261 This subclass is indented under subclass 253. Rotary piston meters, having at least two pistons mounted in a common cylinder and having interengaging portions so that each may act as an abutment for the other.

(1) Note. This subclass includes meters of the “Roots blower” or lobed impeller type.

SEE OR SEARCH CLASS:

418, Rotary Expansible Chamber Devices, subclasses 166+ for rotary expansible chamber devices of the moving cylinder type having intermeshing peripheral surfaces; subclasses 172+, for such devices of the moving cylinder type having interengaging peripheral surfaces and subclasses 191+, for such devices having interengaging rotating members.

262 This subclass is indented under subclass 232. Meters wherein the expansible measuring chamber is defined in whole or in part by a diaphragm, bellows or similar type of collapsible wall which moves to provide the expansion.

SEE OR SEARCH THIS CLASS, SUBCLASS:

272+, for elements such as casings, diaphragm mountings and diaphragms.

SEE OR SEARCH CLASS:

92, Expansible Chamber Devices, subclasses 34+ for a bellows type expansible chamber device; subclasses 89+ for a collapsible chamber wall type expansible chamber device.

417, Pumps, subclasses 472+, 474+, 478, 479, 480 for expansible chamber type pumps having a collapsible wall.

418, Rotary Expansible Chamber Devices, subclass 45 for rotary expansible chamber devices having a collapsible wall.

263 This subclass is indented under subclass 262. Diaphragm or collapsible wall meters employing more than one diaphragm to define the expansible measuring chambers.

SEE OR SEARCH CLASS:

92, Expansible Chamber Devices, subclasses 48+ for an expansible chamber device having a plurality of diaphragms.

264 This subclass is indented under subclass 263. Meters wherein the movable diaphragms define a plurality of measuring chambers for each of which a distributing valve or valves are provided. The distributing valves for one measuring chamber are moved wholly or partly in consequence of movement of the diaphragm in the other measuring chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:

243, for duplex reciprocating piston or cylinder type.

265 This subclass is indented under subclass 263. Meters wherein a rotary valve or valves are provided to control the induction and eduction to all of the chambers defined by the diaphragms. The term “rotary” is intended to include valves which have orbital movement wherein one point on the valve continuously faces in the same direction.

266 This subclass is indented under subclass 265. Meters wherein the rotary valve receives its motion from the diaphragms through the medium of cranks.

267 This subclass is indented under subclass 266. Meters wherein the motion is transmitted to the cranks from flag-wires or flag-rods operated by the diaphragms.

268 This subclass is indented under subclass 263. Meters wherein the induction and/or eduction to the measuring chambers are controlled by slide valves of the oscillating or reciprocating type.

269 Diaphragm meters wherein the measuring chamber or chambers are defined by a single diaphragm or bellows.

SEE OR SEARCH CLASS:

92, Expansible Chamber Devices, subclasses 96+ for a diaphragm type expansible chamber device.

270 This subclass is indented under subclass 269. Meters wherein the valves controlling the induction and eduction of the measuring chambers are actuated by a force which is built up and then suddenly released by the movement of the diaphragm.

SEE OR SEARCH THIS CLASS, SUBCLASS:

225, and 251, for other combinations with valve trip gear.

271 This subclass is indented under subclass 269. Meters wherein the valves controlling the induction and eduction of the measuring chambers are actuated by pressure of the metered fluid when a definite pressure builds up behind the diaphragm at the end of its stroke.

SEE OR SEARCH THIS CLASS, SUBCLASS:
220, and 249, for other fluid operated valve combinations.

272 This subclass is indented under subclass 861. Meter subcombinations or elements of the type meter provided for in ... and not above provided for. Register connections including reduction gearing and packings are included here when claimed with meter structure.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, for reduction gearing, per se.
137, Fluid Handling, subclass 315.06 for means to replace a combustible gas or water meter.
235, Registers, for registers, per se.
346, Recorders, for pertinent subclass(es) as determined by schedule review.
475, Planetary Gear Transmission Systems or Components, for planetary gearing, per se.

273 This subclass is indented under subclass 272. Elements for improvements in the casing structure housing the metering mechanism and not limited to any particular type of meter.

SEE OR SEARCH THIS CLASS, SUBCLASS:
201, for meter boxes.
431, for instrument casings of general application.

274 This subclass is indented under subclass 273. Meter casing structures limited to use with diaphragm meters.

275 This subclass is indented under subclass 272. Elements comprising devices which cooperate with the meter to prevent reversing or running backward of the registering mechanism. This subclass includes devices to protect the meter against breakage caused by reversing as well as to prevent fraud.

276 This subclass is indented under subclass 275. Elements wherein check valves are combined with meter structure to prevent reversing or running backward of the registering mechanism by preventing reverse flow through the meter.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 511+ for check valves, per se.

277 This subclass is indented under subclass 272. Elements wherein provision is made to prevent freezing of the meter; or for expansion or yielding or for the fracture of some particular part to prevent injury to other portions of the meter in the event of freezing of the metered fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
201, for anti-freeze constructions of meter boxes of enclosing the meter.

SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclasses 26 through 35 for other types of frost constructions capable of general application and not tied up with meter structure.
220, Receptacles, subclasses 89.1+ and 265+ for frangible closures and attachments of general application in metallic receptacles.
285, Pipe Joints or Couplings, subclass 1, for fracturable or yieldable flanged joints between two parts of a meter casing wherein said parts are no more in effect than two pipe members.

278 This subclass is indented under subclass 272. Elements comprising a devices for mounting a diaphragm in a meter, usually so as to facilitate removal, repair and/or soldering.

SEE OR SEARCH CLASS:
92, Expansible Chamber Devices, subclasses 98+ for a diaphragm mounting for a diaphragm type expansible chamber device.

279 This subclass is indented under subclass 272. Elements comprising diaphragm or bellows structure, per se, limited to use in meters.

SEE OR SEARCH CLASS:
92, Expansible Chamber Devices, subclasses 96+, for a diaphragm type expansible chamber device.

280 This subclass is indented under subclass 279. Devices having means for oiling the meter diaphragms to preserve and render them impermeable to avoid inaccuracies caused by porosity of the diaphragm walls.

281 **Tangent adjustment:**
This subclass is indented under subclass 272. Elements comprising adjustments, per se, of the tangent arms and/or posts of diaphragm meters.

290 This subclass is indented under the class definition. Gauges for determining the level or depth of bodies of liquid and not otherwise classifiable. The gauges may be properly calibrated for use with certain containers so as to indicate volume as a function of liquid level. The volume indicated in such instances may be the quantity of liquid remaining in the container or the quantity removed therefrom. Devices for gauging the draft of ships are here included.

(1) Note. Devices for determining depths, by sonic or electrical wave means are found in Classes 324, Electricity: Measuring and Testing, subclasses 323+; Class 181, Acoustics, subclass 124 and Class 367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 87+.

(2) Note. For nonquantitative liquid level alarms or indicators, see Class 116, Signals and Indicators, subclasses 109+ and subclasses 227+ where nonelectrical and Class 340, Communications: electrical subclasses 618+ where electrical.

(3) Note. Although the patents classified in this and indented subclasses are principally for devices for determining the depth or level of bodies of liquid, devices which are similar in construction or operation to such devices have been classified herein even though disclosed solely for determining the level of dry fluent materials.

SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, subclass 257.073, for a supply container for loading the tool of an applicator, which container is provided with means for contacting the applicator for indicating or limiting the extent of penetration of the tool into the supply and including means which is adjustable to correspond to the drop in level of the supply.
33, Geometrical Instruments, subclasses 713+ for sounding devices for determining the depth of bodies of fluent material or for measuring the distance from a datum to the surface of fluent material wherein only a measurement of distance is involved.
116, Signals and Indicators, see Note 2.
137, Fluid Handling, subclasses 386+, for fluid handling apparatus including means for controlling flow in response to or to maintain liquid level.
164, Metal Founding, subclass 151.3 for a metal casting apparatus including a melt level sensor.
181, Acoustics, see Note 1.
324, Electricity: Measuring and Testing, see (1) Note above.
340, Communications: Electrical, see (1) Note and (2) Note above.

291 This subclass is indented under subclass 290. Combinations of liquid level gauges and other measuring instruments.

SEE OR SEARCH THIS CLASS, SUBCLASS:
33, for float gauges combined with hydrometers.
198, for flow meters combined with liquid level gauges.

292 This subclass is indented under subclass 291. Liquid level or depth gauges combined with temperature measuring means.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclass 142, for a thermometer combined with another measuring instrument.

293 This subclass is indented under subclass 290. Liquid level or depth gauges provided with means for illuminating the gauge or its indicating portion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
325+, for liquid level gauges equipped with guards or casings but including no source of illumination.
327, for liquid level gauge glasses equipped with reflectors or magnifiers but including no source of illumination.

SEE OR SEARCH CLASS:
362, Illumination, particularly subclasses 23+, for illuminating means, per se, or combined with a gauge dial of general application.

294 This subclass is indented under subclass 290. Combinations of liquid level gauges with funnels or hose nozzles wherein no more of such funnel or nozzle is included than is necessary to provide for the gauge.

SEE OR SEARCH CLASS:
141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclasses 331+, for funnels, per se, and, subclasses 95+, for indicators combined with filling means responsive to level or pressure in the receiver.

295 This subclass is indented under subclass 290. Gauges wherein the liquid level or depth is determined by temperature responsive means.

SEE OR SEARCH CLASS:
164, Metal Founding, subclasses 151.4+ and 450.3 for a metal casting apparatus having a thermal sensor which may be used for sensing melt level.
374, Thermal Measuring and Testing, subclasses 100+ for temperature measurement, per se.

296 This subclass is indented under subclass 290. Gauges wherein the liquid level or depth is determined by weighing a column representative of the depth of liquid in the reservoir.

SEE OR SEARCH THIS CLASS, SUBCLASS:
309, for those operating by buoyant effort exerted on a float.

SEE OR SEARCH CLASS:
177, Weighing Scales, appropriate subclasses for a weighing device, per se.

297 This subclass is indented under subclass 290. Gauges wherein one or a plurality of test cocks are placed in communication with a reservoir or water column at various levels so that the liquid level may be determined by the issuance or nonissuance of liquid from the various levels. This subclass also includes the structure of the water column.

SEE OR SEARCH CLASS:
116, Signals and Indicators, subclasses 227+ for single test indicators.
251, Valves and Valve Actuation, appropriate subclasses for valve structure, per se.

298 This subclass is indented under subclass 290. Gauges having a tube so mounted in the reservoir that one end is movable with respect to the liquid level and the other end is connected to the exterior of the reservoir. Determination of liquid level is accomplished by adjustment of the tube to a position wherein “flow” or “no-flow” conditions through the exterior connection are produced by slight movement in either direction.

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, subclasses 513+ for similar structure employed for decanting.

299 This subclass is indented under subclass 290. Gauges wherein variations in depth are determined by measuring variations in static head at some point normally below the surface of the

liquid. These devices usually comprise a pressure gauge with connections to said point below the surface of the liquid in the reservoir.

SEE OR SEARCH THIS CLASS, SUBCLASS:

32+, for gauges of this type combined with means for indicating the specific gravity of the liquid.

323+, for mere sight glasses.

700+, for pressure gauges, per se.

300 This subclass is indented under subclass 299. Gauges wherein the gauge mechanism as a whole or the pressure responsive portion thereof is peculiarly adapted to be lowered as a unit to the bottom of the liquid to take a reading of hydrostatic pressure as a function of depth. An indicator at the surface may be suitably connected to the pressure responsive device.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 715 and 720 for devices for sounding by the use of a line and weight.

301 This subclass is indented under subclass 299. Gauges having at least one indicator electrically controlled by means responsive to the hydrostatic pressure.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 870.01+ for electric telemetering systems.

302 This subclass is indented under subclass 299. Gauges wherein means is provided for compressing or replenishing the fluid in the system between the reservoir and the pressure gauge, or means is provided for displacing or withdrawing fluid from the measuring system. The displacing or replenishing means may be, for example, an adjustable plug, a pump, a means to entrain air by sloshing of liquid in the tank, a vacuum feed tank in an internal combustion engine fuel feeding system, or other source of pressure or suction.

SEE OR SEARCH THIS CLASS, SUBCLASS:

439, for similar devices for determining specific gravity.

303 This subclass is indented under subclass 302. Gauges wherein the displacement or replenishing means produces a pressure less than atmospheric or the action of a vacuum type fuel feeding tank is employed. The suction may be employed to produce a pressure differential proportional to the head of liquid in the reservoir, or may cause directly or indirectly the entrainment of air to replenish the system.

304 This subclass is indented under subclass 290. Gauges having electrode means exposed to the liquid whereby said liquid may complete the circuit between said electrodes as it rises. There may be a plurality of pairs of electrodes at different elevations or a linear resistance spaced from a conductor and bridged by the fluid to change the resistance by increments upon change of liquid level.

SEE OR SEARCH THIS CLASS, SUBCLASS:

301, for immersible electrode gauges employed in connection with pressure responsive liquid level gauges.

313, for other combinations with electric signals.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 425+ for electrolytic testing and subclasses 600+ for the measuring of impedance.

338, Electrical Resistors, subclass 38 for a liquid resistance element or contact operated by a change in fluid or gas pressure. See the reference to Class 338 under (3) Note, C, above.

340, Communications: Electrical, subclass 620, for a nonquantitative liquid level alarm having an electrode probe.

305 This subclass is indented under subclass 290. Liquid gauges wherein the liquid level or depth is indicated directly or indirectly by at least one float or buoyant body. The float may be fastened to a support insertable into the liquid or may be substantially permanently mounted in a container.

SEE OR SEARCH CLASS:

15, Brushing, Scrubbing, and General Cleaning, subclass 257.073 for a float atop a column of fluent coating material, which float is intended for contact with an applicator to indicate the desired extent of immersion of the tool of the applicator in the supply as the level of the supply drops.

43, Fishing, Trapping, and Vermin Destroying, subclasses 43.1+ for floats used on fishing lines functioning to control and support the line.

137, Fluid Handling, subclasses 386+ particularly subclasses 397, 398+ and 409+ for float controlled valves.

164, Metal Founding, subclass 156.1 and 450.1 for a metal casting apparatus having an electrical or float level sensor.

306 This subclass is indented under subclass 305. Float gauges claimed significantly in combination with other devices. Where more of an art device is claimed than is necessary to provide for the liquid level or depth measurement, the patents are placed with such art machine and cross-referenced here. Since most gauges are situated in a container, the inclusion of any type of container, or closure therefor, broadly is not sufficient to place the patent here, and classification is made in the following subclasses according to the float gauge structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

291+, 293, and 294, for combinations of float gauges with other measuring devices, with illuminating means, or with a funnel of hose nozzle.

307 This subclass is indented under subclass 306. Combinations of float gauges with signal or alarm means. The signal means is usually for the purpose of indicating extremes of high or low level.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 110, 111, 113, and 228+ for float-operated mechanical liquid level signaling means, per se.

122, Liquid Heaters and Vaporizers, subclass 504.2 for boiler safety devices with alarms or indicators.

137, Fluid Handling, subclass 558, for fluid handling apparatus including a liquid level responsive signal or indicator.

308 This subclass is indented under subclass 307. Combinations wherein the signal is electrically operated.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclass 84 for float operated switches, per se.

340, Communications: Electrical, subclasses 618+ for nonquantitative alarms responsive to liquid level.

309 This subclass is indented under subclass 305. Gauges wherein the level or depth is determined by measuring the buoyant effort exerted by the liquid upon a buoyant body.

SEE OR SEARCH CLASS:

177, Weighing Scales, subclass 207 for a weigher operated by the displacement of liquid.

310 This subclass is indented under subclass 305. Gauges having registering means to totalized the upward and/or downward movements of the float so as to obtain a total of the liquid added to and/or removed from a reservoir.

SEE OR SEARCH THIS CLASS, SUBCLASS:

217, through 226, for tank type meters wherein floats are employed to operate a register to obtain a total of the number of times the tank is filled.

SEE OR SEARCH CLASS:

235, Registers, for registering means, per se.

311 This subclass is indented under subclass 305. Gauges having more than one float. These floats may operate on the same liquid, on liquids in different reservoirs or on liquids of different specific gravity in the same reservoir. One or several indicating means may be pro-

vided to indicate the level or levels of the liquid or liquids or their differences in level.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861+, for multiple float gauges employed to measure differences in head on flow meters; see the volume or rate of flow meters in this class, principally subclasses 861.42-861.69 and 227.

312 This subclass is indented under subclass 305. Gauges having means for making a permanent record of the float movements.

SEE OR SEARCH CLASS:
346, Recorders, for pertinent subclass(es) as determined by schedule review.

313 This subclass is indented under subclass 305. Gauges having an indicator which is operated by the float through the medium of electrical means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
301, and 308, for other liquid level or depth gauges with electrical signals or indicators.

SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, subclass 84 for float operated switches, per se.
338, Electrical Resistors, subclass 33 for a resistor having a float actuator responsive to a change in the level of a liquid.
340, Communications: Electrical, subclasses 870.01+, for electric telemetric systems, per se.

314 This subclass is indented under subclass 305. Gauges having means operable to sense or feel the position of the float as distinguished from indicating means which are operatively connected with the float for continuous control thereby. The sensing means is usually manually operable.

315 This subclass is indented under subclass 305. Gauges wherein means is provided to lock the float against motion. Locking is usually maintained to prevent motion of the float during surging of the liquid, or to fix the float until a reading is completed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
314, for float gauges wherein the float is locked during sensing of the float position.

SEE OR SEARCH CLASS:
43, Fishing, Trapping, and Vermin Destroying, subclasses 44.87+ for floats used on fishing lines functioning to control and support the line and having means to permit selective free sliding or affixing of the float on the line.

316 This subclass is indented under subclass 305. Gauges wherein the movement of the float in response to changes in liquid level is transmitted to the indicator through the medium of a hydraulic or pneumatic transmission means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
299, for hydrostatic pressure type gauges.

SEE OR SEARCH CLASS:
60, Power Plants, subclasses 325+ for fluid transmission means, per se.

317 This subclass is indented under subclass 305. Gauges wherein the float is mounted upon an arm which is in turn pivoted.

318 This subclass is indented under subclass 317. Gauges wherein the motion of the float is transmitted to the indicator through a flexible cable or Bowden wire transmission.

SEE OR SEARCH THIS CLASS, SUBCLASS:
321, for flexible cables in another combination.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 500.5+ for flexible transmissions, per se.

319 This subclass is indented under subclass 305. Gauges wherein the float reciprocates vertically or substantially vertically in following the liquid level.

320 This subclass is indented under subclass 319. Gauges wherein the motion of the indicator is derived from a reciprocally guided float coacting with a spiral or similar cam surface.

321 This subclass is indented under subclass 319. Gauges wherein the motion of the float is transmitted to the indicator through a flexible cable or Bowden wire transmission.

SEE OR SEARCH THIS CLASS, SUBCLASS:
318, for flexible cables in another combination.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclasses 500.5+ for flexible transmissions, per se.

322 This subclass is indented under subclass 319. Gauges wherein the motion of the float is indicated by a stem attached to and bodily movable with said float and projecting usually upwardly or downwardly therefrom.

322.5 This subclass is indented under subclass 305. Device comprising the structure of the sensing means with or without its mounting or operating connection.

SEE OR SEARCH CLASS:
43, Fishing, Trapping, and Vermin Destroying, subclasses 43.1+ for fishing float, per se.
441, Buoys, Rafts, and Aquatic Devices, subclasses 1+ for marine buoys and floats.

323 This subclass is indented under subclass 290. Gauges whereby the liquid level may be directly viewed. The gauges may comprise either a transparent plate fastened over an opening in the reservoir wall or a tube transparent at least in part and so communicating with the reservoir that the liquid in the reservoir and tube may assume a common level. The term "glass", as employed in these definition, is intended to include any transparent material.

(1) Note. Similar devices employed for determining the level of dry fluent materials are here included.

(2) Note. For structures similar to sight glasses, such as tubular ullage rods or sampling tubes, insertable into a liquid to determine depth or to take a sample, but not permanently attached to the reservoir, see Class 33, Geometrical Instruments, subclasses 717+ and this class (73) subclasses 864+.

SEE OR SEARCH THIS CLASS, SUBCLASS:
299, for hydrostatic pressure type gauges.
747+, for U-tube pressure gauges.
864+, see (2) Note.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, see Note 2.
138, Pipes and Tubular Conduits, for glass tube structure, per se, not limited to use as a gauge glass.
184, Lubrication, subclasses 96+ for similar structures employed with sight feed lubricators.
220, Receptacles, subclass 82, and see the notes thereto, for structures wherein a transparent panel is mounted in a wall.
359, Optics: Systems (Including Communication) and Elements, subclasses 894+ for transparent closures, in general.

324 This subclass is indented under subclass 323. Glasses having a cleaning apparatus or implement incorporated therewith for cleaning the sight glass, sight tube or its connecting passages.

SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, subclasses 104.03+ for tube cleaning implements, per se.

325 This subclass is indented under subclass 323. Sight glasses provided with a guard or casing for protecting the glass or for catching the flying glass particles when the glass bursts.

SEE OR SEARCH THIS CLASS, SUBCLASS:

293, wherein are classified guards or casings having illuminating means incorporated therewith.

330, and 334, for the transparent closure plate type of gauge glasses which are usually provided with clamping means which project outward from the glass and in a sense form a guard.

326 This subclass is indented under subclass 325. Sight glasses with guards wherein the gauge glass is of the type commonly employed in boiler installations and comprises a tubular conduit, transparent at least in part, connected at one end to the space above the liquid in the reservoir and at the other end to the reservoir below the normal liquid level so that the pressures on the liquid in the reservoir and gauge glass may be equalized.

327 This subclass is indented under subclass 323. Sight glasses having means for reflecting or magnifying the liquid in the glass. The reflection or magnification may be accomplished by prismatic formations integral with the glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

293, for reflectors or magnifiers incorporated with illuminating means.

SEE OR SEARCH CLASS:

359, Optics: Systems (Including Communication) and Elements, subclasses 642+ for lenses, per se, and subclasses 838+ for mirrors, per se.

374, Thermal Measuring and Testing, subclass 191 for a reflecting or magnifying element combined with an indicating tube type thermometer, and subclass 193 for an indicating tube type thermometer in which the tube has a cross section causing it to act as an optical element.

328 This subclass is indented under subclass 323. Glasses of the type commonly employed in boiler installations and comprising a tubular conduit, transparent at least in part, connected at one end to the space above the liquid in the reservoir and at the other end to the reservoir below the normal liquid level so that the pressures on the liquid in the reservoir and gauge may be equalized.

SEE OR SEARCH THIS CLASS, SUBCLASS:

293, and 326, for boiler type glasses equipped with guards or casings.

297, for boiler glasses combined with water columns.

299+, for sight glass structure, in hydrostatic pressure gauges.

747+, for U-tube pressure gauges.

SEE OR SEARCH CLASS:

285, Pipe Joints or Couplings, principally subclasses 238+, for packed boiler glass joints, per se.

329 This subclass is indented under subclass 328. Gauges comprising a plurality of transparent portions connected either seriatim for use in determining levels at different ranges, or in multiple so that they may be selectively employed to indicate over the same range.

330 This subclass is indented under subclass 328. Boiler gauges wherein the transparent portion is in the form of at least one closure mounted over an aperture in the tubular conduit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

334, for similar closures mounted directly upon the reservoir wall.

SEE OR SEARCH CLASS:

220, Receptacles, subclasses 377+, 602 and 662+ see the notes thereto, for structures wherein a transparent panel is mounted in a wall.

331 This subclass is indented under subclass 330. Gauges wherein the transparent closure means is in the form of one or more disks commonly called “bull's eyes”.

332 This subclass is indented under subclass 328. Boiler type glasses wherein improvements are claimed in the manner in which the glasses are provided with valves. The valves are usually manipulable so that the transparent portion may be cleaned by blowing off steam therethrough or whereby the transparent portion

may be isolated from the reservoir to permit replacement of the transparent section.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 559 for sight glasses combined with valves or other fluid handling apparatus.

251, Valves and Valve Actuation, appropriate subclasses for hand manipulable valves, per se.

333 This subclass is indented under subclass 332. Boiler type glasses having provision for automatically closing the valves to isolate the transparent section when breakage occurs.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 329.1 and 329.2+ for automatic gauge valves, per se, and subclasses 455+ for valves which are responsive to change in line condition.

334 This subclass is indented under subclass 323. Glasses mounted directly over an opening in the wall of a container or reservoir.

SEE OR SEARCH THIS CLASS, SUBCLASS:

330, for similar transparent closure plates mounted over apertures in tubes.

427+, for graduated measuring vessels.

SEE OR SEARCH CLASS:

220, Receptacles, subclasses 377+, 602 and 662+ see the notes thereto, for structures wherein a transparent panel is mounted in a wall.

335.01 With optical element:

This subclass is indented under subclass 29.02. Subject matter including a device which changes its optical property in response to radiant energy.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54.13, for determining viscosity by measuring a time interval of travel or flow rate using an orifice, nozzle, or extrusion means wherein there is disclosed detail of a means whose optical character changes due to a change in a physical phenomenon associated with the liquid whose viscosity is being measured.

866.5, for a sensor means, per se.

SEE OR SEARCH CLASS:

250, Radiant Energy, appropriate subclasses for a photocell detector, per se, subclasses 564+ for circuits for evaluating a liquid by means of measuring invisible light which has been modified as a result of the irradiation of the liquid thereby and subclasses 573+ for an optical or pre-optical system having a liquid in the path thereof wherein the modification of or the emission of radiant energy resulting from the irradiation of the liquid is tested.

356, Optics: Measuring and Testing, subclasses 438+ for an apparatus or a process for determining the moisture content of a gas by measuring visible light transmission or absorption and involving no other manipulation other than that necessary for an optical test for Class 356.

359, Optics: Systems (Including Communication) and Element, appropriate subclass, for an detector, per se.

335.02 With electric circuitry or electric circuit component detail:

This subclass is indented under subclass 29.02. Subject matter wherein significance is attributed to an electric circuit arrangement or to an electric circuit component having a parameter which is varied due to the effect of the humidity thereon.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, appropriate subclasses for a device wherein the atmosphere or gas changes in electrical conductance in response to humidity and such property is taken as a measure of humidity. Where no electrical property of the material under test is measured but an additional element is exposed to the material to have its electrical properties affected by a physical property of the material and an electrical property of the additional element is measured,

the art is in Class 73, Measuring and Testing.

338, Electrical Resistors, subclass 35 for electrical resistors whose resistance value is responsive to humidity or change in humidity.

335.03 Impedance:
This subclass is indented under subclass 335.02. Subject matter wherein the parameter is the impedance of the circuit or the circuit component.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 600+ for an apparatus or process for determining the moisture content of a material by measuring impedance, admittance or a related quantity of the material and particularly subclasses 664 and 689 for determining the moisture content of a material by measuring the resistance or the conductivity of a material in order to measure its moisture content.

335.04 Capacitance:
This subclass is indented under subclass 335.03. Subject matter wherein the parameter is the capacitance of the circuit or of the component.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 664 and 689 for determining the water content of a material by measuring the capacitance of the material.

335.05 Resistance or conductivity:
This subclass is indented under subclass 335.03. Subject matter wherein the parameter is either resistance or conductivity.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 691+ for an apparatus for determining the moisture content of a material by measuring the resistance or the conductivity of the material.

338, Electrical Resistors, subclass 35 for an electrical resistor whose resistance value is responsive to humidity or change in humidity.

335.06 Wet and dry responsive elements:
This subclass is indented under subclass 29.02. Subject matter wherein determination is made by measuring the difference in the temperature of aell detectors, per se, reduced by evaporation of a liquid and the temperature of a dry member.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, subclass 28 for a dew point measuring, per se, subclass 109 for a temperature measurement involving a composite climate-temperature related measurement and subclasses 142+ for a combination of a hygrometer and temperature measuring device.

335.07 With direct readout or calculator detail:
This subclass is indented under subclass 335.06. Subject matter wherein significance is attributed to either means for providing at an immediate glance a single observation of the difference in the temperature of the wet responsive element and the dry responsive element or to means manipulated in such a manner as to provide at an immediate glance a single observation of the difference in the temperature of the wet responsive element and the temperature of the dry responsive element.

SEE OR SEARCH CLASS:

235, Registers, appropriate subclass for a register, per se, for detecting the relative humidity from a psychrometer reading or for a register combined with conventional nominally recited elements of hygrometer.

377, Electrical Pulse Counter, Pulse Dividers, or Shift Registers: Circuits and Systems, subclasses 9+ for a pulse counter, per se, for a hygrometer or the combination of a conventional hygrometric element recited in name only.

335.08 Wet bulb detail:
This subclass is indented under subclass 335.06. Subject matter wherein significance is attributed to the member whose temperature is reduced by evaporation.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, subclass 28 for a dew point hygrometer with a wet responsive member detail.

335.09 Relative air motion creating means (e.g., sling psychrometer):

This subclass is indented under subclass 335.08. Subject matter including means which causes air or another type gas to pass over the wet responsive member.

SEE OR SEARCH CLASS:

454, Ventilation, appropriate subclass for ventilation means, per se.

335.11 Expanding-sorption element:

This subclass is indented under subclass 29.02. Subject matter wherein significance is attributed to a humidity responsive means which expands in response to absorbing moisture.

335.12 Coiled or twisted:

This subclass is indented under subclass 335.11. Subject matter wherein the humidity responsive means comprises a hygroscopic material attached to a circular or spiral shaped member which winds or unwinds due to changed in dimensions in the hygroscopic material in response to absorption of humidity.

335.13 Arcuate or elongated:

This subclass is indented under subclass 335.11. Subject matter wherein the humidity responsive means comprises a member which changes in shape from a straight form to either a spiral lying in a substantially single plane or to a convex or a concave form upon absorption of humidity.

335.14 Tensioned:

This subclass is indented under subclass 335.11. Subject matter including means for stretching tightly the humidity responsive means.

379.01 MUSCULAR FORCE (E.G., STRENGTH TESTING, EXERCISING OR TRAINING EFFORT, ETC.):

This subclass is indented under the class definition. Subject matter comprising an apparatus or method for determining a force exerted by a living being.

SEE OR SEARCH THIS CLASS, SUBCLASS:

760+, for stress or strain measuring, or measuring by using stress or strain.

SEE OR SEARCH CLASS:

116, Signals and Indicators, appropriate subclass for a mechanical alarm which produces a humanly perceptible signal in response to a predetermined force; especially, subclass 212 for a similar indicator which is responsive to the presence or absence of stress.

128, Surgery, subclasses 774+ for measuring a force exerted by a living being in order to determine a health condition of the living being.

340, Communications: Electrical, subclasses 573.1+ for an electrical indicator which produces a humanly perceptible signal in response to the attainment of a predetermined condition of a human being or an animal and subclass 665 for an electrical indicator which produces a humanly perceptible signal in response to the attainment of a predetermined mechanical force.

473, Games Using Tangible Projectile, subclasses 131+ for a golf practice device having force-measuring means and subclasses 422+ for a practice or training device for a playing field or court game (e.g., baseball, football, tennis, etc.) which may include a force-measuring means.

482, Exercise Devices, subclasses 92+ for means upon which muscular strength may be exerted, but not provided with indicators movable in proportion to the force exerted, and subclasses 114+ for a user manipulated force resisting mechanism or element.

601, Surgery: Kinesitherapy, subclasses 23+ for exercising appliances.

379.02 Jaw or hand (e.g., gripping, pinching, or biting):

This subclass is indented under subclass 379.01. Subject matter wherein the force is exerted by either a muscle controlling a jaw or

by a muscle controlling a hand of the living being.

SEE OR SEARCH CLASS:
128, Surgery, subclasses 774+ for a device for measuring a force exerted by a jaw or a hand for diagnosing a condition of the body.
433, Dentistry, subclasses 68+ for means for recording or indicating jaw movement or position.
601, Surgery: Kinesitherapy, subclass 40 for an exercising appliance for a hand or a finger.

379.03 Using a resilient force-resister:
This subclass is indented under subclass 379.02. Subject matter wherein the exerted force is applied to a movable component and an elastically deformable member is used to restrict or retard movement thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.621+, for measuring force by measuring elastic deformation.

SEE OR SEARCH CLASS:
482, Exercise Devices, subclasses 92+ for a user manipulated force-resisting mechanism or element.

379.04 Impact:
This subclass is indented under subclass 379.01. Subject matter wherein the force being determined is a sudden blow exerted by the living being.

SEE OR SEARCH THIS CLASS, SUBCLASS:
12.01, for testing by impact, per se.
862.381, for force measuring, per se.

SEE OR SEARCH CLASS:
116, Signals and Indicators, subclass 203 for a device which indicates that an impact has occurred.

379.05 Using a resilient force-resister:
This subclass is indented under subclass 379.04. Subject matter wherein the exerted force is applied to a movable component and an elastically deformable member is used to restrict or retard movement thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.621, for measuring force by measuring elastic deformation.

SEE OR SEARCH CLASS:
482, Exercise Devices, subclasses 92+ for an exercising device which includes a user manipulated force-resisting mechanism or element.

379.06 Including a rotary element with a braking means (e.g., friction brake):
This subclass is indented under subclass 379.01. Subject matter wherein the exerted force drives a rotatable member and a brake is used to resist rotation.

SEE OR SEARCH CLASS:
188, Brakes, appropriate subclass for a brake, per se.

379.07 Pedal driven (e.g., cycle ergometer):
This subclass is indented under subclass 379.06. Subject matter wherein the rotatable member is driven by a pedal to which the exerted force is applied.

SEE OR SEARCH CLASS:
482, Exercise Devices, subclasses 57+ for a bicycle-type exercising device.

379.08 Using a resilient force-resister:
This subclass is indented under subclass 379.01. Subject matter wherein the exerted force is applied to a movable component and an elastically deformable member is used to restrict or retard movement thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.621, for measuring force by measuring elastic deformation.

SEE OR SEARCH CLASS:
482, Exercise Devices, subclasses 92+ for an exercising device which includes a user manipulated force-resisting mechanism or element.

379.09 Using hydraulic or pneumatic force-resister: This subclass is indented under subclass 379.01. Subject matter wherein the exerted force is applied to a movable component and a fluid is used to restrict or retard movement thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.581, for a force measuring device utilizing fluid pressure.

382 This subclass is indented under the class definition. Subject matter for determining the force of gravity by direct measurement or by comparison or by determining acceleration caused by gravity.

SEE OR SEARCH CLASS:
434, Education and Demonstration, subclasses 300+, for apparatus for demonstrating gravitational force but wherein no measurement is taken.

383 This subclass is indented under subclass 382. Subject matter in the form of torsion balances wherein masses mounted upon a beam transit a force to a wire supporting the beam to produce a torque in said wire proportional to the gravitational force. These are frequently called Eotvos type balances.

384 This subclass is indented under the class definition. Barometers, i.e., devices for determining atmospheric pressure whether calibrated in units of barometric pressure or altitude.

(1) Note. Altimeters (other than the barometric type) are classified in other classes in accordance with the means employed to make the distance measurement, see the notes below.

SEE OR SEARCH THIS CLASS, SUBCLASS:
700+, for other pressure gauges, and see the notes thereto.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, for pertinent subclass(es) as determined by schedule review.
181, Acoustics, subclass 124, for mechanical sound echo altimeters.
367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 99+ for sound echo altimeters.

385 This subclass is indented under subclass 384. Barometers in which a mercury column is displaced by changes in atmospheric pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
747+, for U-tube, liquid column pressure gauges.

386 This subclass is indented under subclass 384. Barometers in which the pressure responsive element is in the form of an exhausted container having a wall or portion thereof movable with pressure changes.

387 This subclass is indented under subclass 386. Barometers having means for adjusting the setting of the indicator.

(1) Note. These are frequently used on aircraft as altimeters, the zero point being set for the actual pressure existing at a landing field, without regard to altitude of the air field.

SEE OR SEARCH THIS CLASS, SUBCLASS:
740, for Bourbon type fluid pressure gauges having setting features.

426 This subclass is indented under the class definition. Devices for receiving bulk material for the purpose of measurement of volume (e.g., measuring cups, measuring spoons, and similar devices). The indication of the quantity of material may consist only in the measure being full or only a single mark or level indication may be provided.

SEE OR SEARCH CLASS:
30, Cutlery, subclasses 128, 141, 147, 149, 150, and 324 for spoons.
222, Dispensing, and see the notes thereto for means for discharging measured quantities from a supply and for measuring vessels provided with claimed features which have the disclosed

function of performing a dispensing operation.

294, Handling: Hand and Hoist-Line Implements, subclass 55 for scoops.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 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.)

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 238+ for shaping apparatus comprising a dough divider including a shaping chamber and subclasses 276+ for an ice cream scoop type of measuring and shaping means.

427 This subclass is indented under subclass 426. Measuring vessels provided with two or more calibrations or other means to indicate the quantity of material in the measure.

SEE OR SEARCH CLASS:

215, Bottles and Jars, subclasses 365+ for those having indicating means.

222, Dispensing, subclasses 154+ for those having means for permitting inspection of the amount of material within the dispenser, many having graduations.

428 This subclass is indented under subclass 427. Measuring vessels in which the indicating means is readily removable from the container in which the material to be measured is received.

429 This subclass is indented under subclass 426. Measuring vessels in which the vessel is provided with movable bottom or other means to alter the size of the vessel to adapt it when filled to measure material in units of volume depending upon the amount of adjustment.

SEE OR SEARCH CLASS:

220, Receptacles, subclasses 4.01+ for sectional receptacles whose capacity may be adjusted.

430 This subclass is indented under the class definition. Subject matter directed to the dampening of vibrations within the mechanisms of instruments to effect a steady indication.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514.12+, for fluid or fluent material dampening of inertial element in an acceleration measuring apparatus.

514.14, for vibration dampening in an inertial-type acceleration measuring apparatus.

739, for Bourdon tube fluid pressure gauges with dampening means.

SEE OR SEARCH CLASS:

188, Brakes, subclasses 297+ for a dashpot or shock absorber of general utility.

431 This subclass is indented under the class definition. Casing structures for instruments .

SEE OR SEARCH THIS CLASS, SUBCLASS:

201, for meter boxes.

273, for volume or rate of flow meter casings.

SEE OR SEARCH CLASS:

248, Supports, subclasses 27.1+ support instruments in panels.

368, Horology: Time Measuring Systems or Devices, subclasses 276+ for clock and watch cases.

374, Thermal Measuring and Testing, subclass 208 for housings or supports, per se, which are peculiarly adapted for thermal measuring or testing instruments.

432.1 MISCELLANEOUS:

This subclass is indented under the class definition. Subject matter not provided for elsewhere.

433 This subclass is indented under subclass 32. Devices including a weighing feature.

SEE OR SEARCH CLASS:
177, Weighing Scales, appropriate subclasses, for weighing structure of general utility.

434 This subclass is indented under subclass 433. Devices with means to continuously supply or circulate fluid under test.

435 This subclass is indented under subclass 433. Devices having plural supports for the specimen whereby different determinations are independently or successively made.

436 This subclass is indented under subclass 435. Devices in which the specimen holders are suspended vertically from a common support.

437 This subclass is indented under subclass 433. Devices involving the immersion of a solid in a liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
435, for plural supports one of which provides for submersion of a solid in a liquid.

438 This subclass is indented under subclass 32. Devices operating on the principle of measurement of the hydrostatic pressure of a fixed head of test material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
299+, for similar art where the density is constant and the hydrostatic pressure is an index of liquid level.

439 This subclass is indented under subclass 438. Devices having a submerged tube from which escape gas bubbles, the resistance to which is a measure of the specific gravity of the submerging liquid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
302, for similar devices for measuring liquid level.

440 This subclass is indented under subclass 32. Devices involving a plurality of floats of different densities for seriatim response.

441 This subclass is indented under subclass 32. Devices including a chamber of barrel, usually transparent, containing a free float, and hand manipulable means to draw the test fluid into the chamber.

442 This subclass is indented under subclass 441. Devices including a thermometer subjected to the fluid under test for use in correcting the float reading.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclass 156 for a float supported thermometer, in general.

443 This subclass is indented under subclass 442. Devices including calculator mechanism or chart means for computing corrected reading, for predicting freezing temperature of the test liquid or amount of antifreeze required to protect to a certain temperature.

444 This subclass is indented under subclass 32. Devices comprising a vertically reciprocable float, with or without guides, the movement of which is uninhibited by spring, weight beam, indicator actuation or other load.

(1) Note. In apparatus of this subclass the float usually has a co-axial indicator stem or reference indicium which is read relative to the surface of the liquid or other base point or the position of the float as a whole may be visually observed.

445 This subclass is indented under subclass 444. Devices wherein provision is made for the continuous supply or circulation of test fluid to the float unit.

446 This subclass is indented under subclass 444. Devices having means to draw test fluid into a chamber containing the float.

SEE OR SEARCH THIS CLASS, SUBCLASS:
441, for portable syringe type devices.

447 This subclass is indented under subclass 444. Devices having liquid level responsive means to indicate liquid level or to adjust the hydrometer reading in accordance with varying liquid level.

448 This subclass is indented under subclass 444. Devices comprising a float unit, per se.

SEE OR SEARCH THIS CLASS, SUBCLASS:
305+, for a float for measurement of liquid level.
322.5, for float structure, per se.

449 This subclass is indented under subclass 448. Devices including thermometer or thermal compensation element carried by the float.

SEE OR SEARCH THIS CLASS, SUBCLASS:
442+, for syringe type apparatus with thermometers.

450 This subclass is indented under subclass 448. Devices wherein the float includes means for attaching, carrying or receiving the specimen under test.

SEE OR SEARCH CLASS:
177, Weighing Scales, subclass 207, for a weigher employing the lifting effect of a liquid on a displacing body.

451 This subclass is indented under subclass 32. Devices wherein a float operates or controls an indicator apart from the float itself.

SEE OR SEARCH THIS CLASS, SUBCLASS:
305+, for a float responsive to liquid level operating a separate indicator.

452 This subclass is indented under subclass 451. Devices with means to continuously supply or circulate fluid under test to the float.

SEE OR SEARCH THIS CLASS, SUBCLASS:
434, and 445, for similar supply means on other types of specific gravity testers.

453 This subclass is indented under subclass 451. Devices having electrical means associated with the float for indicating the specific gravity.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclass 33, for electrical resistors with a float actuator.

454 This subclass is indented under subclass 451. Devices wherein the float is pivotally mounted.

455 This subclass is indented under subclass 66. Subject matter relating to propellers, impellers, and fluid couplings.

SEE OR SEARCH THIS CLASS, SUBCLASS:
147, for a study of aerodynamic and hydrodynamic properties of propellers and impellers.

456 This subclass is indented under subclass 455. Subject matter in which the object under study consists of a single propeller blade.

SEE OR SEARCH THIS CLASS, SUBCLASS:
65.01+, for analogous art pertaining to the determination of the center of gravity and turning moments of bodies.

457 This subclass is indented under subclass 66. Subject matter in which study of the rotor unbalance is made without removing the device from its normally operative position.

458 This subclass is indented under subclass 457. Subject matter wherein the rotor unbalance is determined by imposing known counterbalance effects thereon, neutralizing said rotor unbalance.

459 This subclass is indented under subclass 66. Subject matter combining successively static balancing (poising) and dynamic (spinning) operations.

460 This subclass is indented under subclass 66. Subject matter for determination of rotor unbalance by spinning the same and studying its vibratory effects.

461 This subclass is indented under subclass 460. Subject matter wherein the object is rotated to locate end points on the rotor where the axis of rotation and the axis of gyration of the rotor coincide.

462 This subclass is indented under subclass 460. Subject matter comprising electrical sensing and indicating means.

463 This subclass is indented under subclass 462. Subject matter including a wattmeter.

464 This subclass is indented under subclass 462. Subject matter including a rotatable switch or commutator means energized by vibration pick-up means.

465 This subclass is indented under subclass 462. Subject matter comprising a cathode ray oscilloscope.

466 This subclass is indented under subclass 462. Subject matter wherein there is included stroboscopic illuminating means.

467 This subclass is indented under subclass 466. Subject matter comprising a stroboscope for illuminating said indicator.

468 This subclass is indented under subclass 460. Subject matter wherein rotor unbalance is determined by application of known counterbalancing forces sufficient to neutralize the innate unbalance of the rotor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
458, for similar unbalance determinations concerning rotors in situ.

469 This subclass is indented under subclass 468. Subject matter including a test counterbalance weight of known value adjustable radially of its axis of rotation.

470 This subclass is indented under subclass 468. Subject matter where a weight of known value is adjustable circumferentially of the rotor under test.

471 This subclass is indented under subclass 460. Subject matter comprising special vibratable features of the support in which the rotor is held while under test.

472 This subclass is indented under subclass 471. Subject matter wherein the mount supports the rotor with both ends of the rotor free to wabble under unbalance.

473 This subclass is indented under subclass 472. Subject matter wherein means is provided for mounting the test rotor on a horizontal axis.

474 This subclass is indented under subclass 471. Subject matter wherein there is means for mounting the rotor with one end of the rotor free to gyrate under unbalance, thus permitting the free end of the rotor to tilt universally. The axis of rotation is usually vertical.

475 This subclass is indented under subclass 471. Subject matter wherein means is provided for mounting the test rotor on a horizontal axis, while usually permitting vibration in a single plane.

476 This subclass is indented under subclass 475. Devices which vibrate horizontally about a vertical fulcrum.

477 This subclass is indented under subclass 476. Subject matter wherein provision is made for mounting the test rotor to vibrate substantially in a single plane, with both ends of the rotor free to partake of vibration.

478 This subclass is indented under subclass 477. Subject matter including selective end locks for restriction of vibration of either end of the rotor as desired.

479 This subclass is indented under subclass 475. Subject matter wherein provision is made for permitting vibration thereof vertically about a horizontal fulcrum.

480 This subclass is indented under subclass 66. Subject matter wherein the rotor is mounted with its spin axis horizontal and any gravitational moment resulting from an unbalanced distribution of mass causes the rotor to turn about its normal rotational or spin axis.

481 This subclass is indented under subclass 480. Subject matter wherein the rotor mounting means are of the nature of ways, tracks or parallel knife edges.

482 This subclass is indented under subclass 66. Subject matter wherein the rotor is mounted with its spin axis vertical and any gravitational moment resulting from an unbalanced distribution of mass causes the rotor to tilt about an axis transverse to its rotational or spin axis.

(1) Note. Usually the rotor is supported by horizontally spaced mounts, as knife edges, which restricts the direction of tilt to a single plane.

483 This subclass is indented under subclass 482. Subject matter wherein the rotor is so freely supported that the gravitational moment selects the axis about which the rotor tilts.

484 This subclass is indented under subclass 483. Subject matter including tapered or conical rotor centering means.

485 This subclass is indented under subclass 483. Subject matter including expansible or contractible rotor centering means.

486 This subclass is indented under subclass 483. Subject matter wherein the test rotor is pendently supported by a flexible element, gimbals or equivalent suspension means.

487 This subclass is indented under subclass 66. Tools and adjuncts used in the determination of rotor unbalance and not elsewhere classifiable.

488 This subclass is indented under the class definition. Subject matter comprising a process or an apparatus for detecting or determining either (a) a time rate of change of position of a body (speed or velocity) or (b) a change in the time rate of change of speed or velocity of a body (acceleration).

(1) Note. A process or an apparatus for determining or measuring direction of motion not elsewhere classified is found here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1.37+, for proving or calibrating a device which determines speed, velocity, or acceleration.
121+, for vehicle brake testing.
167+, for testing of a projectile.
178+, for a navigational instrument.
652+, for apparatus for sensing vibrations by an inertial element.
861+, for means measuring rate of flow of a fluid.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 231 and 232, for straight-line-light ray sighting instruments involving speed; subclasses 300+, for direction sensing and indicating instruments which may involve speed, particularly subclasses 318+ wherein a gyroscope is utilized for controlling or stabilizing purposes; and subclasses 391+ for pendulums which may respond to and be calibrated in terms of acceleration.
74, Machine Element or Mechanism, subclass 3 for a speed controlled trip.
91, Motors: Expansible Chamber Type, subclass 435 and see the search there noted for expansible chamber motors involving speed control.
116, Signals and Indicators, subclass 37 for an indicator of vehicle speed and direction; subclass 57 for a vehicle speed limit indicator; subclass 74 for a speed limit alarm; and subclasses 200+ for a speed limit indicator.
123, Internal-Combustion Engines, subclasses 319+ for a speed regulator particularly associated with an internal combustion engine, and subclasses 364+ and 441 for a governor controlled charge forming device.
137, Fluid Handling, subclasses 38+ for flow control by response to inertia of the system; and subclasses 47+ for a speed responsive valve.
164, Metal Founding, subclasses 151.1 and 154.3 for an apparatus to cast metal in combination with a speed sensor.
180, Motor Vehicles, subclasses 170+ for a motor vehicle having means which is

responsive to its speed for regulating the vehicle's rate of travel.

188, Brakes, subclasses 180+ for a speed responsive brake.

192, Clutches and Power-Stop Control, subclass .02 for automatic control of a motor and clutch by speed, and subclass 103 for a speed responsive clutch.

200, Electricity: Circuit Makers and Breakers, subclasses 61.45+ for an inertia or tilt switch and subclass 80 for a centrifugal switch.

246, Railway Switches and Signals, subclass 182 for a railway speed control system.

254, Implements or Apparatus for Applying Pushing or Pulling force, subclass 267 for a speed control particularly associated with a drum of a cable hoist.

303, Fluid-Pressure and Analogous Brake Systems, subclasses 121+ for speed responsive means particularly associated with a fluid-pressure brake system.

318, Electricity: Motive Power Systems, subclasses 66+ for running speed control of plural electric motors; subclasses 90+ for acceleration control of plural motors; subclasses 255+ for diverse motor controls including speed control; and subclasses 461+ for speed control and/or starting or stopping.

322, Electricity: Single Generator Systems, subclasses 29+ for electric generator speed control means.

324, Electricity: Measuring and Testing, subclasses 160+ for electrical speed measuring.

340, Communications: Electrical, subclasses 670+ for an electrical signal or alarm responsive to speed.

356, Optics: Measuring and Testing, subclasses 27+ for velocity or velocity and height measuring devices, and subclass 29 for devices with a optical element or reticule which respond to the relative velocity of a remote object.

361, Electricity: Electrical Systems and Devices, subclasses 236+ for an electrical speed responsive system.

388, Electricity: Motor Control Systems, subclasses 800+ and 825+ for single motor running-speed control systems with, and without feedback, respectively.

417, Pumps, subclass 293 for a speed responsive device particularly associated with a pump.

418, Rotary Expansible Chamber Devices, subclasses 40+ for speed controlled rotary expansible chamber devices.

700, Data Processing: Generic Control Systems or Specific Applications, subclass 304 for speed control.

489 This subclass is indented under subclass 488. Apparatus wherein the interaction of two measured variables is recorded.

490 This subclass is indented under subclass 488. Apparatus including means for registering distance traveled.

SEE OR SEARCH CLASS:

235, Registers, subclass 95 for an odometer, per se.

491 This subclass is indented under subclass 488. Apparatus including means whereby indicia of the speed responsive device hold a reading.

492 This subclass is indented under subclass 491. Apparatus wherein the reading retained is that of maximum acceleration.

493 This subclass is indented under subclass 488. Apparatus in which a speed responsive device is installed in, or has means mounting it on, an element of a disparate function device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

128, and 129, for means for attaching a brake testing device to a vehicle.

SEE OR SEARCH CLASS:

91, Motors: Expansible Chamber Type, subclass 435 and see the search there noted for expansible chamber motors with speed governors.

123, Internal-Combustion Engines, subclasses 319+ for a speed regulator installed on an internal combustion engine.

180, Motor Vehicles, subclasses 170+ as explained in the reference thereto appearing in subclass 488 above.
187, Elevator, Industrial Lift Truck, or Stationary Lift for Vehicle, subclasses 373+ for a speed controlled brake installed on an elevator.
248, Supports, subclasses 27.1+ for instrument mounting means of more general application.
388, Electricity: Motor Control Systems, art collections 923+ for specific speed responsive feedback devices used with electric motors.
416, Fluid Reaction Surfaces (i.e., Impellers), subclasses 44+ for control means responsive to the rotation speed of an impeller.
464, Rotary Shafts, Gudgeons, Housings, and Flexible Couplings for Rotary Shafts, particularly subclasses 52+ for a flexible torque transmitting shaft and housing with means to couple said shaft and housing to an auxiliary housing.

494 This subclass is indented under subclass 493. Apparatus including a rotary element that is a functional part of both a speed responsive device and a disparate function device the speed of which is sensed.

495 This subclass is indented under subclass 488. Apparatus including indicators for different motion conditions, e.g., rate and direction.

SEE OR SEARCH CLASS:
116, Signals and Indicators, subclasses 37+ for speed controlled, vehicle motion and direction indicators.

496 This subclass is indented under subclass 488. Apparatus having means to minimize unsteadiness of the indicia which results from inertia, friction, elasticity, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
514.12, for fluid or fluent material dampening of an inertial element in an acceleration measuring apparatus.
514.14, for vibration dampening in an inertial-type acceleration measuring apparatus.
739, for vibration control means for pressure gauge indicia and subclass 430 for miscellaneous instrument dampening means.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclass 125 for means steadying the reading means of an electrical measuring and testing instrument.

497 This subclass is indented under subclass 488. Speed sensitive device which includes means to compensate for temperature change.

498 This subclass is indented under subclass 488. Apparatus including means by which an indicating element can be set or adjusted.

SEE OR SEARCH THIS CLASS, SUBCLASS:
740, for a dial or frame zeroizing adjustment for a pressure gauge.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclasses 198+ for adjustment of a mechanical temperature indicator.

499 This subclass is indented under subclass 488. Apparatus including means for illuminating an indicator.

SEE OR SEARCH CLASS:
362, Illumination, subclasses 23+ for a dial illumination.

500 This subclass is indented under subclass 488. Apparatus wherein a liquid surface actuates a speed condition reading means or itself indicates the speed value.

501 This subclass is indented under subclass 500. Apparatus wherein the indicating surface is that of a confined rotatable body of liquid.

502 This subclass is indented under subclass 488. Apparatus wherein pressure proportional to speed is communicated to a measuring device through a pipe external of the device.

503 This subclass is indented under subclass 488. Apparatus wherein speed valve is determined by means combining time and acceleration.

503.3 Gyroscope:

This subclass is indented under subclass 503. Subject matter wherein the means for determining speed by integrating time and acceleration comprises a wheel or a disc mounted to spin rapidly about an axis of spin and also free to rotate about one or both of two axes perpendicular to each other and to the axis of spin so that a rotation of one of the two mutually perpendicular axes results from the application of torque to the other when the wheel is spinning.

SEE OR SEARCH THIS CLASS, SUBCLASS:

504.02+, for an angular velocity or acceleration measuring means using a gyroscopic effect.

504.18, ,for speed and acceleration measuring means combined with a gyroscope.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 5+ for a gyroscope, per se, and especially subclass 5.43 for plural gyroscopes, per se, subclasses 5.37+ for a gyroscope control, and subclass 5.6 for a gyroscope, per se, having a pick off.

504.01 Angular rate using wave or beam motion (e.g., Sagnac type):

This subclass is indented under subclass 488. Subject matter including means producing a wave or a beam and wherein the wave or beam is propagated about an axis of rotation and the determination of the time rate of change in position of the body is made by measuring a parameter (e.g., phase) of the wave or beam.

(1) Note. The waves of this subclass includes acoustic, electron, entropy, ionic, electromagnetic waves, or microwaves.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514.28, for measuring acceleration of a body by modifying a change in a characteristic of a surface acoustical wave in accordance with a change in a property of an inertial mass due to acceleration of the body.

570+, for measuring or testing by vibration, per se.

SEE OR SEARCH CLASS:

356, Optics: Measuring and Testing , subclass 459 for a ring laser gyroscope.

504.02 Angular rate using gyroscopic or Coriolis effect:

This subclass is indented under subclass 488. Subject matter wherein the determination of the time rate of change in position of the body is made by (1) rotating or (2) linearly moving an inertial element with respect to the body and measuring reaction forces on the element produced by rotation of the body about an axis of rotation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

503.3, for a gyroscope for determining speed by integrating time and acceleration.

504.17, for measuring angular rate by use of a fluid vortex rate sensor.

504.18, for a speed, velocity, or acceleration measuring means combined with gyroscopic means.

514.39, for magnetic angular rate measuring apparatus not using a gyroscopic effect and wherein the magnetic means does not produce an electric signal.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 316+, for gyromagnetic compass and subclasses 318+ for gyroscopically controlled or stabilized geometrical instrument.

74, Machine Element or Mechanism, subclasses 5+ for a gyroscope, per se.

244, Aeronautics, subclass 79, for gyroscope actuated aircraft control, subclass 165 for a gyroscopic attitude control for a spacecraft.

250, Radiant Energy, subclass 231.12 for photocell apparatus comprising a gyroscopic light valve.

318, Electricity: Motive Power Systems, subclasses 648+ for a gyroscope used in platform stabilization.

340, Communications: Electrical, subclass 671 for an electrical indicating system providing a humanly perceptible sig-

nal in response to a predetermined angular velocity and including a gyroscope and wherein no quantitative indication of measurement is provided.

356, Optics: Measuring and Testing , subclass 459 for a ring laser gyroscope.

504.03 Multisensor for both angular rate and linear acceleration:

This subclass is indented under subclass 504.02. Subject matter wherein the inertial element also has an intrinsic or relational property which changes in response to acceleration of the body along a straight line and which can be used to measure the acceleration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

491, for a mechanical speed or acceleration measuring apparatus or method including means retaining a reading of maximum acceleration.

510, for a separate motion sensor in a mechanical speed measuring apparatus.

514.01, for an apparatus using an inertial element for determining acceleration, per se.

652, for an apparatus sensing vibrations by use of an inertial element.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 28+ for a mechanical indicator means, per se, which provides a humanly perceptible signal in response to acceleration and has no quantitative measuring means.

310, Electrical Generator or Motor Structure, subclass 329 for an inertia operated mechanical energy coupling means for a piezoelectric element or device.

324, Electricity: Measuring and Testing, subclass 162 for electrical speed measuring means including an electrical accelerometer which senses acceleration by means other than an inertial element.

340, Communications: Electrical, subclass 669 for an electrical indicator which provides a humanly perceptible signal in response to a predetermined acceleration and wherein no indication of a quantitative measurement is provided.

356, Optics: Measuring and Testing, appropriate subclass for the determination of acceleration by measuring visible light.

361, Electricity: Electrical Systems and Devices, subclasses 280+ for an acceleration responsive capacitor.

504.04 Vibratory mass:

This subclass is indented under subclass 504.03. Subject matter wherein the inertial member is caused to rapidly reciprocate or oscillate about an axis of motion.

SEE OR SEARCH THIS CLASS, SUBCLASS:

504.12+, for measuring the angular velocity, per se, of a body by means of measuring gyroscopic or Coriolis effects on a vibratory inertial mass.

514.15, for measuring acceleration by use of a vibratory inertial member.

514.21+, for measuring acceleration by utilizing a pendulum-type inertia element combined with rebalance means.

514.29, for measuring acceleration by use of a vibrating sensor.

514.36+, for measuring acceleration by means of a pendulum-type inertia element having no rebalance means.

570+, for measuring or testing by vibration, per se.

504.05 Fluid or fluent inertial mass (e.g., electrons, ions, plasma):

This subclass is indented under subclass 504.02. Subject matter wherein the inertial member comprises a liquid or a gaseous body or a plurality of particles exhibiting fluent characteristics.

(1) Note. Included here as a plurality of particles are electrons, ions, plasma, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514.03, for a fluid or fluent inertial mass having a property which changes in response to an angular acceleration of a body and which can be used to measure acceleration.

514.05+, for a fluid or fluent inertial member whose property changes in response to acceleration of a body and which property change can be used to measure acceleration.

504.06 Fluid jet:
This subclass is indented under subclass 504.05. Subject matter wherein the fluid inertial mass comprises a high velocity liquid or gaseous stream emitted through a narrow opening (e. g. nozzle).

504.07 Rotary:
Subject matter under 504.05 wherein the fluid inertial mass is caused to spin about an axis.

504.08 Rotary gyroscope:
This subclass is indented under subclass 504.02. Subject matter wherein the inertial member is caused to spin about an axis so as to comprise the spinning element of a gyroscope.

504.09 Gimbal support:
This subclass is indented under subclass 504.08. Subject matter comprising a ring element which supports the inertial member and permits the spin axis to precess about an axis perpendicular to the spin axis in response to angular rotation.

SEE OR SEARCH CLASS:
248, Supports, for a support, per se.

504.11 Flexible rotor or flexibly mounted rotor:
This subclass is indented under subclass 504.08. Subject matter wherein the inertial member comprises a rotor which either (a) bends within its elastic limit or (b) is supported by structure which bends within its elastic limit.

504.12 Vibratory mass:
This subclass is indented under subclass 504.02. Subject matter wherein the inertial member is caused to rapidly reciprocate or oscillate about an axis of motion.

SEE OR SEARCH THIS CLASS, SUBCLASS:
504.04, for a multisensor using a vibratory inertial mass for determination of both angular rate and linear acceleration by use of a gyroscopic or Coriolis effect.
514.15, for measuring acceleration by use of a vibratory inertial element.
514.21, for measuring acceleration by use of a pendulum-type inertia element wherein rebalance is recited.
514.29, for measuring acceleration by use of a vibratory sensor and utilizing an inertial mass.
514.36, for measuring acceleration by use of a pendulum-type inertia element wherein no rebalance is recited.
570+, for testing by vibration, per se.

504.13 Hollow circular-shaped inertial element:
This subclass is indented under subclass 504.12. Subject matter wherein the inertial member comprises an object having an annular-cross section.

504.14 Elongated element with spaced supports:
This subclass is indented under subclass 504.12. Subject matter wherein the inertial member comprises an extended member supported at at least two points along its extent by means for bearing weight.

504.15 Cantilever:
This subclass is indented under subclass 504.12. Subject matter wherein the inertial member comprises an elongated member having two ends and wherein only one of the ends is fixed.

504.16 Tuning fork:
This subclass is indented under subclass 504.15. Subject matter wherein the inertial member comprises a pair of cantilevered members which are connected to each other so as to form a tuning-fork-shaped structure.

504.17 Angular rate using a fluid vortex rate sensor:
This subclass is indented under subclass 488. Subject matter wherein the determination of the rate of change of position of the body about an axis is made by measuring vortical motion of a liquid or gaseous mass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.22+, for determining a volume or rate of flow of a fluid or fluent material by measuring vibration produced by an

interaction of the material with a vortex shredder.

504.18 With rotary gyroscope:
This subclass is indented under subclass 488. Subject matter including speed, velocity, or acceleration measuring combined with a wheel or a disc mounted to spin rapidly about an axis and also free to rotate about one or both of two axes perpendicular to each other and to the axis of spin.

SEE OR SEARCH THIS CLASS, SUBCLASS:
503.3, for determining speed or velocity by utilizing a gyroscope integrating time and acceleration.
504.02+, for measuring angular rate by use of a gyroscope.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, subclasses 316+ for a gyromagnetic compass, subclasses 318+ for a gyroscopically controlled or stabilized geometric instrument for indicating a direction of force traversing natural media, and subclass 329 for a gyroscope mounted lever indicator.
74, Machine Element or Mechanism, subclasses 5+ for a gyroscope, per se, and especially subclass 5.43 for plural gyroscopes, subclasses 5.37+ for a gyroscope control, and subclass 5.6 for a gyroscope with a pick off.
244, Aeronautics, subclass 79, for gyroscopically actuated aircraft control, subclass 165 for a gyroscopic attitude control for a spacecraft.
250, Radiant Energy, subclass 231.12 for photocell apparatus comprising a gyroscopic light valve and subclass 233 for photocell circuit having a rotary light chopper-type light valve.
318, Electricity: Motive Power Systems, subclasses 648+ for a gyroscope used in platform stabilization.

506 This subclass is indented under subclass 488. Apparatus including means for producing a speed measurement from successive impulses from the speed source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
649+, for vibration sensing apparatus.

507 This subclass is indented under subclass 488. Apparatus for comparing the speed of one device with that of another.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.37, for means proving or calibrating a speed, velocity, or acceleration.

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclasses 68+ for the relative speed control of plural electric motors.
324, Electricity: Measuring and Testing, subclass 161 for an electrical device for measuring speed by comparison to a reference.
361, Electricity: Electrical Systems and Devices, subclasses 242+ for the synchronization of shafts by electrical means.
388, Electricity: Motor Control Systems, subclasses 800+ for single motor running-speed control systems with feedback.
416, Fluid Reacting Surfaces (i.e., Impellers), subclass 35 for electrical control means comparing and reducing error related to a preset datum.

508 This subclass is indented under subclass 488. Apparatus including means whereby the movement normally imparted by the speed responsive element is modified by a means responsive to the failure of the drive for the speed responsive element.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclass 52 for a speed controlled valve responsive to governor drive failure.

509 This subclass is indented under subclass 488. Apparatus including a sensing device effected by a condition additional to speed or rate of change of speed.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 26+ for a prime mover controlled speed and another condition and subclasses 51+ for a valve controlled by speed and another condition.

510 This subclass is indented under subclass 488. Apparatus having more than one speed condition sensor or means responding to more than one speed condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

504.03, for a multisensor for determination of angular rate using gyroscopic or Coriolis effect combined with a determination of linear acceleration.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 27 for a prime mover and subclass 50 for a valve responsive to both speed change and excess speed.

511 This subclass is indented under subclass 510. Apparatus that responds to both speed and rate of change of speed.

512 This subclass is indented under subclass 511. Apparatus wherein the response of a speed sensor of the centrifugal weight type is modified by the action of a distinct inertial mass.

513 This subclass is indented under subclass 488. Apparatus providing for manual operation in certain speed ranges or substitution of manual for speed responsive operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

540+, for centrifugal governors with adjusting means.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclass 319, per se, for an internal-combustion engine with selective manual or automatic speed control.

137, Fluid Handling, subclass 18 for a prime mover with selective manual or automatic control and subclass 49 for a valve with selective manual or automatic speed control.

514.01 Acceleration determination utilizing inertial element:

This subclass is indented under subclass 488. Subject matter comprising an inertial member having an intrinsic or relational property which changes in response to a rate of change of speed of a body and which can be used to measure acceleration.

(1) Note. An inertial sensor responsive to a rate of change in speed and not elsewhere classified is located here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

491, for a speed, velocity, or acceleration measuring apparatus or method including means retaining a reading of maximum acceleration.

503.3, for determining velocity or speed by utilizing a gyroscope for integrating acceleration and time.

504.03, for using gyroscopic or Coriolis effect on an inertial element to determine both angular rate and linear acceleration.

652, for an apparatus sensing vibrations by use of an inertial member.

866.2, for a process or an apparatus for measuring a time rate of change in a sensed condition not provided for elsewhere.

SEE OR SEARCH CLASS:

116, Signals and Indicators, subclasses 28+ for a mechanical indicator, per se, which provides a humanly perceptible signal in response to acceleration and includes no quantitative measuring means.

310, Electrical Generator or Motor Structure, subclass 329 for an inertia operated mechanical energy coupling means for a piezoelectric element or device.

324, Electricity: Measuring and Testing, subclass 162 for electrical speed measuring means including an electrical accelerometer which senses acceleration by means other than an inertial elements.

340, Communications: Electrical, subclass 669 for an electrical indicator or alarm providing a humanly perceptible signal in response to a predetermined acceleration which provides no indication of a quantitative measurement is provided.

356, Optics: Measuring and Testing, for an apparatus or a process for determining acceleration by measuring visible light.

361, Electricity: Electrical Systems and Devices, subclasses 280+ for an acceleration responsive capacitor.

514.02 Angular acceleration:
This subclass is indented under subclass 514.01. Subject matter wherein the relational or intrinsic property of the inertial element changes in response to time rate of change of direction, speed, or velocity of the body about an axis of rotation.

514.03 Fluid or fluent inertial mass (e.g., electrons, ions, plasma):
This subclass is indented under subclass 514.02. Subject matter wherein the inertial member comprises a liquid or a gaseous body or a plurality of particles exhibiting fluent characteristics.

(1) Note. Included here as a plurality of particles are electrons, ions, plasma, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

504.05+, for the determination of angular rate of speed of a body by measuring a gyroscopic or Coriolis effect on a fluid or fluent inertial mass.

514.05+, for utilizing an inertial element to determine linear acceleration including a fluid or fluent material and in particular subclass 514.09 for a fluid or fluent inertial mass whose property changes in response to linear acceleration of a body and can be used to measure acceleration.

514.04 Inertial flywheel:
This subclass is indented under subclass 514.02. Subject matter wherein the inertial member whose property changes in response to acceleration comprises a wheel or disk rotatively mounted on a drive member and which is capable of angular displacement with respect to the drive member in order to measure angular acceleration of the drive member.

514.05 Fluid or fluent material:
This subclass is indented under subclass 514.01. Subject matter including a liquid or a gaseous mass or a plurality of particles exhibiting fluent characteristics.

514.06 Fluid or fluent material support of an inertial element:
This subclass is indented under subclass 514.05. Subject matter wherein the fluid or fluent material bears the weight of the inertial member.

SEE OR SEARCH CLASS:

384, Bearings, subclasses 12 and 100+ for fluid bearings, per se.

514.07 Gas:
This subclass is indented under subclass 514.06. Subject matter wherein the fluid or fluent support comprises a substance having a very low density and viscosity, a rather low expansion and contraction with changes in pressure and temperature, the ability to diffuse rapidly, and the spontaneous tendency to become distributed uniformly throughout a container.

514.08 Magnetic fluid:
This subclass is indented under subclass 514.06. Subject matter wherein the fluid support comprises a liquid suspension of magnetic particles.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 90.5 for a magnetic bearing, per se.

514.09 Fluid or fluent inertial mass:
This subclass is indented under subclass 514.05. Subject matter wherein the inertial member comprises the liquid or the gaseous mass or the plurality of particles exhibiting fluent characteristics.

SEE OR SEARCH THIS CLASS, SUBCLASS:

504.05+, for the determination of angular rate of speed of a body by measuring a gyroscopic or Coriolis effect of the angular rate of speed on a fluid or fluent inertial mass.

514.03, for an inertial member whose property changes in response to an angular acceleration of a body and can be used to measure acceleration.

514.11 Detection by fluid pressure:

This subclass is indented under subclass 514.05. Subject matter comprising sensing pressure of a fluid whose pressure varies in response to the change in the property of the inertial member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37+, for other measuring means using pressurized fluid.

700+, for a fluid pressure gage, per se.

514.12 Fluid or fluent material dampening of an inertial element:

This subclass is indented under subclass 514.05. Subject matter wherein the fluid or fluent material tends to diminish the movement of the inertial member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

430, for miscellaneous instrument dampening means.

496, for vibration control or antistick means for a reading structure of a speed or an acceleration measuring means.

514.14, for an acceleration determining device including a specific type of non-fluid type dampening means.

522, for fluid-type dampening in a nonelectrical or a nonmagnetic speed measuring device not combined with acceleration measuring.

526, for other speed measuring apparatus comprising a dampening means.

739, for dampening a mechanism in a pressure gage.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 574, for rotor vibration dampening means of a more general application.

181, Acoustics, appropriate subclass, for dampening of acoustic waves, per se.

188, Brakes, subclass 322.5 for a fluid damper, per se, and subclasses 371+, 378+, and 381+ for a vibration damper, per se.

248, Supports, subclasses 562+ for a vibration dampening support.

324, Electricity: Measuring and Testing, subclass 125 for dampening means for a display of an apparatus for measuring and testing electricity.

514.13 Gas:

This subclass is indented under subclass 514.12. Subject matter wherein the fluid dampener comprises a substance having a very low density and viscosity, a rather low expansion and contraction with changes in pressure and temperature, the ability to diffuse rapidly, and the spontaneous tendency to become distributed uniformly throughout a container.

514.14 Specific type of dampener (e.g., eddy current dampener):

This subclass is indented under subclass 514.01. Subject matter of ... comprising specified means for diminishing the movement of the inertial member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

430, for miscellaneous instrument dampening means.

496, for vibration control or antistick means for a reading structure of a speed or an acceleration measuring means.

514.12+, for an acceleration determining device including fluid or fluent material dampening of an inertial member.

522, for fluid-type dampening in a nonelectrical or a nonmagnetic speed measuring device.

526, for other speed measuring apparatus comprising a dampening means.

739, for dampening a mechanism in a pressure gage.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 574 for rotor vibration dampening means of a more general application.

181, Acoustics, appropriate subclasses, for dampening of acoustic waves, per se.

188, Brakes, subclasses 378+ for vibration damper, per se.

248, Supports, subclasses 562+ for a vibration dampening support.

324, Electricity: Measuring and Testing, subclass 125 for dampening means for a display of an apparatus for measuring and testing electricity.

514.15 Spinning or vibrating accelerometer:

This subclass is indented under subclass 514.01. Subject comprising either (a) means for rotating the inertial member about a motion axis or (b) means for moving the inertial member in a periodic manner along or about a motion axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

504.04, for a multisensor for determination of angular rate using gyroscopic or Coriolis effect combined with a determination of linear acceleration and including a vibratory mass.

504.12+, for measuring the angular velocity, per se, of a body by means of measuring the gyroscopic or Coriolis effects on a vibratory inertial mass.

514.21, for measuring acceleration by means of a pendulum type inertia element wherein rebalance is recited.

514.29, for measuring acceleration by use of a vibrating sensor.

514.36, for measuring acceleration by means of a pendulum-type inertia element wherein no rebalance is recited.

570, for testing by vibration, per se.

514.16 Specific type of electric sensor or specific type of magnetic sensor:

This subclass is indented under subclass 514.01. Subject matter comprising a specified sensing means whose electric or magnetic characteristic changes in response to the change in the property of the inertial member due to the acceleration of the body.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514.39, for (a) magnetic speed measuring, per se, wherein the magnetic means does not produce an electric signal or (b) mechanical speed measuring means combined with ancillary magnetic or electric means.

SEE OR SEARCH CLASS:

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclasses 414+ for an acceleration responsive device having a significant semiconductor potential barrier.

438, Semiconductor Device Manufacturing: Process, subclasses 50+ for methods of making an acceleration responsive semiconductor device.

514.17 Rebalance:

This subclass is indented under subclass 514.16. Subject matter wherein (a) the electric or magnetic sensing means produces an output signal in response to displacement of the inertial member and (b) the output signal is used to restore the inertial member to a null position.

SEE OR SEARCH CLASS:

318, Electricity: Motive Power Systems, subclasses 648+ for the combination of a positional servo system using an inertial measuring system for error detection and, in particular subclass 651, for a positional servo system using an acceleration measuring instrument for error detection.

514.18 Electrostatic restoring means:

This subclass is indented under subclass 514.17. Subject matter wherein the electrical output signal generates an electrostatic force which returns the inertial member to the null position.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 225+ for an electrostatic device, per se.

514.19 Radiant energy sensor (e.g., optical, charged, or radioactive particle):
This subclass is indented under subclass 514.17. Subject matter wherein the output signal of the sensing means changes in response to detecting (a) light, (b) charged particles, or (c) an alpha, beta, or gamma particles due to the change in a property of the inertial member caused by an acceleration of the body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
653, for an inertial-type vibration sensing means having a light beam indicator.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 227.14+ for a condition responsive light guide, subclasses 231.1+ for a light valve actuated by an external dynamic physical quantity, and subclasses 336.1+ and 493.1+ for radioactive particle sensing, per se.
356, Optics: Measuring and Testing, subclasses 335+ for measuring visible light to detect particle size and subclasses 337+ for measuring and testing by particle light scattering.
378, X-Ray or Gamma Ray Systems or Devices, appropriate subclass for an analysis by measuring an X-ray or gamma ray, per se.

514.21 Pendulum or beam:
This subclass is indented under subclass 514.17. Subject matter wherein the inertial member either (A) comprises or (B) is supported by: either (a) an object suspended from a fixed support so that it is free to swing back and forth or (b) an elongated flexible member.

SEE OR SEARCH THIS CLASS, SUBCLASS:
504.04, for a multisensor for determination of angular rate using gyroscopic or Coriolis effect combined with a determination of linear acceleration and including a vibratory inertial body.
504.12+, for measuring angular velocity using gyroscopic or Coriolis effect on a vibratory inertial body.
514.15, for acceleration measuring by means of a vibratory inertial mass.
514.29, for measuring acceleration by means of a vibrating sensor.
514.36, for acceleration measuring by means of a pendulum-type inertia element wherein no rebalance is recited.
570+, for a vibrator, per se, used in testing.

514.22 Including a bearing support:
This subclass is indented under subclass 514.21. Subject matter comprising a bearing and wherein the pendulum is mounted for pendulous motion by means of the bearing.

SEE OR SEARCH CLASS:
384, Bearings, subclasses 12 and 100+ for fluid bearings, per se.

514.23 Including a flexure support:
This subclass is indented under subclass 514.21. Subject matter comprising a pliable element which supports the pendulum for pendulous motion.

514.24 Including an elastic support for an inertial element (e.g., spring):
This subclass is indented under subclass 514.17. Subject matter comprising an element which is capable of bearing weight and which tends to return to an initial state or form after deformation and wherein the inertial member is supported by the element for bearing weight.

514.25 Charged particle or radioactive particle sensor:
This subclass is indented under subclass 514.16. Subject matter wherein the characteristic of the sensing means changes in response to detecting (a) a charged particle or (b) alpha, beta, or gamma rays.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 306+ for using charged particles for inspecting a solid or liquid and subclasses 336.1+ and subclasses 493.1+ for radioactive particle sensing, per se.
378, X-Ray or Gamma Ray Systems or Devices, appropriate subclass for analysis by measuring characteristics of X-rays or gamma rays.

514.26 Optical sensor:
This subclass is indented under subclass 514.16. Subject matter wherein the characteristic of the sensing means changes in response to a light beam being modified in accordance with the change in the property of the inertial member due to the acceleration of the body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
653, for an inertial-type vibration sensing means having a light beam indicator.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 227.14+ for a condition responsive light guide and subclasses 231.1+ for a light valve actuated by an external dynamic physical quantity.

514.27 Frequency or phase shift:
This subclass is indented under subclass 514.26. Subject matter wherein the modification of the light beam comprises a frequency or phase shift.

SEE OR SEARCH THIS CLASS, SUBCLASS:
657, for an inertial-type vibration sensing means modifying a light by a shift in frequency or phase to provide an indication or a measurement.

514.28 Surface acoustical wave:
This subclass is indented under subclass 514.16. Subject matter wherein a change in a characteristic of an acoustical wave propagating along a surface is modified in accordance with the change in the property of the inertial member due the acceleration of the body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
504.01, for measuring angular rate by use of a surface wave.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 313 for a surface acoustical wave device, per se.

514.29 Having a vibrating element:
This subclass is indented under subclass 514.16. Subject matter wherein the sensing means includes an element whose frequency of vibration is modified in response to the change in the property of the inertial member due to acceleration of the body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
504.04, for a multisensor for determination of angular rate using gyroscopic or Coriolis effect combined with a determination of linear acceleration and including a vibratory inertial member.
504.12+, for measuring angular velocity using gyroscopic or Coriolis effect on a vibratory inertial body.
514.15, for acceleration measuring by means of a vibratory inertial mass.
514.21, for acceleration measuring by means of a pendulum-type inertia element wherein rebalance is specified.
514.36+, for acceleration measuring by means of a pendulum-type inertia element wherein no rebalance is recited.
662+, for a vibrator, per se, used in testing.

514.31 Inductive or magnetic sensor (e.g., Hall effect sensor):
This subclass is indented under subclass 514.16. Subject matter wherein the sensing means comprises: (a) a magnetic body which produces an electromotive force in a circuit or a circuit element wherein the electromotive force is varied by the change in the property of the inertial member due to an acceleration of the body or (b) a body whose magnetic characteristic changes in response to the change in the property of the inertial member due to the acceleration of the body.

SEE OR SEARCH CLASS:
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, appropriate subclass for a magnet or an electromagnet, per se.
336, Inductor Devices, subclass 30 for an inductor device having an acceleration responsive inductance adjusting means.

514.32 Capacitive sensor:
This subclass is indented under subclass 514.16. Subject matter wherein the sensing means comprises spaced electrodes whose capacitance varies by the change in the property of the inertial member due to an acceleration of the body.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems And Devices, subclasses 280+ for an acceleration responsive capacitor.

514.33 Resistive sensor:
This subclass is indented under subclass 514.16. Apparatus wherein the sensing means comprises an element whose electrical resistance is varied by the change in the property of the inertial member due to an acceleration of the body.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclasses 2+ for a strain-gage-type resistor and subclasses 43+ for a gravity or inertia responsive resistor.

514.34 Piezoelectric sensor:
This subclass is indented under subclass 514.16. Subject matter wherein the sensing means comprises a pressure sensitive material which generates an electrical signal which is varied by the change in the property of the inertial member due to an acceleration of the body.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 311+ for a piezoelectric element or device, per se and especially subclass 329 for an inertial responsive piezoelectric device.

514.35 Electric:
This subclass is indented under subclass 514.01. Subject matter comprising means generating an electrical signal which is varied by the change in the property of the inertial member due to an acceleration of the body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
514.39, for a magnetic speed measuring wherein the magnetic means does not produce an electric signal or mechanical speed measuring apparatus including ancillary magnetic means or ancillary electric means.

SEE OR SEARCH CLASS:
324, Electricity: Measuring And Testing, subclasses 160+ for electrical speed measuring including an electrical accelerometer other than one sensing acceleration by means of an inertial element.

514.36 Pendulum or beam:
This subclass is indented under subclass 514.01. Apparatus wherein the inertial member either (A) comprises or (B) is supported by: either (a) an object suspended from a fixed support so that it is free to swing back and forth or (b) an elongated flexible element.

SEE OR SEARCH THIS CLASS, SUBCLASS:
504.04, for a multisensor for determination of angular rate using gyroscopic or Coriolis effect combined with a determination of linear acceleration and including a vibratory inertial member.
504.12, for angular velocity measuring, per se, by means of a gyroscopic or Coriolis effect on a vibratory inertial mass.
514.15, for measuring acceleration by means of a vibrating inertial mass.
514.21, for measuring acceleration by means of a pendulum-type inertia sensor wherein rebalance is recited.
514.29, for measuring acceleration by use of a vibrating sensor.
570+, for testing by vibration, per se.

514.37 Including a pivot support:
This subclass is indented under subclass 514.36. Apparatus comprising a support which bears the weight of the pendulum and permits it to swing.

514.38 Including an elastic support for an inertial element (e.g., spring):
This subclass is indented under subclass 514.01. Subject matter comprising an element which is capable of bearing weight and which tends to return to an initial state or form after deformation and wherein the inertial member is

supported by means of the element for bearing weight.

514.39 Magnetic speed measuring or mechanical speed measuring with ancillary magnetic means or with ancillary electrical means:
This subclass is indented under subclass 488. A process or an apparatus comprising: (a) a magnetic means used for detecting the rate of change in position of the body or (b) a mechanical speed measuring means responsive to the rate of change in position of the body combined with magnetic means or electrical means, wherein the magnetic means or the electrical means is subordinate to the mechanical speed measuring means.

(1) Note. The apparatus herein does not include magnetic means for producing an electrical signal representative of speed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
504.01, for measuring angular rate by using wave motion.
504.02+, for measuring angular rate by gyroscopic or Coriolis effect.
504.17, for measuring angular rate by means of a fluid vortex rate sensor.
514.16+, for an acceleration measuring apparatus which senses acceleration by means of an inertial element and which has a specific type of electric or magnetic sensor and, in particular, subclass 514.31 for an acceleration measuring apparatus which senses acceleration by means of an inertial element that has a magnetic sensor.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 160+ for an electrical measuring speed device including an electrical accelerometer other than one which senses acceleration by means of an inertial element, in particular, subclasses 173+ for purely electric speed measuring using a magnetic sensor and subclass 207.25 for magnetically measuring rotary displacement.
340, Communications: Electrical, subclasses 671+ for an electrical indicating system providing a humanly perceptible electrical signal in response to a predetermined angular velocity wherein no indication of quantitative measurement is provided.
356, Optics: Measuring and Testing, subclasses 27+ for determining speed by measuring a characteristic of visible light.

519.01 Eddy current drag means (e. g., drag cup):
This subclass is indented under subclass 514.39. Subject matter wherein the magnetic means comprises a permanent magnet and a drag element and wherein (a) a magnetic coupling exists between the permanent magnet and the drag element and (b) due to the magnetic coupling, movement of the permanent magnet causes motion of the drag element.

520.01 With a flux adjusting means:
This subclass is indented under subclass 519.01. Subject matter combined with means for varying the magnetic coupling between the drag element and the permanent magnet.

521 This subclass is indented under subclass 488. Apparatus in which a fluid is used.

SEE OR SEARCH CLASS:
60, Power Plants, subclasses 325+ for a device in which a hydraulic actuator is supplied by fluid directly by the operation of a pump or its equivalent.
91, Motors: Expansible Chamber Type, subclass 435 and see the search there noted for expansible chamber motors having speed responsive control.
123, Internal-Combustion Engines, subclasses 378+ for a speed controller of the pneumatic type for an internal-combustion engine.
137, Fluid Handling, subclasses 34 and 36 for a prime mover speed controller using fluid pressure; and subclass 58 for a valve controlled by a speed actuated servo-motor.

522 This subclass is indented under subclass 521. Apparatus wherein fluid serves to suppress vibration or dampen movement.

SEE OR SEARCH THIS CLASS, SUBCLASS:

514.12+, for fluid or fluent material dampening of an inertial element in an inertial-type acceleration measuring apparatus.

514.14, for vibration dampening in an inertial-type acceleration measuring apparatus.

523 This subclass is indented under subclass 521. Apparatus including a fluid container comprising one or more walls which are movable with respect to others to vary the volume of the container.

SEE OR SEARCH THIS CLASS, SUBCLASS:

502, for devices in which the expansible chamber is part of an externally connected gauge.

524 This subclass is indented under subclass 521. Apparatus wherein an output member is moved against bias by the impact or drag of a fluid.

525 This subclass is indented under subclass 521. Apparatus wherein response is to the force required to drive a speeding element through fluid.

526 This subclass is indented under subclass 488. Apparatus having means to dampen the mechanism or protect it from shock.

SEE OR SEARCH THIS CLASS, SUBCLASS:

496, for dampening means acting directly upon the reading structure.

514.12+, for fluid or fluent material dampening of an inertial element in an acceleration measuring apparatus.

514.14, for vibration dampening in an inertial-type acceleration measuring apparatus.

522, for dampening means using fluid.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 574, for rotor vibration dampening means of more general application.

527 This subclass is indented under subclass 488. Apparatus including means for transmitting a speed signal to the speed measuring device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

493+, for structurally installed speed responsive devices.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 12 for speedometer drive means, per se.

528 This subclass is indented under subclass 527. Apparatus including means for selecting one of several available ratios between the speed of the source and of the responsive device.

529 This subclass is indented under subclass 527. Apparatus including means for frictionally engaging a speed source.

530 This subclass is indented under subclass 488. Apparatus with immediately associated means for transmitting motion from the sensing means such as two or more relatively moving links or gearing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

493+, for a structurally installed speed responsive device.

531 This subclass is indented under subclass 530. Apparatus including means by which the transmitting means can be adjusted.

SEE OR SEARCH THIS CLASS, SUBCLASS:

498, for adjustment means for indicator reading structure.

532 This subclass is indented under subclass 530. Apparatus wherein the mechanism includes gearing.

533 This subclass is indented under subclass 532. Apparatus in which the gearing includes a rectilinear rack.

534 This subclass is indented under subclass 530. Apparatus wherein the mechanism includes a surface and follower.

535 This subclass is indented under subclass 488. Apparatus wherein the speed responsive means comprises a rotating or revolving weight or weights, the position assumed by such weight or weights due to centrifugal force varying as a function of the speed at which they are rotated or revolved.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclasses 364+, for a speed regulator of the centrifugal type particularly associated with an internal-combustion engine.

137, Fluid Handling, subclasses 33+ for prime mover motive fluid control by a centrifugal governor and subclasses 53+ for valve control by a centrifugal governor.

180, Motor Vehicles, subclasses 172+ for a motor vehicle having means which is responsive to its speed for regulating the vehicle's rate of travel, and wherein the means includes a device which is responsive to centrifugal force.

200, Electricity: Circuit Makers and Breakers, subclass 80 for a centrifugally actuated switch.

318, Electricity: Motive Power Systems, subclass 462 for automatic starting or stopping of an electric motor by a centrifugal device.

322, Electricity: Single Generator Systems, subclass 30 for a centrifugal governor particularly associated with an electrical generator driving means.

388, Electricity: Motor Control Systems, art collections 924+ for centrifugal speed responsive feedback devices used with electric motors.

416, Fluid Reaction Surfaces (i.e., Impellers), subclasses 50, 51 and 52+ for a centrifugal weight governor operative responsive to impeller rotation.

536 This subclass is indented under subclass 535. Apparatus wherein the effective pivot arm length of a governor weight pivotally mounted on a rotating support has different values at different speeds.

537 This subclass is indented under subclass 535. Apparatus with means by which different biasing action is obtained at different speeds.

SEE OR SEARCH CLASS:

91, Motors: Expansible Chamber Type, subclass 366 for a speed responsive device controlling an expansible chamber motor that varies the bias of the device.

538 This subclass is indented under subclass 537. Apparatus with a snap action effect.

539 This subclass is indented under subclass 535. Apparatus wherein means is provided with which the centrifugal weight or its supporting structure comes into contact to arrest the radial motion of the weight, the means being in the nature of an abutment or stop.

540 This subclass is indented under subclass 535. Apparatus having elements provided for adjusting or varying the response of the device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

513, for a speed responsive device combined with a manual speed control arrangement.

528, for adjustment means for the drive of the speed sensor.

531, for adjustment means for the output mechanism of the speed sensor.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclass 319, per se, for a speed controlled internal-combustion engine with manual control or adjustment structure.

541 This subclass is indented under subclass 540. Apparatus wherein there are two adjusting means having different functions or means that effects more than one type of adjustment of the device.

542 This subclass is indented under subclass 540. Apparatus wherein the adjustment is of the effect of a biasing weight.

543 This subclass is indented under subclass 540. Apparatus comprising a lever or gear device.

544 This subclass is indented under subclass 540. Apparatus wherein an adjusting means and a bias spring are both concentric to the axis of rotation of the centrifugal device.

545 This subclass is indented under subclass 540. Apparatus wherein a screw means adjusts the loading of a spring connected between two weights on opposite sides of the axis of rotation.

546 This subclass is indented under subclass 535. Apparatus wherein a leaf spring supports or biases the centrifugal weight.

547 This subclass is indented under subclass 535. Apparatus wherein the revolving weight acts at the junction of two pivotally joined bars.

548 This subclass is indented under subclass 535. Apparatus wherein the centrifugal mass is radially displaced for operation of an external device by contact.

SEE OR SEARCH CLASS:
74, Machine Element or Mechanism, subclass 3 for a speed controlled trip.

549 This subclass is indented under subclass 535. Apparatus comprising rigidly connected body portions statically balanced about the axis of rotation, but inclined thereto, so that the extremities revolve in different planes, which approach each other under the action of centrifugal force.

550 This subclass is indented under subclass 535. Apparatus relating to a pivoted weight-lever assembly so arranged that radial movement of the weight causes axial output movement.

551 This subclass is indented under subclass 535. Apparatus including a surface and follower as a part of the centrifugal speed sensing device.

570 VIBRATION:
This subclass is indented under the class definition. Subject matter for (1) testing an article or mechanism by subjecting it to vibratory forces for determining qualities, characteristics or conditions thereof, or (2) sensing, study or analysis of vibrations otherwise generated in or existing in the article or mechanism.

(1) Note. The “article or mechanism” will be hereinafter referred to as a “body” or “test body”.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.43+, for proving or calibrating a chronometer or watch unbalance.
1.82+, for proving or calibrating an apparatus by use of vibration or by measuring vibration.
11.08, and 11.09, for testing an automobile shock absorber by oscillation.
12.01+, for delivering a test impact to a body under study, although the result is to be listened to.
12.12, for impact testing using oscillation.
35.01+, for determining engine knock or detonation by measuring abnormal vibration.
66, for determining the unbalance of rotors by the vibratory thrusts effects thereof.
152.15, for determining the characteristic of a borehole by logging the results of measuring the effect of a borehole, a well casing, or a drill rigging on vibration combined with radioactivity measuring.
152.16, for determining the characteristic of a borehole by logging the results of measuring the effect of a borehole, a well casing, or a drill rigging on vibration.
152.32, for a flowmeter for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring vibration.
152.47, for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring vibration while an instrument is within a borehole while a drilling operation is taking place.
152.58, for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring vibration while an instrument is within a borehole.
861+, for employment of vibration transmission in measuring fluid flow.

570.5 Acoustic levitation:
This subclass is indented under subclass 570. Subject matter comprising a process or an apparatus for supporting an object in a fluid by means of acoustic waves.

(1) Note. The acoustic levitation process or apparatus found here includes measuring detail.

SEE OR SEARCH CLASS:
181, Acoustics, subclass .5 for acoustic levitation devices, per se, with no measuring detail.
406, Conveyors: Fluid Current, appropriate subclass, for using fluid current to move solids from one position to another.

571 Test chamber:
This subclass is indented under subclass 570. Subject matter which provides specialized housing in which a test body is located for the application thereto of vibratory forces for making desired determinations, or for the sensing, study, or analysis of vibrations otherwise generated in, or existing in, the test body.

SEE OR SEARCH THIS CLASS, SUBCLASS:
586, for determination of sonic wave characteristics in an enclosed room or space.

572 Loose object detection:
This subclass is indented under subclass 570. Subject matter wherein means are provided for detecting loose particles or parts.

573 Hardness or compliance:
This subclass is indented under subclass 570. Subject matter wherein the test body is subjected to means, e.g., a resonating probe or by indirect oscillations, for deriving a measure of hardness or flexibility thereof.

SEE OR SEARCH CLASS:
257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclass 414 for such devices used as chemical sensors, pressure sensors, etc.

574 Mechanical impedance:
This subclass is indented under subclass 570. Subject matter for determining the mechanical impedance of the body to vibration, as by the damping action of the body, the ratio of energy input to amplitude, etc.

(1) Note. This subclass may include a device used in making the determination which has one or more rotatable, unbalanced masses for creating vibration in the device and thus in the body to be tested.

575 Of an elastomer:
This subclass is indented under subclass 574. Subject matter wherein the test body is made of an elastic material such as rubber.

576 Device having an electromagnetic drive:
This subclass is indented under subclass 574. Subject matter wherein the body or body supporting unit is vibrated by direct application of electromagnetic action thereto.

577 Fatigue study:
This subclass is indented under subclass 570. Subject matter wherein the body is subjected to prolonged or repeated vibration while sensing, measuring, or recording its change of condition, as by change in its temperature, amplitude, or resonance, energy input required to maintain vibration or timing or registering duration to failure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
808+, for repeated stressing (e.g., flexing) of bodies to determine fatigue characteristics thereof.

578 Electromagnetic drive:
This subclass is indented under subclass 577. Subject matter wherein the body or body supporting unit is vibrated by direct application of electromagnetic action thereto.

579 Resonance, frequency, or amplitude study:
This subclass is indented under subclass 570. Subject matter wherein the body is caused to vibrate at its natural mechanical resonance and measurement of frequency and/or amplitude at resonance is made; a study of amplitude response over a frequency range is made; nodal

points, wave lengths, and standing wave characteristics are measured under predetermined vibration conditions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
658+, for electrical indicating means for sonic sensing apparatus.

580 Including weight determination:
This subclass is indented under subclass 579. Subject matter wherein a device is utilized for determining the mass or the weight of a body or of a unit length of a body.

581 Including axial force determination:
This subclass is indented under subclass 579. Subject matter wherein a device is utilized for measuring the axial force exerted on a body, e.g., a bolt, wire.

582 Including structural bond evaluation:
This subclass is indented under subclass 579. Subject matter wherein means are provided for testing for structural defects in a bond, e.g., separation of rubber tire laminations, metallic or nonmetallic type welds.

SEE OR SEARCH THIS CLASS, SUBCLASS:
588, for other structural bond evaluation.

583 Of aircraft or related structural element:
This subclass is indented under subclass 579. Subject matter wherein means are provided for detecting and analyzing vibrations in aircraft structural members, e.g., wing flutter, propeller.

584 By mechanical waves:
This subclass is indented under subclass 570. Subject matter wherein (1) the vibratory forces applied or (2) the vibrations sensed are in the form of mechanical, sonic-type waves and the frequency of the waves and the frequency of the waves is either in the sonic or ultrasonic frequency range.

(1) Note. The waves involve uniform motion of a part of a larger body, rather than motion of the whole body, in the form of particles of the body during travel of the waves in the body.

(2) Note. The sonic waves include longitudinal or compressional, shear, Raleigh waves, etc.

(3) Note. For the purposes of this section, the body being tested may include a fluid body such as air or water.

(4) Note. This subclass and subclasses indented hereunder provide for measuring and testing, employing mechanical, sonic-type waves except as specifically provided for elsewhere. See the search notes below.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.43+, for proving or calibrating a chronometer or watch unbalance.
1.82+, for proving or calibrating an apparatus by use of vibration or by measuring vibration.
12.01+, for delivering a test impact to a body under study although the result is to be listened to.
19, for determining the gas content of materials.
24, for gas analysis by sonic means.
32, for determining specific gravity or density by sonic means.
35.09+, for determining engine knock or detonation by measuring abnormal vibration.
40.5+, for detecting leakage by listening devices.
61.41, for determining the content or effect of the constituent of a liquid mixture, as concentration of particles in the liquid, by sonic means.
170.29+, for meteorology and oceanology.
290+, for liquid level determination by sonic means.
339+, for measurement of temperature by sonic means.
432+, for measurement of particle size by sonic means.
645+, for measuring an acoustic parameter.
659, for sensing apparatus with electrically controlled indicator for spectrum analysis.
861+, for measurement of fluid flow rate by sonic means.

SEE OR SEARCH CLASS:

128, Surgery, subclasses 647 and 660+ for medical diagnostic methods and apparatus utilizing ultrasonic mechanical wave energy.

181, Acoustics, subclasses 101+ for geophysical or subsurface exploration involving mechanically transmitting or receiving sound waves, subclass 123 for mechanical sound echo systems in general and subclass 125 for mechanical sound location means.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclass 87, subclasses 7+ for producing images of the body subclasses 118+, for electrical systems using compressional waves to determine distance or direction and subclasses 14+, for electrical systems using compressional waves to investigate geologic or subsurface structure.

585 Including ear or hearing testing:

This subclass is indented under subclass 584. Subject matter wherein the sonic waves are used to measure the auditory response of a person.

SEE OR SEARCH CLASS:

128, Surgery, subclass 746 for methods and apparatus for diagnosing a condition of the ear.

374, Thermal Measuring and Testing, subclasses 117+ for temperature.

586 Reverberation:

This subclass is indented under subclass 584. Subject matter wherein sonic characteristics of the sonic waves in an enclosed room or space are determined.

(1) Note. Included herein are means for producing a sonic wave in a room and measuring the sonic decay characteristics of the room.

SEE OR SEARCH THIS CLASS, SUBCLASS:

571, for special test chambers.

587 Acoustic emission:

This subclass is indented under subclass 584. Subject matter for sensing mechanical sonic-type waves emitted by flaws and other anomalies which generally occur in the test body in the early stages of the flaw or other anomaly.

(1) Note. An acoustic emission is a generally inaudible noise caused by minute changes in a material or object due to stresses imposed thereon. Thus, when a material undergoes a permanent deformation, it will generate a sound which may be monitored by ultrasensitive means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

801, for similar subject matter in combination with means for applying stress to the test object to induce strain and accompanying acoustic emission.

588 Structural bond evaluation:

This subclass is indented under subclass 584. Subject matter wherein mechanical waves are utilized for testing for structural defects in a bond, e.g., separation of rubber tire laminations, metallic or nonmetallic-type welds.

SEE OR SEARCH THIS CLASS, SUBCLASS:

582, for other structural bond evaluation.

589 Acoustical impedance:

This subclass is indented under subclass 584. Subject matter for determining the acoustical impedance of the body to vibration, as by the ratio of sound pressure to the volume velocity, the ratio of sound pressure to particle velocity, etc.

590 In detection of a liquid reaction, a chemical reaction, or a nuclear reaction:

This subclass is indented under subclass 584. Subject matter wherein a determination is made of the quality, characteristic, or condition of a reaction which involves chemicals, nuclear materials, or other types of reactions, e.g., liquid cavitation in a boiler, detonation in an engine cylinder, etc., which are imminent or presently occurring.

(1) Note. The reaction, whether desired or undesired, will manifest itself in the form of sonic vibrations from which the determination is made.

(2) Note. The reaction may be or may not be taking place in an appropriate chamber or container.

SEE OR SEARCH THIS CLASS, SUBCLASS:
592, for detection of fluid, fluid leak, or pipe flaw.

591 Listening or sound tube:
This subclass is indented under subclass 584. Subject matter wherein a device for detecting the mechanical waves utilized a tube through which one may listen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
649+, for sensing or detecting apparatus.

SEE OR SEARCH CLASS:
181, Acoustics, subclass 131 for stethoscopes, per se.

592 Fluid, fluid leak, or pipe flaw detection:
This subclass is indented under subclass 584. Subject matter wherein determination is made of the location of a fluid leak in a fluid container, e.g., a flaw in a water pipe, or of the location of a fluid, e.g., underground water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
40.5+, for acoustic detectors for locating fluid leakage, the fluid being pressurized
590, for detection of liquid, chemical or nuclear reactions.

593 Bearing, gear, or related moving mechanism:
This subclass is indented under subclass 584. Subject matter wherein the test body is a bearing, a bearing assembly, a gear, a gear assembly, or other parts related to a machine which includes moving parts.

SEE OR SEARCH THIS CLASS, SUBCLASS:
660, for sensing or recording apparatus of rotating machinery and devices.

594 Soil or building structure:
This subclass is indented under subclass 584. Subject matter wherein means are provided for determining the soundness of soil or building or support structure.

595 Frangible:
This subclass is indented under subclass 584. Subject matter wherein means are provided for the detecting of flaws, such as cracks, in articles which may be subject to easy breakage.

596 Beamed:
This subclass is indented under subclass 584. Subject matter wherein (1) the sonic waves are in the form of beamed or directed waves or (2) the beamed waves sensed emanate from within or reflect from the surface of the body.

(1) Note. While the production of a beamed wave is not limited to the ultrasonic range, frequencies are generally in the ultrasonic range above 25 kHz as in the detection of typically sized discontinuities or flaws. The beam pattern is a function of the ratio of wavelength employed to the distance across the face of the transducer.

(2) Note. Where some means is provided for confining the wave, as a duct, the wave is considered to be a directed wave for the purposes of this subclass.

SEE OR SEARCH CLASS:
128, Surgery, subclasses 660.01+ for devices employing beamed, mechanical waves having means particularly adapted for usage on a living body to aid in the diagnosis of diseased or abnormal conditions of the body.
181, Acoustics, subclasses 101+ for geophysical or subsurface exploration involving mechanically transmitting or receiving sound waves, subclass 123 for mechanical sound echo systems in general, and subclass 125 for mechanical sound location means.

348, Television, subclass 163 for only receiving sonic or ultrasonic energy and producing an image of a scene or object that is representative of the image that would be produced by visible light.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclass 87, subclasses 7+ for producing images of the body, subclasses 118+ for electrical systems using compressional waves to determine distance or direction, and, subclasses 7 and 15.5 for electrical systems using compressional waves to investigate geological or subsurface structure.

597 Velocity or propagation time measurement:
This subclass is indented under subclass 596. Subject matter wherein velocity or propagation or transit time of sonic waves in the test body is measured to determine a physical characteristic such as density, Young's modulus, shear modulus, stress, microstructure, etc.

598 For flaw or discontinuity detection:
This subclass is indented under subclass 597. Subject matter wherein the velocity or propagation time indicates the presence of a flaw or discontinuity.

(1) Note. The subject matter in this subclass may be distinguished from subclass 597 only on the basis of function, i.e., determination of the presence of a flaw or discontinuity.

SEE OR SEARCH THIS CLASS, SUBCLASS:

596+, for flaw or discontinuity location or thickness measurement by pulse echo timing, imaging, etc., except this subclass and subclass 600.

599 Attenuation measurement:
This subclass is indented under subclass 596. Subject matter for measuring the attenuation of energy transmitted through the test body or the energy reflected from the surface of the body.

(1) Note. The measurement indicates microstructure, paper pulp composition, surface reflection characteristics, etc.

600 For flaw or discontinuity detection:
This subclass is indented under subclass 599. Subject matter wherein the attenuation indicates the presence of a flaw or discontinuity.

(1) Note. The subject matter in this subclass may be distinguished from subclass 599 only on the basis of function, i.e., determination of the presence of a flaw or discontinuity.

(2) Note. Flaw or discontinuity location by pulse echo, imaging, flaw size, etc., is in appropriate subclasses indented under subclass 596 other than this subclass and subclass 598.

SEE OR SEARCH THIS CLASS, SUBCLASS:

596+, for flaw or discontinuity location by pulse echo, imaging, flaw size, etc., except this subclass and subclass 598.

601 Having plural, diverse forms of radiant energy:
This subclass is indented under subclass 596. Subject matter wherein plural forms of radiation, as ultrasonic, magnetic, X-ray, etc., are employed to test the body.

602 With signal analyzing or mathematical processing:
This subclass is indented under subclass 596. Subject matter wherein electrical or electronic means are provided for spectrum analysis or to mathematically process electrical signals corresponding to the sonic waves, to determine flaw size, shape, orientation, to improve resolution, etc.

(1) Note. This subclass is not intended to include subject matter under subclass 596 wherein simple mathematical operations are performed, such as combining of signals, comparing signals, doubling signals, forming a ratio, etc. This subclass includes oscilloscope frequency versus amplitude display, Fourier transformation of the signal for spectrum analysis, mathematical convolution involving the Laplace transformation of the signal for signal compression, filtering for spectrum analysis, etc.

(2) Note. This subclass will include only mathematical processing or calculating if combined with significant measuring or testing. For measuring or testing combined with significant data processing, see search note below.

SEE OR SEARCH CLASS:

702, Data Processing: Measuring, Calibrating, or Testing, subclasses 33 through 56 for mechanical measurement system, subclasses 35-40 for flaw or defect, and subclasses 41-44 for force or torque measurement.

603 Acoustic holography:

This subclass is indented under subclass 596. Subject matter wherein the test or measurement involves acoustic holography employing sonic (i.e., acoustic) waves from the test body in formation of the hologram.

(1) Note. Included herein are imaging of an interior portion of the body as a flaw or discontinuity, determining surface defects or surface quality, etc.

SEE OR SEARCH CLASS:

359, Optics: Systems (Including Communication) and Elements, subclasses 1+ for producing images of bodies by optical holography and subclass 901 for a cross reference art collection relating to acoustic holography.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 7+, for producing images of underwater and underground bodies, respectively, by acoustic holography.

604 Having means substituted for reference signal:

This subclass is indented under subclass 603. Subject matter wherein the hologram is formed without an electronic or acoustic reference signal as by temporal reference, optical heterodyne, or optical homodyne techniques.

605 Liquid or deformable surface holography:

This subclass is indented under subclass 603. Subject matter wherein the hologram is formed on a liquid or deformable surface.

606 Imaging of discontinuity with stationary sonic transmitter:

This subclass is indented under subclass 596. Subject matter wherein a test body or area portion thereof is subjected to a beam of waves from a nonscanned transmitter for producing an image of a discontinuity within the body covered by the beam.

(1) Note. This subclass includes such imaging wherein the receiver is a liquid-containing cell having particles oriented by the action of the sonic waves, a sonic deformable liquid surface, etc.

SEE OR SEARCH CLASS:

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 7+ for similar electrical sound echo systems for producing external images of the body as opposed to imaging internal structure, as a discontinuity, of the body.

607 By scan of a sonic receiver:

This subclass is indented under subclass 606. Subject matter wherein the beam from the test body is scanned by a sonic receiver, and the receiver is typically a transducer mosaic, the elements thereof being sequentially connected to image display means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

626, wherein plural receivers or elements of a receiver are sequentially operated to respond to a scanned transmitted beam.

608 By Bragg diffraction:

This subclass is indented under subclass 606. Subject matter wherein the image is obtained by Bragg diffraction.

609 Measuring or testing system having threshold, gating, delay, or blocking means:

This subclass is indented under subclass 596. Subject matter having a threshold circuit, a gating circuit, delay means or blocking means to eliminate undesired signals form measuring or indicating means.

(1) Note. A delay means may be part of the gating means or a mechanical delay line between a sonic transmitter or receiver and a test body.

(2) Note. The blocking means includes an acoustic curtain between adjacent sonic transmitter and receiver means or a masking means to block off portions of an indication on a cathode-ray tube.

SEE OR SEARCH THIS CLASS, SUBCLASS:
618+, for plural gates for effecting scanning.

610 Electronic gating:
This subclass is indented under subclass 609. Subject matter wherein electronic gating means controls the received signal portion which is to be indicated.

611 Adjustably responsive to information signal:
This subclass is indented under subclass 610. Subject matter wherein the gating means is adjusted or controlled in accordance with an electrical information signal, as a signal corresponding to an echo signal from the test body, a signal corresponding to movement of the sonic transmitter or receiver, etc.

612 Plural gating:
This subclass is indented under subclass 610. Subject matter wherein a plurality of gating means are provided for selecting signals from different depths of the test body or for selecting signals from a selected depth for a plurality of receivers.

613 Of noise:
This subclass is indented under subclass 610. Subject matter wherein noise signals, which are generally random signals extraneous to the testing signals, are eliminated.

614 Of signals to pass only echoes from within test body:
This subclass is indented under subclass 610. Subject matter wherein only echoes from within the test body are passed to indicating or measuring circuitry.

615 Of signals to pass only echoes from front surface or flaw and from rear surface of test body:
This subclass is indented under subclass 610. Subject matter wherein only echoes from the front surface or flaw and from the rear surface of the test body are passed to indicating or measuring circuitry.

616 Of signals to pass only echoes from rear surface of test body:
This subclass is indented under subclass 610. Subject matter wherein only echo signals from the rear surface of the test body are passed to indicating or measuring circuitry.

617 Having mechanical delay or mechanical blocking:
This subclass is indented under subclass 609. Subject matter wherein the undesired signals or indication thereof are eliminated or blocked by mechanical means, as a solid delay line or masking means on a cathode-ray tube.

SEE OR SEARCH THIS CLASS, SUBCLASS:
644, for transducer-to-object coupling means which may serve as a mechanical delay line.

618 Measuring or testing system having scanning means:
This subclass is indented under subclass 596. Subject matter wherein a sonic wave transmitter means is scanned relative to the test body, and the receiver is a separate and stationary transducer or the receiver is scanned relative to the test body and is the same as or a separate transducer from, the transmitting transducer and measuring or indicating circuitry is provided with or without the final display or indicating means.

(1) Note. The scanning may be effected by switched plural transmitters or receivers.

(2) Note. Scanning of the sonic receiver over an areal portion of the test body covered by the transmitted beam of a nonscanned sonic transmitter is in this class, subclass 607.

(3) Note. The scanning must be more than nominal, be particularly adapted for scanning purposes or be a requirement for operation of the device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

633+, for sonic wave transmitter or receiver means, per se, having means for effecting or providing for scanning of the transmitter or receiver relative to the test body.

619 Programmed scan:
This subclass is indented under subclass 618. Subject matter wherein the scanning is automatically controlled in accordance with a previously recorded program.

620 By reflected wave:
This subclass is indented under subclass 618. Subject matter wherein the wave transmitted to the test body is reflected from a surface within the test body and is received.

621 Having compound scan:
This subclass is indented under subclass 620. Subject matter wherein the scan comprises a compound or combined motion of transmitting and receiving transducer means comprising a movement of the transducer in transducer supporting means and a movement of the transducer support, at least one of the movements being angular and wherein display means is coordinated with the combined movements of the transducer.

622 Of tubing, vessel, or cylindrical object:
This subclass is indented under subclass 620. Subject matter wherein the scan is of a tubing, vessel, or cylindrical object.

623 Scan from within object:
This subclass is indented under subclass 622. Subject matter wherein the scanning is within a pipe or cylindrical vessel.

624 Having separate sonic transmitter and receiver:
This subclass is indented under subclass 620. Subject matter wherein separate transducers are used for transmitting and receiving.

625 Having plural sonic type transmitter or receiver transducers:
This subclass is indented under subclass 620. Subject matter wherein more than one transmitter or receiver transducer is provided and wherein an additional transducer may serve function other than providing echoes from a discontinuity, such as a wave coupling test signal.

626 Switched:
This subclass is indented under subclass 625. Subject matter wherein the plural transmitter or receivers are switched for sequential operation.

(1) Note. The scanning may be due to the switching or the scanning may be performed by relative movement of the transducers and test body and the transducers are switched to perform respective different functions.

(2) Note. A transducer wherein discrete portions are rendered sequentially operative is deemed to constitute plural, switched transducers for purposes of this definition.

627 By reflected wave:
This subclass is indented under subclass 596. Subject matter wherein the wave energy is reflected from a reflecting surface of the test body and received, and the measurement of the reflected wave determines the location of flaws, thickness, etc.

(1) Note. Detection of the presence or absence of a flaw by measurement of the time of propagation or the attenuation of the waves in the body is in this class, subclasses 598 and 600, respectively.

628 Having plural sonic type transmitters or receivers transducers:
This subclass is indented under subclass 627. Subject matter wherein more than one transmitter or receiver is provided.

(1) Note. The additional transducer may function other than to obtain information from the test body, as to improve coupling by eliminating bubbles.

629 Having unitary sonic type transmitter-receiver transducer:
This subclass is indented under subclass 627. Subject matter wherein a single transducer transmits the sonic wave and receives the reflected echo.

630 Establishing resonance in a test body:
This subclass is indented under subclass 629. Subject matter wherein resonance frequency of the test body is measured.

631 Having automatic gain control:
This subclass is indented under subclass 629. Subject matter wherein automatic gain control of the received signal is provided.

632 Sonic wave transmitter or receiver transducer:
This subclass is indented under subclass 596. Subject matter directed to transducer means, particularly adapted for inducing sonic waves into a test body or for receiving sonic waves from the body for test purposes.

(1) Note. The coupling means may serve as a delay means.

(2) Note. A measuring combination under subclass 596 including coupling means producing a mechanical delay is in subclass 617.

(3) Note. A measuring combination under subclass 596 including scanning is in subclasses 618+.

(4) Note. A method of inducing waves in a body or receiving waves from a body is in this class, subclasses 632+, but a method of testing under subclass 596 is classified in the appropriate subclass preceding subclasses 632+.

(5) Note. This subclass and subclasses indented hereunder include such noted transducer means with means for energizing the transducer, scanning the transducer, positioning the transducer, producing signals corresponding to transducer scan position, focusing or shaping the waves, and coupling the waves to the body.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 334+ for piezoelectric devices.

633 Having transducer scanning means:
This subclass is indented under subclass 632. Subject matter wherein means is provided for effecting scanning or relative movement between transducer and test body or has some means for facilitating such scanning.

SEE OR SEARCH THIS CLASS, SUBCLASS:
618+, for the combination of a measuring or testing system with scanning means.
644, for coupling means which may facilitate scanning.

634 Automatic transducer positioning:
This subclass is indented under subclass 633. Subject matter wherein the transducer is automatically positioned as to distance from, or angle to, with respect to the test body generally under control of an electrical or mechanical probe which senses the position of the test body to produce a signal to operate transducer positioning means.

(1) Note. The probe may sense the presence of the test body at a testing station and the transducer is then brought into contact with the test body.

635 Rolling contact:
This subclass is indented under subclass 633. Subject matter wherein the relative movement involves rolling contact by wheel means between the transducer or transducer support and the test body.

636 On railroad rails:
This subclass is indented under subclass 635. Subject matter wherein the transducer is moved along a railroad rail.

637 Around cylindrical object:
This subclass is indented under subclass 635. Subject matter wherein relative movement of the transducer around a cylindrical test body is provided.

(1) Note. Scanning around a cylindrical test body but without rolling contact is also in this class, subclass 640.

638 Along cylindrical object:
This subclass is indented under subclass 635. Subject matter wherein relative movement of the transducer lengthwise of a cylindrical body is provided.

639 Transducer forms wheel or is within a wheel:
This subclass is indented under subclass 635. Subject matter wherein the transducer is shaped in the form of a wheel or is mounted within a wheel but does not rotate with the wheel.

640 Scanning curved surface in direction of curvature:
This subclass is indented under subclass 633. Subject matter wherein the transducer scans over a curved surface in the direction of the curvature.

(1) Note. Scanning around a cylindrical object employing roller means engaging the test body is in this class, subclass 637.

641 Plural sonic transmitters or receivers:
This subclass is indented under subclass 633. Subject matter wherein plural sonic transmitters or receivers are scanned relative to the test body.

(1) Note. A transducer wherein discrete portions are rendered sequentially operative is deemed to constitute plural transducers for the purposes of this definition.

642 Having wave shaping means:
This subclass is indented under subclass 632. Subject matter wherein means for modifying the shape of the beam is provided, as a sonic wave lens or curved reflector.

SEE OR SEARCH CLASS:
181, Acoustics, subclasses 175+ for acoustic transducers combined with a sound modifier.
310, Electrical Generator or Motor Structure, subclass 335 for acoustic wave type generator or receiver with lens or reflector.
367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 140+ for acoustic transducers combined with a lens or reflector respectively.

643 Nonvibrating transducer:
This subclass is indented under subclass 632. Subject matter wherein the transducer means does not mechanically vibrate but induces or receives mechanical vibrations, as by arc discharge, laser beam, electromagnetic means, etc.

644 Having significant coupling means:
This subclass is indented under subclass 632. Subject matter having significant means between the transducer and test body of coupling the sonic waves to or from the test body, as a circulated liquid couplant, wear shoe, heat resistive shoe, delay block, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
617, for delay or blocking means in a measuring or testing combination.

645 Acoustic parameter:
This subclass is indented under subclass 584. Subject matter for determining sonic characteristics of the sonic waves in a medium.

(1) Note. Included herein are means for determining a frequency characteristic.

SEE OR SEARCH THIS CLASS, SUBCLASS:
589, for determining acoustical impedance.

646 Amplitude, power, or intensity:
This subclass is indented under subclass 645. Subject matter wherein the characteristics include power, amplitude, intensity, energy, loudness or radiation pressure.

647 Current generating or modifying:
This subclass is indented under subclass 646. Subject matter including electrical means which gives or uses an electrical signal which

varies as a function of at least one of the acoustical characteristics.

SEE OR SEARCH THIS CLASS, SUBCLASS:
649+, for subject matter comprising means for indicating or recording mechanical vibrations or analysis thereof.

648 Frequency sensitive:
This subclass is indented under subclass 647. Subject matter wherein the current generating or modifying means produces a variable frequency signal as a function of the power, amplitude, etc., of the sonic waves.

SEE OR SEARCH THIS CLASS, SUBCLASS:
645, for determining the frequency of sonic waves not included in this subclass 648.

649 Sensing apparatus:
This subclass is indented under subclass 570. Subject matter comprising means for rendering perceptible, indicating, or recording such vibrations or analysis thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
591, for sound tubes.

SEE OR SEARCH CLASS:
181, Acoustics, subclass 131 for stethoscopes.
310, Electrical Generator or Motor Structure, subclasses 334+ for piezoelectric devices.

650 Torsional:
This subclass is indented under subclass 649. Subject matter relating to the sensing or measurement of torsional vibrations of a rotating member.

SEE OR SEARCH THIS CLASS, SUBCLASS:
134+, for other apparatus for measuring torque by absorption.
136+, for other apparatus for measuring torque during transmission.
660, for other apparatus for sensing or measuring vibrations of rotating parts.

651 Vibratable reed:
This subclass is indented under subclass 649. Subject matter including one or more vibratable reeds as the sensing elements.

SEE OR SEARCH CLASS:
84, Music, subclass 454 for reeds used in tuning musical instruments.
324, Electricity: Measuring and Testing, subclass 76.49 for a tuned mechanical resonator (e.g., reed piezocrystal).

652 With inertia element:
This subclass is indented under subclass 649. Subject matter in which the sensing apparatus includes a heavy mass which will remain relatively stationary.

SEE OR SEARCH THIS CLASS, SUBCLASS:
514.01+, for an acceleration responsive device.
651, for a mass located on a vibratable reed.

SEE OR SEARCH CLASS:
346, Recorders, subclass 7 for recording accelerometers.

653 With light beam indicator:
This subclass is indented under subclass 652. Subject matter wherein there is an indicator in the form of a light beam movable over a scale on the interferometer principle, usually over photofilm.

654 With electrically controlled indicator:
This subclass is indented under subclass 652. Subject matter including an electrically controlled indicator.

655 With light beam indicator:
This subclass is indented under subclass 649. Subject matter wherein a light beam is employed which is modified in accordance with the vibrations in order to obtain an indication or measurement.

(1) Note. Measurement of a modification in the direction or intensity of the light beam is included in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

653, for similar structure in combination with inertia type sensing apparatus.

SEE OR SEARCH CLASS:

356, Optics: Measuring and Testing, subclasses 445+ for optical measuring and testing involving interferometry.

656 By optical holography:

This subclass is indented under subclass 655. Subject matter wherein indication or measurement involves the formation of an optical hologram.

SEE OR SEARCH CLASS:

356, Optics: Measuring and Testing , subclass 457 for optical measuring and testing involving interferometry.

359, Optics: Systems (Including Communication) and Elements, subclasses 1+ for formation of an optical hologram.

657 By frequency or phase shift:

This subclass is indented under subclass 655. Subject matter wherein the modification of the light is in the form of a frequency or phase shift which is indicated or measured.

658 With electrically controlled indicator:

This subclass is indented under subclass 649. Subject matter wherein the means for indicating is electrical.

SEE OR SEARCH THIS CLASS, SUBCLASS:

654, for similar structure in combination with inertia type sensing apparatus.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclass 683 for machine vibration responsive alarms.

659 Spectrum analysis:

This subclass is indented under subclass 658. subject matter relating to the analysis of vibrations by measuring the amplitudes of the frequency components of the vibrations.

(1) Note. An example of a complete analysis would be the sensing and measuring of airplane vibrations over a wide range of engine speeds.

660 Rotating machinery or device:

This subclass is indented under subclass 658. Subject matter relating to the sensing or measurement of the vibrations of a rotating member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

134+, for other apparatus for measuring torque by absorption.

136+, for other apparatus for measuring torque during transmission.

593, for measuring vibrations by mechanical waves of a bearing and other rotating parts.

650, for apparatus for measuring torsional vibrations of a rotating member.

661 Having a probe:

This subclass is indented under subclass 658. Subject matter wherein the sensing apparatus includes a probe which would require physical contact with the object being sensed.

662 Vibrator:

This subclass is indented under subclass 570. Subject matter particularly adapted for producing and applying vibratory forces for test purposes.

663 Table, platform, or other support:

This subclass is indented under subclass 662. Subject matter wherein the vibrator includes a table, platform, or other support of the body under test.

664 Circuitry:

This subclass is indented under subclass 663. Subject matter wherein various electrical circuits are designed for use with the table or platform for adjustments or equalization of, for example, noise frequencies which may occur in at least one of plurality of vibrational dimensions.

665 Having fluid bearing or fluid pressure actuated:

This subclass is indented under subclass 663. Subject matter wherein the table or platform utilizes a fluid, e.g., an oil film, between the table (or platform) and its support for reducing

bearing friction, and/or the table or platform is vibrated by a fluid pressure means.

666 Having spring support:
This subclass is indented under subclass 663. Subject matter wherein the table or platform is supported by one or more springs for aiding the vibrating thereof.

(1) Note. The spring may be an elastic material as well as a metal material.

667 Eccentrically vibrated:
This subclass is indented under subclass 663. Subject matter wherein the table or platform is vibrated by an imbalanced rotating mass or by a cam mechanism.

668 Electromagnetically vibrated:
This subclass is indented under subclass 663. Subject matter wherein the table or platform is vibrated by electromagnetic means.

669 Vehicle shaker:
This subclass is indented under subclass 662. Subject matter for shaking of automotive vehicle for the purpose of testing or detection of squeaks.

670 Treadmill:
This subclass is indented under subclass 669. Subject matter wherein at least one wheel of a vehicle furnishes rotating power directly to at least one rotatable vehicle support, e.g., a pulley, wheel, or belt, the support having means for vibrating itself, and thus the vehicle, or the rotatable vehicle support, is self-powered and thus vibrates the vehicle accordingly.

(1) Note. Sometimes all of the vehicle wheels may be in contact with rotating belts, and at other times the vehicle wheels may be in contact with the vibrator support wheels.

671 Having a fluid jet:
This subclass is indented under subclass 662. Subject matter wherein the vibrator is vibrated by a fluid jetted unevenly or pulsed, e.g., into the vanes of a rotor, to cause an imbalanced condition therein and thus vibration.

672 Having a rotatable imbalanced mass:
This subclass is indented under subclass 662. Subject matter wherein the vibrator is vibrated by an imbalanced rotating mass.

700 FLUID PRESSURE GAUGE:
This subclass is indented under the class definition. Subject matter for the direct measurement of fluid pressures.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37+, for testing apparatus and processes in which fluids under pressure (positive or negative) are utilized to perform the test, and with which a fluid pressure gauge may be used.

78+, for devices for measuring hardness as an index of fluid pressure (e.g., tonometers, subclass 80, and tire hardness gauges, subclass 81).

115, for obtaining pressure derivatives within an engine cylinder.

152.22, for determining a characteristic of a borehole, a casing, or a drill rigging during drilling by measuring a fluid flow or analyzing a fluid, either (a) by detecting or (b) combined with measuring pressure.

152.27, for determining a characteristic of a borehole, a casing, or a drill rigging by sampling of a borehole formation and measuring a fluid flow or analyzing a fluid, either (a) by detecting pressure or (b) combined with measuring pressure.

152.51+, for determining a characteristic of a borehole, a casing, or a drill rigging by measuring a fluid flow or analyzing a fluid either (a) by detecting or (b) combined with measuring pressure.

299+, for hydrostatic pressure type of liquid level or depth gauge.

384+, for barometers.

861.42+, for pressure differential measuring devices for determining volume or rate of flow.

SEE OR SEARCH CLASS:

128, Surgery, subclasses 672+ for blood pressure measuring devices.

138, Pipes and Tubular Conduits, subclasses 26+ for such devices combined with pressure compensators.
164, Metal Founding, subclasses 154.8 and 155.3 for a metal casting apparatus having pressure sensing means.
200, Electricity: Circuit Makers and Breakers, subclasses 81+ for fluid pressure-operated switches.
374, Thermal Measuring and Testing, subclasses 201+ for an expanding fluid type thermometer.

701 Null balance type:
This subclass is indented under subclass 700. Subject matter wherein the signal response of a pressure transducer to the pressure being measured is minimized or nullified by a counteracting force or signal, the magnitude of which is determined as an indication of the pressure.

702 Vibration type:
This subclass is indented under subclass 700. Subject matter wherein an element or body communicating with the pressure being measured is subjected to vibratory forces and determinations of frequency and/or amplitude characteristics are taken as a measure of pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
570+, for testing an article by means of vibratory forces, e.g., measurements of frequency and/or amplitude at resonance in subclass 67.2.

703 Ultrasonic:
This subclass is indented under subclass 702. Subject matter wherein the element or body is subjected to a directed beam of mechanical wave energy which is sensed upon emanation from within or reflection from the surface of the element or body and transduced into perceptible indications of pressure.

704 Vibrating strip or wire:
This subclass is indented under subclass 702. Subject matter wherein the element or body is in the form of a thin elongated piece of material.

705 Photoelectric:
This subclass is indented under subclass 700. Subject matter wherein the response of a transducer device due to applied pressure being measured is determined by a photodetector and light source which generate a signal indicative of such pressure.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 200+ for photocells circuits and apparatus.
338, Electrical Resistors, subclasses 15+ for photoconductive devices (e.g., light sensitive).

706 With protective separator:
This subclass is indented under subclass 700. Subject matter that embody a material separator in a conduit connectable with the fluid pressure source to be measured to prevent foreign matter and corrosive material from reaching the measuring mechanism.

SEE OR SEARCH CLASS:
96, Gas Separation: Apparatus, for apparatus for gas separation, per se (i.e., not combined with analysis means).

707 With fluid pulsation dampener:
This subclass is indented under subclass 700. Subject matter having means to suppress pulsations of the fluid under pressure to be gauged.

SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclasses 40+, for flow restrictors, per se.

708 With pressure and/or temperature compensation:
This subclass is indented under subclass 700. Subject matter comprising means to countervail for the degree of hotness or coldness or ambient-type pressure changes.

709 With excess or maximum registering:
This subclass is indented under subclass 700. Subject matter which embody a mechanical-type device for recording the highest or lowest pressure to which the device is subjected.

710 With steam trap:
This subclass is indented under subclass 700. Subject matter which comprises means for holding liquid as converted into a vapor to prevent line vapors from reaching certain parts of the pressure measuring device.

SEE OR SEARCH CLASS:
96, Gas Separation: Apparatus, for apparatus for gas separation, per se (i.e., not combined with analysis means).

711 With variable drive:
This subclass is indented under subclass 700. Subject matter which comprises a mechanism whereby the sensitivity of indication is changeable over two or more ranges of indication, e.g., mechanism by means of which the indicator has greater motion per unit of pressure change over one range of pressure than over a second range.

712 With recorder:
This subclass is indented under subclass 700. Subject matter with means to make a permanent chronological entry of the fluid pressure measured.

713 With float:
This subclass is indented under subclass 700. Subject matter wherein communicating liquid columns are subjected to pressure and the difference in levels of the columns is indicated with the aid of one or more devices that stays on the surface of the liquid.

714 Combined:
This subclass is indented under subclass 700. Subject matter in combination significantly with other devices wherein only so much of such other device is included as to provide for the pressure measurement.

(1) Note. Where other devices are claimed further than as indicated above and the pressure measuring instrument is merely incidental to the combination, the patents are placed with such devices and cross-referenced here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
146.2+, for a pressure measuring instrument mounted on a vehicle wheel or tire stem.

715 Diaphragm:
This subclass is indented under subclass 700. Subject matter comprising a flexible wall or plate as the pressure responsive element.

(1) Note. This subclass includes devices in which fluid transmission means are provided to transmit changes in pressure from the pressure sensitive element to the indicator.

SEE OR SEARCH CLASS:
92, Expansible Chamber Devices, subclasses 90+ for a flexible wall type expansible chamber device.

716 Multiple and/or differential:
This subclass is indented under subclass 715. Subject matter having multiple unit flexible wall or plate devices subjected to single or plural pressures and single flexible wall or plate devices responsive to plural pressures.

SEE OR SEARCH THIS CLASS, SUBCLASS:
763, for multiple unit and/or differential Bourdon type.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclass 112 for differential temperature measurement.

717 With electrical readout:
This subclass is indented under subclass 716. Subject matter wherein the multiple unit devices and single devices generate or modify an electric current and the value of such current is indicative of the pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
336.5, for current generating hygrometers or hygrostats.
723, for other devices with electrical readouts.

733, 745 and 749, for Bourdon, piston or U-tube pressure gauges with electrical readout.
753, for electric pressure gauges.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 311+, for piezoelectric devices, especially subclass 338.
374, Thermal Measuring and Testing, subclass 188, for a thermometer with a mechanical sensor and an electrical indicator.

718 Capacitive:
This subclass is indented under subclass 717. Subject matter wherein the devices effect a variation in capacitance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
724, for other devices involving capacitance.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 280+, for capacitors automatically responsive or non-responsive to condition.

719 Resistive:
This subclass is indented under subclass 717. Subject matter wherein the device effect a variation in resistance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
734, 746 and 750, for diaphragm, Bourdon, piston or U-type pressure gauges with resistors.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclasses 36+ for fluid or gas pressure actuated.

720 Strain gauge:
This subclass is indented under subclass 719. Subject matter wherein the stress and/or strain in one or more elements varies the resistance.

SEE OR SEARCH THIS CLASS, SUBCLASS:
726, for diaphragm-type pressure gauges with strain gauges.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclass 4 for strain gauge type fluid or gas pressure actuated.

721 Piezoresistive:
This subclass is indented under subclass 720. Subject matter wherein the element is made of a semiconductor material whose resistance to the flow of electrical current is varied by the application of pressure thereto.

SEE OR SEARCH THIS CLASS, SUBCLASS:
727, for diaphragm-type gauges involving semiconductors.
754, for electrical-type pressure gauges involving semiconductor devices.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclass 4 for strain gauge type fluid or gas pressure actuated.

722 Electromagnetic:
This subclass is indented under subclass 717. Subject matter wherein the deflection of the flexible walls or plates effect a variation in inductance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
728, and 735, for diaphragm or Bourdon tube-type pressure gauges with inductor.

SEE OR SEARCH CLASS:
336, Inductor Devices, subclass 30 for inductor devices with condition responsive inductance adjusting means (e.g., by electromagnet).

723 With electrical readout:
This subclass is indented under subclass 715. Subject matter wherein the pressure being measured deflects the flexible wall or plate to generate or modify an electric current and the

value of such current is indicative of the pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
336.5, for current generating hygrometers or hygrostats.
717, 733, 745, and 749, for multiple and/or differential diaphragm, Bourdon, piston or U-tube with electrical readout.
753, electric pressure gauge.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 311+ for piezoelectric devices, especially subclass 338.
374, Thermal Measuring and Testing, subclass 188 for a thermometer with a mechanical sensor and an electrical indicator.

724 Capacitive:
This subclass is indented under subclass 723. Subject matter wherein the deflection of the flexible wall or plate effects a variation in capacitance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
718, multiple and/or differential diaphragm pressure gauge involving capacitive reactance.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 280+ for capacitors automatically responsive or nonresponsive to condition.

725 Resistive:
This subclass is indented under subclass 723. Subject matter wherein the deflection of the flexible wall or plate effects a variation in resistance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
734, 746 and 750, for Bourdon, piston or U-tube type pressure gauges involving resistance.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclasses 36+ for fluid or gas pressure actuated.

726 Strain gauge:
This subclass is indented under subclass 725. Subject matter wherein the stress and/or strain in an element varies the resistance.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclass 4 for strain gauge type fluid or gas pressure actuated.

727 Piezoresistive:
This subclass is indented under subclass 726. Subject matter wherein the element is made of a semiconductor material whose resistance to the flow of electrical current is varied by the application of pressure thereto.

SEE OR SEARCH THIS CLASS, SUBCLASS:
754, for electrical pressure gauges involving semiconductor devices.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclass 4 for strain gauge type fluid or gas pressure actuated.

728 Electromagnetic:
This subclass is indented under subclass 723. Subject matter wherein the deflection of the flexible wall or plate effects a variation in inductance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
735, for Bourdon tube-type pressure gauges with inductor elements.

SEE OR SEARCH CLASS:
336, Inductor Devices, with condition responsive inductance adjusting means (e.g., by electromagnet).

729.1 Bellows:
This subclass is indented under subclass 715. Subject matter wherein the flexible wall or plate comprises a receptacle or container having a corrugated wall made up of plural diaphragms with edges sealed together.

729.2 Capsule:
This subclass is indented under subclass 715. Subject matter wherein the flexible wall or plate comprises a disc-shaped receptacle or container made up of plural diaphragms with edges sealed together.

730 Expansible conduit:
This subclass is indented under subclass 715. Subject matter wherein the pressure being measured deflects a flexible portion of a fluid-carrying pipe or tube section and a detection of the degree of deflection is taken as an indication of pressure.

731 Sack:
This subclass is indented under subclass 715. Subject matter wherein the pressure responsive element is in the form of a flexible container.

SEE OR SEARCH CLASS:
92, Expansible Chamber Devices, subclasses 91+ for a flexible sack-type expansible chamber device.

732 Bourdon:
This subclass is indented under subclass 700. Subject matter wherein the pressure sensitive element comprises a thin-walled hollow member of elastic material bent into a curved configuration or twisted wherein an increase or decrease of pressure inside the element tends to straighten it.

733 With electrical readout:
This subclass is indented under subclass 732. Subject matter wherein the tubular pressure responsive element is deflected by the pressure to be measured to generate or modify an electric current and the value of such current is indicative of the pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
117, and 723, for diaphragm gauges with electrical readout.
335.02, for current generating hygrometers or hygrostats.
717, 745 and 749, for Bourdon, piston or U-tube gauges with electrical readout.
753, for electric pressure gauges.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 311+, for piezoelectric devices, especially subclass 338.
374, Thermal Measuring and Testing, subclass 188 for a thermometer with a mechanical sensor and an electrical indicator.

734 Resistive:
This subclass is indented under subclass 733. Subject matter wherein the deflection of the tubular pressure responsive element effects a variation in electrical resistance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
719, 725, 746, and 750, for diaphragm, piston or U-tube type pressure gauges with resistors.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclasses 36+, for fluid or gas pressure actuated.

735 Electromagnetic:
This subclass is indented under subclass 733. Subject matter wherein the deflection of the tubular pressure responsive element effects a variation in inductance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
722, and 728, for diaphragm devices involving inductor devices.

SEE OR SEARCH CLASS:
336, Inductor Devices, subclass 30 for inductor devices with condition responsive inductance adjusting means (e.g., by electromagnet).

736 Multiple and/or differential:
This subclass is indented under subclass 732. Subject matter having multiple unit devices subjected to single or plural pressures, and single devices responsive to plural pressures.

SEE OR SEARCH THIS CLASS, SUBCLASS:
716, for multiple unit and/or differential diaphragm type.

737 Intermediately supported:
This subclass is indented under subclass 732. Subject matter wherein the Bourdon tube is secured between its ends, usually at its approximate center for equal distribution of pressure, with each end of the tube being an active end.

738 Safety pressure release casing:
This subclass is indented under subclass 732. Subject matter wherein the Bourdon tube has a casing enclosure which has a pressure release in the event the tube breaks.

739 With mechanism dampening:
This subclass is indented under subclass 732. Subject matter wherein excessive and/or undesirable movements of the Bourdon tube and/or mechanical indicating system thereof are reduced by a means which oppose such movements.

SEE OR SEARCH THIS CLASS, SUBCLASS:
430, for miscellaneous instrument dampening means.
514.12+, for fluid or fluent material dampening of an inertial element in an acceleration measuring apparatus.
514.14, for vibration dampening in an inertial-type acceleration measuring apparatus.

740 With zeroizing adjustment:
This subclass is indented under subclass 732. Subject matter having an adjustable feature whereby calibration can be effected to the extent that the pointer or indicator mechanism is caused to register with a datum on a scale.

SEE OR SEARCH THIS CLASS, SUBCLASS:
387, for barometers having a similar feature.

741 Bourdon tube and mounting:
This subclass is indented under subclass 732. Subject matter wherein a unique characteristic of the Bourdon tube structure or connection and support of the Bourdon tube for communication with a pressure source is featured.

742 Helical Bourdon tube:
This subclass is indented under subclass 741. Subject matter wherein the tubular pressure responsive element is in the form of a helix.

743 Spiral Bourdon tube:
This subclass is indented under subclass 741. Subject matter wherein the tubular pressure responsive element is in the form of a spiral.

744 Piston:
This subclass is indented under subclass 700. Subject matter wherein the pressure being measured displaces a movable wall.

SEE OR SEARCH CLASS:
92, Expansible Chamber Devices, for a piston and cylinder-type expansible chamber device and particularly subclasses 172+ for piston, per se.

745 With electrical readout:
This subclass is indented under subclass 744. Subject matter wherein the pressure being measured displaces a movable wall to generate or modify an electric current and the value of such current is indicative of the pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
335.02, for current generating hygrometers or hygrostats.
717, 723, 733, and 749, for other pressure gauges with electrical readout.
749, for U-tube pressure gauges with electrical readout.
753, for electric pressure gauges.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 311+, for piezoelectric devices, especially subclass 338.
374, Thermal Measuring and Testing, subclass 188, for a thermometer with a mechanical sensor and an electrical indicator.

746 Resistive:
This subclass is indented under subclass 745. Subject matter wherein the displacement of the movable wall effects a variation in resistance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
719, 725, 734, and 750, for diaphragm, Bourdon or U-tube type pressure gauges with resistors.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclasses 36+, for fluid or gas pressure actuated electrical resistors.

747 U-tube liquid column:
This subclass is indented under subclass 700. Subject matter comprising a column of liquid wherein the liquid is subjected to a pressure to be measured and the difference in the levels of the columns or the height of a column from a datum is read directly as an index of the pressure.

748 Sphygmomanometer:
This subclass is indented under subclass 747. Subject matter for use in blood pressure measuring devices.

SEE OR SEARCH CLASS:
128, Surgery, subclasses 672+, for blood pressure measuring apparatus involving more than the pressure gauge, per se.

749 With electrical readout:
This subclass is indented under subclass 747. Subject matter wherein the displacement of the liquid within the U-shaped tube generates or modifies an electric current, and the value of such current is indicative of the pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
335.02, for current generating hygrometers or hygrostats.
717, 723, 733, and 745, for gauges with electrical readout.
753, for electric pressure gauges.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 311+, for piezoelectric devices, especially subclass 338.
374, Thermal Measuring and Testing, subclass 188, for a thermometer with a mechanical sensor and an electrical indicator.

750 Resistive:
This subclass is indented under subclass 749. Subject matter wherein the displacement of the liquid effects a variation in resistance to modify the electric current.

SEE OR SEARCH THIS CLASS, SUBCLASS:
719, 725, 734, and 746, for other gauges involving resistance.

SEE OR SEARCH CLASS:
338, Electrical Resistors, subclasses 36+ for fluid or gas pressure actuated.

751 Balance:
This subclass is indented under subclass 700. Subject matter wherein a container or containers containing communicating liquid columns is displaced when the liquid columns are subjected to the pressures to be measured.

752 McLeod type:
This subclass is indented under subclass 700. Subject matter comprising means for measuring the degree of vacuum wherein a definite volume of the medium subjected to vacuum conditions is compressed by a predetermined head and the amount of such compression is a measure of the degree of vacuum.

753 Electrical:
This subclass is indented under subclass 700. Subject matter wherein an electric current is generated or modified by direct application of the pressure to be measured to an electric circuit element and the value of such current is indicative of the pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
335.02, for current generating hygrometers or hygrostats.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, subclasses 163+ for thermometers having electrical or magnetic sensors.

754 Semiconductor:

This subclass is indented under subclass 753. Subject matter wherein the electric circuit element is a semiconductor.

SEE OR SEARCH CLASS:

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclasses 414+, especially subclasses 415+ for sensors of physical deformation.

438, Semiconductor Device Manufacturing: Process, subclasses 50+ for methods of making semiconductor electrical devices which are sensors of physical deformation.

755 Pirani type:

This subclass is indented under subclass 753. Subject matter comprising a thermal conductivity of the medium (the pressure of which is to be measured) is measured as an index of such pressure.

756 Mounting and connection:

This subclass is indented under subclass 700. Subject matter wherein means are featured to either mount the gauge on or connect the gauge to the means containing the fluid whose pressure is to be measured.

SEE OR SEARCH CLASS:

285, Pipe Joints or Couplings, subclasses 158+ for a pipe or rod-to-pipe-to-plate coupling means, and, subclasses 189+ for a pipe-to-plate joint, per se.

760 SPECIMEN STRESS OR STRAIN, OR TESTING BY STRESS OR STRAIN APPLICATION:

This subclass is indented under the class definition. Subject matter for (a) the measurement or study of stress (load) or strain (deformation) of a specimen of material or structure, or (b) the testing of a specimen of material or structure by application of a stress or strain thereto.

(1) Note. Where a stress or strain determination is made as a part (i.e., subcombination) of a larger measuring or testing organization (e.g., vane type fluid flow measurement, accelerometer) classification will be with the larger testing organization.

SEE OR SEARCH THIS CLASS, SUBCLASS:

152.48, for a downhole apparatus for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring force during drilling.

152.49, for a nondownhole-type apparatus for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring force during drilling.

152.59, for a downhole-type apparatus for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring a response due to force while drilling is not taking place.

862+, for dynamometers where strain in a part of the measuring apparatus itself is utilized as an index of power applied thereto or transmitted thereby.

SEE OR SEARCH CLASS:

33, Geometrical Instruments, subclasses 787+ for extensometers physical contact with the specimen.

411, Expanded, Threaded, Driven, Headed, Tool-Deformed, or Locked-Threaded Fastener, subclasses 8+ for fastener devices having means functioning to facilitate measuring or to denote the attainment of a desired stress or strain in a fastener device in situ.

761 Threaded fastener stress:

This subclass is indented under subclass 760. Subject matter wherein the specimen is a fastener for holding together two solid elements or has a complementary fitting engaged by the threads (e.g., nut and bolt).

(1) Note. Mere naming of a test specimen as a fastener (e.g., bolt) is not, of itself, sufficient for classification herein.

762 Indicating coating or sheet providing direct visual indication (e.g., cracking, color change):
This subclass is indented under subclass 760. Subject matter wherein an indicating element or coating on the specimen undergoes a directly visually perceptible change in response to specimen stress or strain.

(1) Note. Such testing or measurement using optical elements (e.g., lenses) or photoresponsive devices are not classifiable herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
799, for testing of a crack in the specimen, rather than in an indicating element.
800, for testing using optical or photoresponsive elements with specimen loading.

SEE OR SEARCH CLASS:
116, Signals and Indicators, subclass 212 for indicators responsive to a given level of stress.
356, Optics: Measuring and Testing, subclasses 32+ for stress testing using optical or photoresponsive elements absent specimen loading.

763 Specified electrical sensor or system:
This subclass is indented under subclass 760. Subject matter wherein the stress or strain is sensed by an electrical transducer and (a) either succeeding circuitry or (b) specific transducer structure and identifiable load applying structure.

(1) Note. Mere nominal recitation of a "strain gage" with other mechanical structure is not classified herein but rather in the appropriate subclass indented under 760.

(2) Note. Recitation of specific transducer structure absent identifiable load applying structure is classifiable in the appropriate electrical transducer class.

SEE OR SEARCH THIS CLASS, SUBCLASS:
781+, for a specified load transmission device from the specimen to a nominal or an unspecified electrical sensor.
855, for a support, holder or housing for an unspecified electrical sensor.

SEE OR SEARCH CLASS:
331, Oscillators, subclass 65 for an oscillator system responsive to a mechanical input.

764 Having level attainment counter:
This subclass is indented under subclass 763. Subject matter including means to determine the number of times one or more predetermined levels of stress or strain are reached or exceeded.

SEE OR SEARCH THIS CLASS, SUBCLASS:
769+, for other counters controlled by stress or strain responsive elements.
787, for time-related (e.g., time integral) stress or strain parameters, in general.

765 Compensation (e.g., linearization):
This subclass is indented under subclass 763. Subject matter including means to provide a constant relationship between stress and strain or to eliminate measurement errors due to changes in the test environment.

(1) Note. Linearizing circuits are included herein as nonlinearity compensating circuits.

766 Temperature:
This subclass is indented under subclass 765. Subject matter wherein the compensating means operates to eliminate thermally caused measurement errors.

767 Plural sensors at single location (e.g., diverse orientation, plural level):
This subclass is indented under subclass 763. Subject matter having a plurality of strain gages at substantially a single location on the specimen to provide a different response to distinct strain levels or types (e.g., bending, compression).

(1) Note. The term "substantially" is intended to include sensors spaced from each other at distances small compared to the specimen dimensions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
771, for a system having selector switch means for sensors at different locations.
781, for a load or strain transmitting element for an electrical sensor which is differently responsive to different load or strain orientations.

768 Sensor embedded in specimen:
This subclass is indented under subclass 763. Subject matter wherein the sensor is completely surrounded or enclosed by the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
781, for other mechanical load or strain transmitting structure for an electrical sensor.

769 Coupling circuit for specific additional purpose (e.g., noise suppression) or having specified structure:
This subclass is indented under subclass 763. Subject matter having circuitry (a) for a purpose additional to, or perfecting, the transmission of the signal between the sensor and indicator or (b) in which the details of such circuitry are particularly described.

(1) Note. Mere naming of the circuit connection (e.g., conductor, bridge) is not, of itself, sufficient for classification herein.

770 Peak indicating system:
This subclass is indented under subclass 769. Subject matter wherein the circuitry operates to provide an indication of maximum or minimum value measured during a specific time interval.

771 Having selector switching means:
This subclass is indented under subclass 769. Subject matter wherein the coupling circuit includes plural, alternative circuit components and switching means selective as to which of these elements are connected into the circuit.

(1) Note. This subclass include plural sensor devices at distinctly different locations.

SEE OR SEARCH THIS CLASS, SUBCLASS:
767, for systems having plural sensors at a single location.

772 Plural sensed signal system:
This subclass is indented under subclass 769. Subject matter wherein more than one signal is sensed and in which means responsive to the plural signals are simultaneously operable.

SEE OR SEARCH THIS CLASS, SUBCLASS:
771, for devices alternatively responsive to plural signals.
789+, for devices simultaneously responsive to stress and strain signals, in general.
794, for plural stress-strain testing, in general.

773 Specified signal transmitting link:
This subclass is indented under subclass 769. Subject matter wherein the details of structure or circuitry for transmitting the sensed signal between relatively movable parts, or over a distance which is large compared to the sensor dimensions is described.

(1) Note. Examples of such structure are slip rings and details of cable connections.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 177+ for details of electrical signal transmission means, in general.

774 Specified sensor structure:
This subclass is indented under subclass 763. Subject matter wherein the stress or strain sensor structure is particularly described.

(1) Note. Mere nominal recitation of a transducer or transducer type is insufficient for classification herein. Particular structural features of the sensor must be recited.

(2) Note. Stress or strain sensors without either circuitry or mechanical means for coupling stress or strain related forces are not classified herein, but are classified in the appropriate electrical element class (e.g., resistor).

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 311 for piezoelectric elements, per se.
338, Electrical Resistors, subclasses 2+ for resistive strain gage elements, per se.

775 Bonded to specimen:
This subclass is indented under subclass 774. Subject matter wherein an entire surface of the sensor is firmly adhered to a specimen surface so as to form an interface between the sensor and surface.

776 Sensor comprises coating:
This subclass is indented under subclass 775. Subject matter wherein the sensor consists of a coating formed on the specimen.

777 Semiconductor:
This subclass is indented under subclass 774. Subject matter wherein the sensor is composed of material having conductivity intermediate that of conductors and insulators.

SEE OR SEARCH CLASS:
257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclasses 414+, especially subclasses 417+ for stress/strain sensors.
438, Semiconductor Device Manufacturing: Process, subclasses 50+ for methods of making semiconductor electrical devices which are sensors of physical deformation.

778 Vibratory element:
This subclass is indented under subclass 774. Subject matter wherein the frequency of vibration of a sensing element stressed by the specimen provides the desired indication.

779 Magnetic or inductive:
This subclass is indented under subclass 774. Subject matter wherein deformation or stress in the specimen is mechanically coupled to a sensor which causes a variation in the strength of magnetic flux intercepted thereby or a change in reluctance of a magnetic circuit including the sensor.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclass 209 for stress measurement by a magnetic field in which a specimen directly interacts with the magnetic field.

780 Capacitive:
This subclass is indented under subclass 774. Subject matter wherein the specimen deformation varies the spacing between or a dimension of the plates forming a capacitor or varies a characteristic of the dielectric thereof.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 280+ for condition responsive capacitors, per se.

781 Specified load or strain transmission device from specimen to electrical detector:
This subclass is indented under subclass 760. Subject matter wherein the specimen is coupled to an electrical sensor by means transmitting the stress or strain from the specimen to the sensor. The coupling means often differs in response to different orientations of specimen stress or strain.

782 Strain multiplier:
This subclass is indented under subclass 781. Subject matter wherein the coupling means imparts a strain to the electrical sensor which is a multiple of the specimen strain.

783 Deformation or change in stress after fracture, cutting, or boring:
This subclass is indented under subclass 760. Subject matter wherein the change in stress or strain after separation of or removal of material from the specimen is determined as a measure of stress, strain or an associated parameter (e.g., elastic modulus).

784 Earth stresses:
This subclass is indented under subclass 760. Subject matter wherein the specimen is a subterranean volume of earth.

785 Prestressed specimen:
This subclass is indented under subclass 760. Subject matter wherein the specimen being tested is subjected to a preexisting stress as a result of the structure or manufacture thereof.

786 In static structures (e.g., buildings, bridges):
This subclass is indented under subclass 760. Subject matter wherein the specimen is a structure, permanently affixed to the earth or an element thereof.

(1) Note. Foundations and pilings are considered elements of such a structure.

787 Stress or strain history of a specimen without application of a load:
This subclass is indented under subclass 760. Subject matter wherein a time related parameter of the stress or strain of a specimen is sensed and in which no load is applied to the specimen.

(1) Note. Examples of such time related parameters include time integrals, fatigue and maximum values over an interval.

(2) Note. Graphical representations as a function of time are classified herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
808+, for fatigue testing by repetitive loading of a specimen.

788 By loading of specimen (e.g., strength of material test):
This subclass is indented under subclass 760. Subject matter wherein the test is effected by intentionally applying a load to the specimen.

SEE OR SEARCH CLASS:
72, Metal Deforming, appropriate subclasses for metal deformation of general utility.
374, Thermal Measuring and Testing, subclasses 46+ for thermal testing combined with loading of a specimen.

789 Stress-strain relationship determination:
This subclass is indented under subclass 788. Subject matter wherein a determination of a function of or functional relationship between, the load upon and deformation of a specimen is obtained.

(1) Note. A device separately measuring the load and deformation of a specimen without a functional relationship between, said measurement is not included herein.

790 Compression:
This subclass is indented under subclass 789. Subject matter wherein the load is applied to the specimen in such manner as to tend to shorten the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
818+, for compressional testing in general.

791 Graphical output:
This subclass is indented under subclass 789. Subject matter wherein the output is presented in the form of a multidimensional graph.

(1) Note. A device providing a graphical output of a single parameter as a function of time is not classified herein, but in the appropriate parameter subclass.

792 Moving chart:
This subclass is indented under subclass 791. Subject matter where graphical output medium is itself moved in response to variation of one of the measured parameters.

793 Drum:
This subclass is indented under subclass 792. Subject matter where the graph is drawn on a medium formed in a cylindrical shape which is rotated about its axis.

794 Plural diverse stress-strain tests or composite loads:
This subclass is indented under subclass 788. Subject matter combining at least two different types of stress-strain tests (e.g., tensile, bending, compressive, torsion, shear, etc.).

(1) Note. Composite loads in a single test are classified herein.

(2) Note. Plural tests or loads of the same type are classified by the particular test.

795 Strain:
This subclass is indented under subclass 794. Subject matter where the deformation of a specimen is measured.

796 Tension-compression:
This subclass is indented under subclass 794. Subject matter where the load applied may be either a push or pull.

797 Alternating:
This subclass is indented under subclass 796. Subject matter where the specimen is cyclically subjected to alternate push-pull stresses of tension and compression.

SEE OR SEARCH THIS CLASS, SUBCLASS:
808+, for repetitively applied load testing, in general.

798 Hydraulic or pneumatic actuation:
This subclass is indented under subclass 796. Subject matter where the load is applied by means of a fluid operated device or system.

799 Specimen cracking or crack propagation:
This subclass is indented under subclass 788. Subject matter wherein the loading causes formation of a narrow line splitting at least the surface of the specimen and where the splitting or progress thereof is ascertained.

SEE OR SEARCH THIS CLASS, SUBCLASS:
762, for subject matter in which an indicating coating or sheet is cracked by specimen stress.
835, for tear testing of a specimen.

800 Optical:
This subclass is indented under subclass 788. Subject matter wherein the stress or strain indication includes strain responsive visual or photoresponsive means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
762, for a specimen sheet or coating providing a direct visual indication of stress or strain of a specimen.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclasses 32+, for optical strain analysis absent loading of the specimen.

801 Acoustic emission:
This subclass is indented under subclass 788. Subject matter for detection of sonic-type waves emitted by the specimen as a result of the load induced strain.

(1) Note. An acoustic emission is generally an inaudible noise caused by minute changes in a material or object due to stresses imposed thereon. Thus, when a material undergoes a permanent deformation, it will generate a sound which may be monitored by ultrasensitive means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
587, for acoustic emission detection not accompanied by specimen loading.

802 Aircraft structure:
This subclass is indented under subclass 788. Subject matter wherein the specimen forms a part of an aircraft body.

803 Concrete:
This subclass is indented under subclass 788. Subject matter wherein the specimen is formed of concrete.

804 Model of structure to determine structure properties:
This subclass is indented under subclass 788. Subject matter wherein the specimen comprises a model of a structure which is tested in order to ascertain properties of the structure.

805 Varied in response to specimen condition other than failure:
This subclass is indented under subclass 788. Subject matter wherein the load applied to the specimen is controlled by a device responsive

to a condition of the specimen other than failure.

(1) Note. Devices which cease loading upon specimen failure are classified in the appropriate testing to failure subclass below. However, a device responsive to either failure or another condition is classified herein and cross-referenced to the appropriate testing to failure subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
810, for periodic load testing to failure.
821, for compressional load testing to failure.
834, for tensile testing to failure.
838+, for rupture or burst test of sheet material by transverse loading.
845, for shear testing to failure.
848, for torsion testing to failure.
851, for bending, flexing or folding to failure.

806 Varied according to predetermined pattern:
This subclass is indented under subclass 788. Subject matter wherein the load is automatically varied as a function of time upon operation of the loading device.

(1) Note. Included herein are devices characterized as varying the rate of change of the loading.

(2) Note. Included herein are devices sequentially testing plural specimens.

807 Applied directly by fluid pressure:
This subclass is indented under subclass 806. Subject matter wherein the load is applied to the specimen by direct contact with a fluid under pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
37+, for testing by fluid pressure in general.

808 Repetitive:
This subclass is indented under subclass 806. Subject matter wherein the variation in loading is repeated during a single operation of the device.

(1) Note. Included hereunder are devices causing a repetitive load upon a traveling specimen by inducing differing loads thereon at particular locations passed by the specimen.

809 Plural specimen:
This subclass is indented under subclass 808. Subject matter in which a plurality of specimens are simultaneously tested.

SEE OR SEARCH THIS CLASS, SUBCLASS:
806, for a device which is repetitively actuated to load sequentially load distinct specimens.

810 To failure:
This subclass is indented under subclass 808. Subject matter in which the application of stress is repeated until the specimen is permanently deformed, damaged or ruptured.

SEE OR SEARCH THIS CLASS, SUBCLASS:
799, for detecting cracking of specimen undergoing such testing.

811 Electric control circuit or particular loading device:
This subclass is indented under subclass 808. Subject matter having particular circuitry to control a specimen loading device or a particularly described electrical loading device.

(1) Note. An electric motor recited by name only is not a particularly described electric loading device for purposes of this classification.

812 Flexing, bending, or folding:
This subclass is indented under subclass 808. Subject matter wherein the specimen has a long axis and the repetitive load tends to deform the long axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
849+, for testing by bending, flexing or folding, in general.

813 Compressive:
This subclass is indented under subclass 808. Subject matter where the repetitive load tends to shorten the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
818+, for static compressional testing.

814 Torsional:
This subclass is indented under subclass 808. Subject matter when the repetitive load tends to twist the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
847+, for torsion testing in general.

815 Shear:
This subclass is indented under subclass 808. Subject matter where the repetitive load is either at right angles to the long axis of the specimen, or oppositely directed along parallel axes of the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
841+, for shear testing in general.

816 Hydraulic or pneumatic actuation:
This subclass is indented under subclass 806. Subject matter wherein the load is applied to the specimen by a fluid actuated device.

817 Motor driven actuating screw:
This subclass is indented under subclass 806. Subject matter wherein the load is applied to the specimen by a device driven by a motor-screw combination.

818 Compressional:
This subclass is indented under subclass 788. Subject matter wherein the load is applied so as to squeeze the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
790, for a test of a relationship between a compressive load and its resultant deformation.
813, for repetitive application of a compressive load.

SEE OR SEARCH CLASS:
100, Presses, appropriate subclasses for presses of general utility.

819 Plural specimen or multiaxial loading:
This subclass is indented under subclass 818. Subject matter wherein the compressive load is applied to plural specimens or along plural axes of a specimen.

820 Fluid displacement provides indication:
This subclass is indented under subclass 818. Subject matter wherein the parameter to be indicated controls the position of a fluid volume which position is calibrated so as to provide the desired parameter indication.

821 To fracture, crushing, or yield point:
This subclass is indented under subclass 818. Subject matter wherein the specimen compressively loaded until it is permanently ruptured, damaged, or deformed.

822 Plastic flow or creep:
This subclass is indented under subclass 818. Subject matter wherein the specimen is capable of flow under the compressive load and in which such flow is determined.

(1) Note. Determination of viscosity of plastic materials by a compressive test is included herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
54.01+, for determination of viscosity of liquids.

823 Residual deformation (e.g., consolidation):
This subclass is indented under subclass 818. Subject matter wherein the amount of deformation remaining after release of the compressive load is measured.

824 By rotating squeezing element:
This subclass is indented under subclass 818. Subject matter wherein the compressive load is applied by a rotating element, the periphery of which overlaps that of the specimen.

SEE OR SEARCH CLASS:
209, Classifying, Separating, and Assorting Solids, subclass 599, for item sorting means controlled by susceptibility of the item to deformation.

825 With hydraulic or pneumatic actuation:
This subclass is indented under subclass 818. Subject matter wherein the compressive load is applied by a fluid operated device.

SEE OR SEARCH THIS CLASS, SUBCLASS:
816, for a similar device in which the compressive load is varied in accordance with a predetermined pattern.

826 Tensile:
This subclass is indented under subclass 788. Subject matter in which the applied load is a pull tending to stretch the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
796+, for devices having both tensile and compressive loading.
806+, for tensile loading according to a predetermined pattern, particularly 808+ for repetitively effected tensile loading.

SEE OR SEARCH CLASS:
72, Metal Deforming, subclass 302 for metal stretching, in general.

827 Bond test:
This subclass is indented under subclass 826. Subject matter where the specimen includes an interface where two materials are joined together.

828 Strand or chain test:
This subclass is indented under subclass 826. Subject matter where the specimen configuration is essentially one dimensional (e.g., chains, threads, yarns, etc.).

829 By roller:
This subclass is indented under subclass 828. Subject matter where there is a roller, drum, or pulley over which the specimen passes.

(1) Note. Supply and take up reels are not included as “rollers” in this subclass.

830 To failure:
This subclass is indented under subclass 828. Subject matter where the specimen is stretched until it is permanently deformed, damaged, or ruptured.

SEE OR SEARCH THIS CLASS, SUBCLASS:
834, for tensile failure testing in general.

831 Having specified clamp:
This subclass is indented under subclass 826. Subject matter having a particularly described device for gripping or holding a specimen subjected to tension.

(1) Note. Mere recitation of a clamp by name only is insufficient for classification herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
828+, for specified gripping or holding devices particularly adapted for strand or chain testing.
856+, for such clamping devices, per se.

SEE OR SEARCH CLASS:
24, Buckles, Buttons, Clasps, etc., subclasses 455+ for clamps of a more general utility.

832 Interior to specimen:
This subclass is indented under subclass 831. Subject matter wherein the clamp is totally within the specimen.

833 Jaws:
This subclass is indented under subclass 831. Subject matter where the clamp includes two or more movable opposing parts that open and close for holding the specimen between them.

834 To failure:
This subclass is indented under subclass 826. Subject matter where the specimen is stressed until it is permanently deformed, damaged, or ruptured.

835 Tear:
This subclass is indented under subclass 834. Subject matter where tension is applied to a specimen to cause separation of parts of the specimen along a predetermined path of separation.

(1) Note. The predetermined path is generally composed of scoring or perforations in the specimen.

836 Pendulum dynamometer:
This subclass is indented under subclass 826. Subject matter which includes a weighted lever arm, the angular position of which indicates the load applied to the specimen.

837 Hydraulic or pneumatic actuation:
This subclass is indented under subclass 826. Subject matter in which a fluid actuated device applies the load to the specimen.

838 Rupture or burst strength of sheet material by transverse loading:
This subclass is indented under subclass 788. Subject matter wherein one axis of the specimen is very small compared to the other two and the specimen is stressed substantially along said axis until it fails or ruptures.

SEE OR SEARCH THIS CLASS, SUBCLASS:
807, for a similar device in which fluid pressure is applied directly to the material according to a predetermined time variation.

839 Including cutting or piercing element:
This subclass is indented under subclass 838. Subject matter wherein the transverse loading is applied by an element which penetrates the specimen.

840 Hydraulic or pneumatic actuation:
This subclass is indented under subclass 838. Subject matter wherein the loading is effected by a fluid operated device.

SEE OR SEARCH THIS CLASS, SUBCLASS:
807, for devices in which fluid is applied directly to the specimen with a predetermined pressure variation.

841 Shear:
This subclass is indented under subclass 788. Subject matter wherein the loading is applied to a section of the specimen such that the loading or the deformation has a component tangential to the section.

SEE OR SEARCH THIS CLASS, SUBCLASS:
815, for such loading effected repetitively during the testing operation.

842 Bond:
This subclass is indented under subclass 841. Subject matter wherein the specimen includes an interface where two materials are joined together.

843 By rotary element:
This subclass is indented under subclass 841. Subject matter wherein the loading is applied by an element rotating about an axis therethrough.

(1) Note. The load applying element is generally located within the outer bounds of the specimen.

844 Impact (e.g., pendulum):
This subclass is indented under subclass 841. Subject matter wherein the shear load is applied to the specimen by sudden contact of a force applying element.

(1) Note. The sudden contact may include movement of the specimen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
12.01+, for impact testing in general.

845 To fracture or failure:
This subclass is indented under subclass 841. Subject matter wherein the load is applied to the specimen until it is permanently ruptured, damaged, or deformed.

846 Opposing work holders including specimen:
This subclass is indented under subclass 841. Subject matter in which the load is applied to the specimen by plates on opposite sides of the specimen applying loads thereto in different directions.

847 Torsion:
This subclass is indented under subclass 788. Subject matter where the specimen has an axis and the loading produces an angular deformation about said axis.

(1) Note. Rotation of a plate or other force applying element on or within the specimen is considered a shear, rather than a torsional load.

SEE OR SEARCH THIS CLASS, SUBCLASS:
814, for such loading effected repetitively during the testing operation.

SEE OR SEARCH CLASS:
72, Metal Deforming, subclass 299, for metal twisting of general utility.

848 To failure:
This subclass is indented under subclass 847. Subject matter where the torsional load is applied until a permanent change of characteristic of the specimen occurs.

849 Bending, flexing, or folding:
This subclass is indented under subclass 788. Subject matter where the specimen has at least one axis and the difference in angular orientation of the ends of the axis is varied by the applied load.

SEE OR SEARCH THIS CLASS, SUBCLASS:
812, for such subject matter where the angular variation is repetitively effected.

SEE OR SEARCH CLASS:
72, Metal Deforming, subclasses 127+, for metal bending by deflection of successive portions of moving workpiece; and subclasses 380+, for metal bending by relatively movable offset tool faces, both of general utility.

850 Weld testing:
This subclass is indented under subclass 849. Subject matter wherein the specimen includes two portions joined by a fusion bond.

851 To failure or fracture:
This subclass is indented under subclass 849. Subject matter wherein the specimen is loaded until a permanent change of characteristic or a fracture of the specimen occurs.

SEE OR SEARCH THIS CLASS, SUBCLASS:
810, for periodic stressing of a specimen to failure.
812, for periodic bending or flexing of a specimen.

852 Loading means intermediate stationary end holders or supports:
This subclass is indented under subclass 849. Subject matter wherein the opposite ends of the specimen are mechanically supported and the load is applied to the specimen between the supported ends.

SEE OR SEARCH CLASS:
388, Electricity: Motor Control Systems, appropriate subclasses for motor control systems responsive to torque.

853 Having opposite ends of specimen clamped:
This subclass is indented under subclass 849. Subject matter where each end of the specimen is rigidly fastened to a support during the test.

(1) Note. Either support may be angularly movable.

854 By angular displacement of opposite ends of specimen:
This subclass is indented under subclass 849. Subject matter where the stressing is effected by movement of one or both ends of the specimen along the arc of a circle.

855 Support, holder, or housing for unspecified type electrical sensing element:
This subclass is indented under subclass 760. Subject matter for a device which at least partially surrounds an electrical strain gage which is only nominally described.

(1) Note. The device is generally for support or protection.

(2) Note. Such devices with a particular electrical sensor are classified with the sensor.

856 Specimen clamp, holder, or support:
Apparatus for or method of holding a specimen to be subjected to a test of the type classified in subclasses 760+.

(1) Note. These holding devices or methods are subcombinations of the subject matter of subclasses 760+ and are peculiar to such testing.

(2) Note. Single or plural gripping devices are classified herein, even if broadly correlated for testing; however, inclusion of additional structure for application or transmission of a test load will be classified in the appropriate subclass above.

(3) Note. Gripping Means, in general, without structure peculiar to stress or strain testing, is classified in the appropriate class therefor.

SEE OR SEARCH CLASS:
24, Buckles, Buttons, Clasps, etc., subclasses 455+ for clamps of a more general utility.

857 With hydraulic or pneumatic actuation of grip:
This subclass is indented under subclass 856. Subject matter wherein the specimen support is operated by a fluid pressure system.

858 Winding drum or roller type:
This subclass is indented under subclass 856. Subject matter wherein a portion of the specimen is wound about an element of the gripping apparatus.

859 With wedging or camming elements contacting specimen:
This subclass is indented under subclass 856. Subject matter wherein the specimen gripping elements have either a wedge shape surface or are pivotable about an axis to allow the gripping elements to conform to the specimen surface to center the specimen.

(1) Note. The wedge shaped surface of such elements is not necessarily the specimen contacting surface.

SEE OR SEARCH CLASS:
269, Work Holders, subclass 217 for work holders of general utility having wedging or camming jaws.

860 Opposed pair:
This subclass is indented under subclass 856. Subject matter including a pair of gripping devices at opposite ends of a specimen.

861 VOLUME OR RATE OF FLOW:
This subclass is indented under the class definition. Devices for determining the volume of flow, speed, volume rate of flow or mass rate of flow of fluent material.

(1) Note. For purposes of this subclass, fluent materials include liquids, gases, fluent solids, and fluent mixtures.

(2) Note. Patents claiming only such motive part of volume meters as are capable of general use as a fluid motor are classified in Classes 91, Motors: Expansible Chamber Type and 415, Rotary Kinetic Fluid Motors or Pumps. See the reference to Class 73 in section III of the Class Definition of Class 91 for a further statement of this line.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.16+, for calibration of flow meters.
155, for determining fluid flow in bore holes.
170.07, and 170.11, for determining fluid flow-rate and direction.
181+, for determining the speed of a craft with respect to a fluid.
488+, for mechanical speed, velocity, or acceleration measuring of nonfluent material.

SEE OR SEARCH CLASS:
48, Gas: Heating and Illuminating, subclasses 180+ for metering and mixing two gases where one is a fuel.
91, Motors: Expansible Chamber Type, see (3) Note above.

116, Signals and Indicators, for nonelectrical means for giving an alarm upon occurrence of fluid flow.

128, Surgery, subclasses 630+ for flow-measuring means with structure particularly adapted for placement on or in a living body.

137, Fluid Handling, subclasses 98+ for a self-proportioning flow system; and subclasses 624.11+ for a programmed or timed valve which meters fluid merely by timing the interval between opening and closing of the valve.

164, Metal Founding, subclasses 154.3 and 155.5 for a metal casting apparatus which may include a volumetric flow rate sensor.

175, Boring or Penetrating the Earth, subclass 48, for measuring the rate of flow of drilling fluid.

222, Dispensing, particularly subclasses 14+, 59+ and 71+ for volume or rate of flow-measuring means having dispensing features or used in dispensing combinations.

235, Registers, subclass 92 for particle counting with display means.

250, Radiant Energy, particularly subclasses 258, 259+, 302+, 356.1, and 432+ for miscellaneous radiant energy responsive devices.

324, Electricity: Measuring and Testing, subclass 306, for flow-measuring means responsive to nuclear induction.

340, Communications: Electrical, subclasses 606+ for electric means for giving a nonquantitative indication or signal in response to the condition, such as flow, of a fluid.

356, Optics: Measuring and Testing, subclasses 27+ for flow-measuring means employing lasers.

415, Rotary Kinetic Fluid Motors or Pumps, see (2) Note above.

418, Rotary Expansible Chamber Devices, for rotary expansible chamber devices, per se.

700, Data Processing: Generic Control Systems or Specific Applications, subclass 281 for control of fluid level or volume, subclasses 282-285 for flow control.

861.01 With indirect temperature or density compensation:

This subclass is indented under subclass 861. Subject matter with means for combining the output from a flow transducer with the output from one or more transducer means responsive to a fluid parameter to effect temperature correction of the output from the flow transducer or to convert volumetric flow rate into mass flow rate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

861.04, for combining the output from a flow transducer with the output from one or more fluid condition responsive transducer means to determine the flow rate of a selected fluid component.

861.02 Electrical:

This subclass is indented under subclass 861.01. Subject matter wherein the transducer outputs are combined electrically.

861.03 Digital:

This subclass is indented under subclass 861.02. Subject matter wherein the output of each transducer is an electrical signal or is converted to an electrical signal before being combined, and wherein at least one of the signals being combined contains a characteristic which is recurrent (e.g., a pulse or waveform) over a period of time, and the information in the signal is contained in the number of recurrences of the characteristic during the period of time.

861.04 Of selected fluid mixture component:

This subclass is indented under subclass 861. Subject matter for detecting one or more selected components of a multiphase (i.e., gas, liquid, or solid) fluid or fluid mixture.

SEE OR SEARCH THIS CLASS, SUBCLASS:

861.01, for similar structure to effect compensation or correction of the output of a volumetric flow transducer or to convert volumetric flow rate into mass flow rate.

861.05 By measuring transit time of tracer or tag:
This subclass is indented under subclass 861. Subject matter responsive to the time elapsed for a detectable property of the fluid or a detectable body or substance introduced into the fluid to travel a fixed distance.

(1) Note. For the purposes of this subclass, a body or substance that divides the fluid into segments is a tracer if it does not impede the fluid flow.

861.06 With autocorrelation or cross-correlation detection:
This subclass is indented under subclass 861.05. Subject matter wherein it is determined if a signal (i.e., $f_1(t)$) is noise by correlating it with either another signal (i.e., the solution to cross-correlation in Figure 1) or with itself (i.e., the solution to autocorrelation in Figure 2), where $f_1(t)$ and $f_2(t)$ are functions of time, t, and t is a period of delay:

$$\lim_{T \to \infty} \frac{1}{2T} \int_{-T}^{T} f_1(t) f_2(t-\tau) dt$$

Figure 1

$$\lim_{T \to \infty} \frac{1}{2T} \int_{-T}^{T} f_1(t) f_1(t-\tau) dt$$

Figure 2

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 76.12+ for analysis of complex waves.
708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 5+, 422+ and 813+, for correlators, per se.

861.07 By measuring tracer concentration:
This subclass is indented under subclass 861. Subject matter wherein (a) a tracer substance is introduced into the fluid at a fixed rate and a downstream detector means is responsive to the tracer concentration or (b) a fixed concentration of tracer substance is introduced into the fluid and a downstream detector means is responsive to the rate of introduction of the tracer.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 302+ and 356.1 for radiation tracer methods and flow metering of invisible radiation.

861.08 By measuring electrical or magnetic properties:
This subclass is indented under subclass 861. Subject matter directly responsive to an electrical or magnetic property of the fluid.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclass 306 for measuring electrical or magnetic property, per se, and for measuring flow rate by nuclear induction.

861.09 Ionization type:
This subclass is indented under subclass 861.08. Subject matter wherein ions are produced in the fluid and the flow rate is determined by (a) the ion production rate, or (b) the rate of ion collection by ion collector means (e.g., electrodes).

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.05, for detection of the transit time of an ionized tracer or tag.
861.07, for detection of the concentration of an ionized substance or solution injected into the fluid.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 306+, for inspection of solids or liquids by charged particles.
324, Electricity: Measuring and Testing, subclasses 460+, for the measurement of gas pressures by means of ionization gages.

861.11 Electromagnetic induction (e.g., Faraday type):
This subclass is indented under subclass 861.08. Subject matter wherein the fluid traverses an applied magnetic field, and potential gradients, indicative of flow rate, are produced in the fluid by magnetic induction.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 11 for dynamo-electric machinery in which the fluid may be conductive to electricity.
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnetics, subclasses 209+ for magnet structure, per se.
417, Pumps, subclass 50 in which a pumped fluid is electrically conductive.

861.12 With detecting electrodes:
This subclass is indented under subclass 861.11. Subject matter wherein electrodes are placed in contact with the fluid or are capacitively coupled therewith to detect a potential gradient produced in the fluid along a path through the fluid extending transverse to both the magnetic field and a component of the flow direction.

861.13 Including permanent magnet or D.C. field:
This subclass is indented under subclass 861.12. Subject matter wherein the applied magnetic field is produced by a permanent magnet or by an electromagnet supplied with a constant and continuous field current.

861.14 For dielectric fluids:
This subclass is indented under subclass 861.12. Subject matter for fluids which do not conduct direct electric current (e.g., petroleum products).

861.15 Plural pairs of detecting electrodes:
This subclass is indented under subclass 861.12. Subject matter having means for detecting plural potential gradients along plural paths through the fluid.

861.16 Including electrically interconnected or synchronized input and output circuit:
This subclass is indented under subclass 861.12. Subject matter wherein the applied magnetic field is produced by an electromagnet and the detected potential gradient is applied to an electrical output circuit which also receives a signal responsive to or synchronized with the applied magnetic field or the power supply to the electromagnet.

(1) Note. Usually, the signal is used to compensate for fluctuations in the power supply or to control means for rejecting spurious signals.

861.17 Selective or periodic sampling:
This subclass is indented under subclass 861.16. Subject matter with switching or gating means for selective or periodic sampling of the potential gradient detected by electrodes (e.g., for sampling when the magnetic flux is in a steady state).

861.18 By measuring vibrations or acoustic energy:
This subclass is indented under subclass 861. Subject matter responsive to (a) traveling compressional waves (e.g., acoustic waves) existing in the fluid or applied thereto, (b) mechanical oscillations or fluid vortices produced by the interaction of the fluid with passive structure (e.g., an obstacle) or (c) vibrations applied to the fluid by dynamic means vibrating in a plane parallel with the direction of flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152.32, for a flowmeter for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring vibration.
861.34, for detection of the precessional motion of swirling fluid.
861.355+,for applied vibrations which impart angular or lateral momentum to the fluid.

861.19 Produced by fluidic oscillator:
This subclass is indented under subclass 861.18. Subject matter wherein the fluid is accelerated to form a fluid jet and including means to oscillate the jet (e.g., by negative

feedback forces exerted thereon through control ports).

861.21 Caused by fluid interaction with obstacle:
This subclass is indented under subclass 861.18. Subject matter wherein a body in the flow path either vibrates due to the dynamic effects of the fluid or imparts vibrations to the fluid.

861.22 Vortex shedders:
This subclass is indented under subclass 861.18. Subject matter wherein an obstacle (e.g., bluff body) in the flow path generates Karman vortex streets.

861.23 Acoustic:
This subclass is indented under subclass 861.22. Subject matter wherein an acoustic wave is transmitted through the fluid by transducer means.

861.24 Movable sensor responsive to vortices:
This subclass is indented under subclass 861.22. Subject matter wherein the vortices cause an element to vibrate proportional to the vortex frequency.

(1) Note. The element may be the vortex generator itself, a segment thereof, or separate element.

861.25 Reflection or scattering of acoustic waves:
This subclass is indented under subclass 861.18. Subject matter wherein the rate of flow is determined by acoustic waves transmitted to and reflected or scattered by the fluid.

861.26 Deflection of acoustic waves:
This subclass is indented under subclass 861.18. Subject matter responsive to the downstream deflection of acoustic waves transmitted through the fluid transverse to a component of the direction of flow.

861.27 Transit time of acoustic waves:
This subclass is indented under subclass 861.18. Subject matter responsive to the transit time of acoustic waves transmitted through the fluid along a path extending between upstream and downstream locations.

(1) Note. Usually, a comparison of upstream and downstream transit times is effected.

SEE OR SEARCH THIS CLASS, SUBCLASS:
339, and 597, for measuring transit time of acoustic waves to determine other properties of a fluid (e.g., density, temperature, etc.).

861.28 Transmitted along single path:
This subclass is indented under subclass 861.27. Subject matter wherein the acoustic waves are transmitted upstream and downstream along the same path.

861.29 In both directions simultaneously:
This subclass is indented under subclass 861.28. Subject matter wherein the acoustic waves are simultaneously transmitted upstream and downstream along the same path.

861.31 Transmitted along parallel paths:
This subclass is indented under subclass 861.27. Subject matter wherein the acoustic waves are transmitted along plural upstream-downstream paths which are substantially parallel.

861.32 By measuring swirl rate imparted by static means:
This subclass is indented under subclass 861. Subject matter responsive to the angular velocity imparted to the fluid by fixed vanes, tangential inlet to a chamber, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.01+, for other devices which combine the output from a flow transducer with the output from one or more transducer means.
861.351+, for devices which are responsive to a dynamic characteristic of the fluid.

861.33 With turbine in a swirl chamber:
This subclass is indented under subclass 861.32. Subject matter wherein a swirl chamber is included and the rate of swirl is measured by a turbine located in the swirl chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152.34, for a flowmeter for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring

a rotation rate of an element about a rotation axis.

861.34 Precess type:
This subclass is indented under subclass 861.32. Subject matter wherein the swirling motion of the fluid is transformed into precessional movement and the precessional movement is detected.

(1) Note. Usually, an expansion or constriction of the flow path is employed to transform the swirling motion to precessional movement.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.22, for detection of Karman vortices.

861.351 Mass flow by imparting angular or transverse momentum to the fluid:
This subclass is indented under subclass 861. Subject matter wherein a fluid is accelerated in a direction other than the normal direction of flow and a response related to the acceleration is determined to provide a direct measurement of mass flow.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.01, through 861.03, for a mass flow measurement in which the volume of flow is combined with another measurement to provide a measurement of mass flow.
861.32, for a device responsive to the angular velocity imparted to a fluid

861.352 Rotated resiliently coupled elements:
This subclass is indented under subclass 861.351. Subject matter wherein impellers or an impeller and drum are rotated at the same angular velocity by the fluid or drive means and connected by a biasing means, and the angular displacement between the members is a measure of mass flow.

861.353 Reaction turbine or vane:
This subclass is indented under subclass 861.351. Subject matter wherein the angular momentum of the fluid is absorbed by (a) a turbine restrained against free rotation (normally spring biased) or (b) a fixed member.

861.354 Coriolis or gyroscopic:
This subclass is indented under subclass 861.351. Subject matter wherein (a) a conduit or impeller is rotated or oscillated to impose a transverse velocity gradient on the fluid or (b) a conduit is formed as a loop to provide an effective spin axis, the loop is rotated or oscillated about a drive axis and a gyroscopic couple is produced.

861.355 Vibrated conduit:
This subclass is indented under subclass 861.354. Subject matter wherein the conduit is subjected to oscillations.

861.356 Signal processing or analysis details:
This subclass is indented under subclass 861.355. Subject matter including specific means or steps for evaluating the output for determination of mass flow or drive control.

861.357 Drive and sensor element located on straight conduit portion:
This subclass is indented under subclass 861.355. Subject matter wherein the vibration means and sensing element are located on a straight section of the conduit.

861.39 Using an applied fluid jet:
This subclass is indented under subclass 861. Subject matter having means responsive to the interaction of the fluid with a high velocity stream issued from a nozzle.

861.41 By counting drops, bubbles, or particles:
This subclass is indented under subclass 861. Subject matter wherein the fluid consists of or is converted into discrete drops, bubbles or particles which are detected and counted.

SEE OR SEARCH CLASS:
337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 10, for particle counting where no significant measuring or testing structure is claimed.

861.42 Using differential pressure:
This subclass is indented under subclass 861. Subject matter wherein the velocity of the fluid to be metered creates a pressure differential or kinetic head across (a) a flow restriction such as a Venturi, flow nozzle or orifice plate, or (b)

a Pitot or like device, which differential or head is substantially proportional to a function of the velocity of the fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

215, for Weir-type meters.

716, for differential pressure gauges including diaphragms and capable of general use.

747+, for U-type manometers capable of general use.

861.01, wherein the output from the flow meter is combined with that of another transducer for temperature compensation or the measure of mass flow.

861.39, wherein the pressure differential is created by the interaction of the fluid with a high velocity stream from a nozzle.

861.71, wherein the restriction is varied by an object in its flow path.

SEE OR SEARCH CLASS:

138, Pipes and Tubular Conduits, subclasses 40+, for flow restrictors, per se.

861.43 With time integration:
This subclass is indented under subclass 861.42. Subject matter wherein means is provided for integrating the pressure differential or kinetic head with respect to time, so that a measure of the total flow over a period may be obtained.

SEE OR SEARCH THIS CLASS, SUBCLASS:

183, for differential pressure-type meters having integrating means and forming ships' log navigating devices.

861.44 By electrical means:
This subclass is indented under subclass 861.43. Subject matter wherein the integration is performed electrically.

861.45 By mechanical means:
This subclass is indented under subclass 861.43. Subject matter wherein the integration is performed mechanically.

861.46 Including pressure applied to liquid column or reservoir:
This subclass is indented under subclass 861.45. Subject matter wherein a liquid column or reservoir is subjected to the pressure to be measured and the subsequent change in level is sensed and utilized as an input to the integration means.

861.47 Pressure applied to movable member (e.g., a diaphragm):
This subclass is indented under subclass 861.42. Subject matter wherein a moveable member, such as a diaphragm, bellows, or piston, is subjected to the pressure to be measured.

861.48 With linearization (e.g., square root extraction):
This subclass is indented under subclass 861.47. Subject matter wherein structure is included to produce an output which is linearly related to fluid velocity.

861.49 Pressure applied to liquid column or reservoir:
This subclass is indented under subclass 861.42. Subject matter wherein a liquid column or reservoir is subjected to the pressure to be measured and the resultant change in level is a measure of the flow rate.

861.51 With linearization:
This subclass is indented under subclass 861.49. Subject matter wherein structure is included to produce an output which is linearly related to fluid velocity.

861.52 With restriction:
This subclass is indented under subclass 861.42. Subject matter wherein the differential pressure is created by a restriction located in the flow path.

SEE OR SEARCH THIS CLASS, SUBCLASS:

861.47, wherein a pressure is applied to a movable member.

861.49, wherein a pressure is applied to a liquid column or reservoir.

SEE OR SEARCH CLASS:
138, Pipes and Tubular Conduits, subclasses 40+, for flow restrictors, per se.

861.53 Automatically variable restriction:
This subclass is indented under subclass 861.52. Subject matter wherein the effective area of the restriction is automatically varied by the differential pressure created.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.71, wherein a restriction is varied by the thrust forces on an object and the object is biased by gravity or a spring.

861.54 Slotted piston or cylinder:
This subclass is indented under subclass 861.53. Subject matter wherein the effective area of the restriction is varied by relative movement of an apertured or slotted piston or cylinder.

861.55 Cone and ball or disk:
This subclass is indented under subclass 861.53. Subject matter wherein the effective area of the restriction is varied by relative movement of a ball, disk or like member (e.g., float) with respect to a cone or tapered cylinder.

861.56 With structure of coupling to indicator:
This subclass is indented under subclass 861.55. Subject matter including details of the elements transmitting the relative motion to an indicator.

861.57 With structure of float, float tube, or float guide:
This subclass is indented under subclass 861.55. Subject matter wherein a float is displaced and details of either the float, float tube, or a float guide are included.

861.58 Orifice and tapered plug:
This subclass is indented under subclass 861.53. Subject matter wherein the effective area of the restriction is varied by relative movement of a tapered plug and an orifice member.

861.59 Including recirculation pump:
This subclass is indented under subclass 861.52. Subject matter wherein a constant volumetric recirculating pump is used to add or subtract a given volumetric flow of fluid to the flow being measured.

861.61 Orifice or flow nozzle:
This subclass is indented under subclass 861.52. Subject matter wherein the means producing the differential pressure is an opening (as a vent, mouth or hole) through which the fluid passes or a tube having a taper or constriction (e.g., nozzle).

861.62 Adjustable:
This subclass is indented under subclass 861.61. Subject matter wherein the effective area of the orifice or flow nozzle may be selectively varied.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.53, wherein the effective area is changed automatically in response to fluid pressure.

861.63 Venturi:
This subclass is indented under subclass 861.52. Subject matter wherein the means producing the differential pressure has flaring ends connected by a constricted middle.

861.64 Inlet or outlet structure:
This subclass is indented under subclass 861.63. Subject matter wherein specific details of the converging inlet or diverging outlet are included.

861.65 Pitot:
This subclass is indented under subclass 861.42. Subject matter comprising a device that consists of a tube which is placed in a moving body of fluid and is used to measure a kinetic head.

861.66 Sensing at plural transverse locations:
This subclass is indented under subclass 861.65. Subject matter wherein the total pressure or static pressure is sensed at a plurality of locations in a plane transverse to the flow direction.

861.67 Adjustable:
This subclass is indented under subclass 861.65. Subject matter wherein the position of the Pitot tube relative to the fluid may be varied.

861.68 With heating element:
This subclass is indented under subclass 861.65. Subject matter wherein the Pitot tube is provided with a heater (e.g., for de-icing).

861.69 Centrifugal:
This subclass is indented under subclass 861.42. Subject matter wherein the fluid is caused to curve from a normally straight path so as to produce a centrifugal change of pressure which is taken as a measure of the rate of flow of the fluid.

861.71 By measuring thrust or drag forces:
This subclass is indented under subclass 861. Subject matter responsive to the magnitude of forces imparted by the fluid to (a) an object placed in the flow path or (b) a conduit segment.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.355, for detection of reaction forces imparted to a conduit segment by dynamic means.

861.72 By changing fluid direction:
This subclass is indented under subclass 861.71. Subject matter wherein the object or conduit segment changes the direction of the fluid and the forces imparted by the fluid are predominantly the reaction forces necessary to change the direction of the flow.

861.73 Impact of particulate material:
This subclass is indented under subclass 861.71. Subject matter wherein the fluid is particulate material and the object is an impact plate.

861.74 On a vane:
This subclass is indented under subclass 861.71. Subject matter wherein the object is a vane or pivoted flap valve and movement of the vane or flap valve is measured.

SEE OR SEARCH THIS CLASS, SUBCLASS:
170.05+, for vane meters combined with wind vanes.
186, for vane meters combined with ships log.

861.75 With rotation about a fixed axis:
This subclass is indented under subclass 861.74. Subject matter wherein the vane is mounted for rotation about a fixed axis and the angular displacement is a measure of the forces imparted.

861.76 Spring biased:
This subclass is indented under subclass 861.75. Subject matter wherein the vane is biased against rotation by a spring.

861.77 Using rotating member with particular electrical output or circuit:
This subclass is indented under subclass 861. Subject matter wherein the fluid to be measured causes an element placed in the fluid path to be rotated and provides an electrical signal which is a measure of rotation of the element and including specific details of either the sensing means or the electrical circuit to process the output of the sensing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152.34, for a flowmeter for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring a rotation rate of an element about a rotation axis.
861.02, wherein the electrical output is combined with the output from another transducer to effect temperature compensation or mass flow rate.

861.78 With pick-up coil:
This subclass is indented under subclass 861.77. Subject matter wherein the electrical signal is generated by varying the magnetic flux between a pick-up coil and the element.

861.79 Using turbine:
This subclass is indented under subclass 861. Subject matter wherein means rotatable about an axis by a flowing fluid provides an output indicative of flow rate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

861.01, for devices wherein the turbine output is combined with the output from one or more fluid condition responsive transducers.

861.33, wherein a turbine is used to measure swirl rate.

861.77+, wherein the output of the turbine is electrical and specific details of the circuit are included.

SEE OR SEARCH CLASS:

415, Rotary Kinetic Fluid Motors or Pumps, wherein only those motive parts are claimed such as are capable of general use as a turbine meter or motor.

861.81 With response modification:
This subclass is indented under subclass 861.79. Subject matter wherein the output is variable or adjustable.

(1) Note. The modification may be attained by adjusting a drag brake, nozzle angle either manually or automatically in accordance with pressure or velocity, or by modifying the flow into or through the turbine, or by correcting the output.

SEE OR SEARCH THIS CLASS, SUBCLASS:

861.01, for modification of the meter response wherein the output of a second transducer is combined with the output from the turbine to effect temperature compensation or obtain mass flow rate.

861.77+, wherein the output of the meter is electrical and an electrical processing circuit is included.

861.82 Pressure responsive valve or restriction:
This subclass is indented under subclass 861.81. Subject matter wherein a valve or restriction responds to fluid pressure to control the flow through the meter.

(1) Note. This includes altering the amount of fluid directed to a shunt.

SEE OR SEARCH THIS CLASS, SUBCLASS:

202+, wherein a portion of the fluid is separated from the main flow and the meter is located in the separated portion.

861.83 Axial supply and delivery:
This subclass is indented under subclass 861.81. Subject matter wherein the supply to and delivery from the turbine chamber is at the ends thereof and substantially parallel to the axis of the turbine.

861.84 Differentially responsive turbines:
This subclass is indented under subclass 861.83. Subject matter wherein at least two freely rotatable turbines with differentially pitched vanes respond to the same flow to provide different or opposite rotation rates.

861.85 Anemometers:
This subclass is indented under subclass 861.79. Subject matter wherein wind speed is measured with a turbine.

SEE OR SEARCH THIS CLASS, SUBCLASS:

170.07, and 170.11, where both wind speed and direction are measured.

861.86 With fluid directed radially outward:
This subclass is indented under subclass 861.79. Subject matter wherein the fluid enters at or near the axis of rotation of the turbine and is directed with a predominantly radial component against a member, (e.g., curved vanes or tubes) and the radial component of the fluid causes rotation of the member.

861.87 With flow direction retained in a plane perpendicular to turbine axis:
This subclass is indented under subclass 861.79. Subject matter wherein the fluid is directed to and from the turbine with no initial, intermediate, or final direction having a component parallel to the turbine axis.

861.88 Mechanical coupling to indicator:
This subclass is indented under subclass 861.87. Subject matter wherein the turbine is directly coupled to an indicator by mechanical means.

861.89 Axial supply and delivery:
This subclass is indented under subclass 861.79. Subject matter wherein the supply to and delivery from the turbine chamber is at the ends thereof and substantially parallel to the axis of the turbine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
861.83, for turbines of this type where the response is modified.

861.91 With structure to reduce friction or wear:
This subclass is indented under subclass 861.89. Subject matter wherein structure, other than the bearings themselves, is provided to reduce friction or wear of the turbine bearings.

(1) Note. Reduction of friction or wear may be attained by reducing axial thrust or lubricating the bearings.

861.92 With structure of bearing or turbine support structure:
This subclass is indented under subclass 861.89. Subject matter wherein the turbine is combined with details of either the turbine bearings or the structure for mounting the turbine.

SEE OR SEARCH CLASS:
384, Bearings, subclasses 91+ for rotary bearing, per se.

861.93 With mechanical coupling to indicator:
This subclass is indented under subclass 861.89. Subject matter wherein the turbine is directly coupled to an indicator by mechanical means.

861.94 With magnetic coupling drive assembly:
This subclass is indented under subclass 861.89. Subject matter wherein the turbine is coupled to an indicator by means of drive and driven magnets.

861.95 Thermal tracer or tag:
This subclass is indented under subclass 861.05. Subject matter wherein the detectable flow indicating property is a localized thermal change in the fluid being measured.

SEE OR SEARCH THIS CLASS, SUBCLASS:
152.33, for a flowmeter for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring a rate of fluid flow responsive to a thermal property of a fluid.
204.11+, for a flowmeter which measures the thermal effect of flow on a sensor.

862 DYNAMOMETERS:
This subclass is indented under the class definition. Subject matter for measuring or determining force, torque, work or mechanical power.

(1) Note. For purposes of this subclass, a dynamometer may either be employed to measure an applied load or to apply a measured load (e.g., for test purposes).

(2) Note. Dynamometers included in this subclass and subclasses indented hereunder either have general utility or perform specific measurements or tests which are not elsewhere classifiable. For example, dynamometers that measure certain physical properties or conditions (e.g., weight, gravity, vibration, acceleration and fluid pressure) or test certain devices (e.g., brakes, springs and shock absorbers) are classified elsewhere according to use.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.08+, for proving or calibrating dynamometers wherein only those details necessary for describing the calibrator is claimed.
54.39, for a viscometer measuring shearing torque between parallel surfaces.

SEE OR SEARCH CLASS:
81, Tools, subclasses 52.4+ for tools that yield on predetermined overload, and subclass 52.5 for such tools combined with overload signals.
173, Tool Driving or Impacting, subclasses 176+ for power-operated tools comprising torque responsive control means and subclasses 20+ for tool driving or impacting combined with

force indicating means when more tool structure is recited than is necessary to describe the measuring apparatus.

177, Weighing Scales, appropriate subclasses.

188, Brakes, for friction brakes, per se.

310, Electrical Generator or Motor Structure, subclass 93 for dynamoelectric brakes and subclasses 94 and 95 for automatic control of dynamoelectric brakes.

318, Electricity: Motive Power Systems, appropriate subclasses for a dynamometer controlling a motor.

324, Electricity: Measuring and Testing, subclasses 76.77+ for phase measuring and indicating, per se.

338, Electrical Resistors, subclasses 2 through 6, for strain gages, per se, and condition responsive means comprising strain gage resistors.

340, Communications: Electrical, subclasses 665+ for indicating systems responsive to force or stress.

346, Recorders, appropriate subclasses for recorder structure.

356, Optics: Measuring and Testing, appropriate subclasses.

GLOSSARY

FORCE:

The strength or energy exerted upon or brought to bear or the cause of motion or change in motion or a state of rest.

POWER:

The rate at which work is done or the rate at which energy is transferred.

TORQUE:

A turning or twisting force or a force that produces or tend to produce rotation or torsion.

WORK:

The transference of energy that is produced by motion at the point of application of force which is measured by multiplying the force and the displacement of its point of application in the line of action.

862.01 For testing force-biased connections:

This subclass is indented under subclass 862. Subject matter comprising means for examining the load sustaining ability of devices for joining or fastening one member to another with a biasing force.

(1) Note. Examples of force-biased joining or fastening devices are male-female frictional connectors, wire-wrapped electrical terminals, and spring-biased clamping means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

150, 827 and 842, for examining the holding strength of bonding materials.

161, for measuring the biasing force of springs.

761, and 862.21, for testing threaded connections.

862.02 Ski bindings:

This subclass is indented under subclass 862.01. Subject matter wherein the device for joining or fastening comprises a safety type ski binding for holding a ski boot to a ski.

862.03 For testing relative pulling power (e.g., for contests):

This subclass is indented under subclass 862. Subject matter comprising means for providing a measured or controlled tractive load to compare the pulling ability of mechanical tractive power means.

(1) Note. The load is usually progressively increased to exceed the pulling capacity of the power means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

379.01, for testing the pulling ability of animals.

862.57, for measuring the pulling power of a working draft animal or machine.

862.041 Responsive to multiple loads or load components:

This subclass is indented under subclass 862. Subject matter wherein; (a) both force and torque, or (b) more than one force or more than

one torque, or (c) more than one component of a single force or torque are determined.

862.042 Along or about mutually orthogonal axes:
This subclass is indented under subclass 862.041. Subject matter wherein the forces, the force components, the torques or, the torque components are perpendicular to each other.

862.043 Three dimensional (e.g., x, y, z axes):
This subclass is indented under subclass 862.042. Subject matter wherein three mutually perpendicular forces, force components, torques, or torque components are determined.

862.044 Using a resistance strain gage:
This subclass is indented under subclass 862.043. Subject matter wherein the determination is made by measuring a change in electrical resistance of a sensing means comprising an electrical conductor or semiconductor that is stressed by the deflection or distortion of an elastic member.

(1) Note. For purposes of this subclass, a disclosure of strain detecting means affixed to a surface of the elastic member is presumed to be of the resistive type unless otherwise stated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
763+, for determining stress or strain of a test specimen with a strain gage.
862.045, 862.338+, 862.474, and 862.627+, for other force or torque measuring means having an elastically deformable member combined with a resistance strain gage.

SEE OR SEARCH CLASS:
177, Weighing Scales, subclass 211 for a weigher using a strain gage.
338, Electrical Resistors, subclasses 2 through 6 for a strain gage, per se.

862.045 Using a resistance strain gage:
This subclass is indented under subclass 862.041. Subject matter wherein the determination is made by measuring a change in electrical resistance of a sensing means comprising an electrical conductor or semiconductor that is stressed by the deflection or distortion of an elastic member.

(1) Note. For the purpose of this subclass, a disclosure of strain detecting means affixed to a surface of the elastic member is presumed to be of the resistive type unless otherwise stated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
763+, for determining stress or strain of a test specimen with a strain gage.
862.044, 862.338+, 862.474, and 862.627+, for other torque and force measuring means having an elastically deformable member using a resistance strain gage.

SEE OR SEARCH CLASS:
177, Weighing Scales, subclass 211 for a weigher using a strain gage.
338, Electrical Resistors, subclasses 2 through 6 for a strain gage, per se.

862.046 Transducer array (e.g., columns and rows):
This subclass is indented under subclass 862.041. Subject matter wherein the determination is made by utilizing a sensing means comprising a plurality of transducers distributed over an area.

862.05 Applied to guidance means:
This subclass is indented under subclass 862.041. Subject matter wherein the measuring means are responsive to manual force or torque applied to a guiding mechanism by an operator.

862.06 On machine tools:
This subclass is indented under subclass 862.041. Subject matter wherein the measuring means are responsive to force or torque on a working tool effecting a machining function.

(1) Note. Examples of machining functions are cutting, drilling and milling.

862.07 To determine distribution of tensile stress:
This subclass is indented under subclass 862.041. Subject matter comprising individual force responsive means at different points spaced across the width of a web or strip to

determine the longitudinal tension thereof at said points.

862.08 Responsive to torque:
This subclass is indented under subclass 862. Subject matter for measuring torque, work or power comprising sensing means responsive to a force couple or moment of force that induces or resists rotation of a body about a point or axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.041+,for dynamometers comprising means responsive to plural torques.

862.09 By absorption:
This subclass is indented under subclass 862.08. Subject matter comprising rotary power absorbing means for testing a source of rotary mechanical power by applying a measured or controlled power consuming load thereto.

(1) Note. Dynamometers in this subclass must be capable of applying a sustained, nonstalling rotary load to the source.

862.11 Having plural brake means:
This subclass is indented under subclass 862.09. Subject matter wherein the load is applied by more than one rotary power absorbing means.

862.12 Having friction brake means:
This subclass is indented under subclass 862.09. Subject matter wherein the load is applied by an absorbing means using mechanical friction to consume the power.

(1) Note. Prony brake dynamometers are classifiable in this subclass.

SEE OR SEARCH CLASS:
188, Brakes, for friction brakes, per se.

862.13 Automatic load control:
This subclass is indented under subclass 862.12. Subject matter comprising speed or torque responsive means to control the load applied by the absorbing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.16, and 862.18, for other automatic load control devices.

862.14 Having fluid brake means:
This subclass is indented under subclass 862.09. Subject matter wherein the load is applied by an absorbing means using a working fluid to consume the power.

(1) Note. Hydraulic pumps or motors adapted for use as absorption dynamometers are classifiable in this subclass.

SEE OR SEARCH CLASS:
188, Brakes, subclasses 290+ for fluid brakes, per se.

862.15 Air brakes:
This subclass is indented under subclass 862.14. Subject matter wherein the working fluid is a gas or vapor.

862.16 Automatic load control:
This subclass is indented under subclass 862.14. Subject matter comprising speed or torque responsive means to control the load applied by the absorbing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.13, and 862.18, for other automatic load control devices.

862.17 Having magnetic or electromagnetic brake means:
This subclass is indented under subclass 862.09. Subject matter wherein the load is applied by an absorbing means using magnetic drag to consume the power.

(1) Note. Eddy current dynamometers and motors or generators adapted for use as absorption dynamometers are classifiable in this subclass.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclass 93, for dynamoelectric brakes.

862.18 Automatic load control:
This subclass is indented under subclass 862.17. Subject matter comprising speed or torque responsive means to control the load applied by the absorbing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.13, and 862.16, for other automatic load control devices.

SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, subclasses 94 and 95, for automatic control of dynamoelectric brakes.

862.191 During transmission to an external load:
This subclass is indented under subclass 862.08. Subject matter wherein the torque, work or power is transmitted from a source to a load other than the dynamometer.

(1) Note. The load may comprise either work or test structure.

(2) Note. The sensing means has no appreciable loading affect on the source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.09, for similar subject matter wherein the load is the dynamometer.

862.192 By measuring angular acceleration:
This subclass is indented under subclass 862.191. Subject matter wherein the determination is made by measuring a rate of change in the angular velocity of a torque transmitting component.

SEE OR SEARCH THIS CLASS, SUBCLASS:
488+, for determining angular velocity and angular acceleration, per se.

862.193 By measuring an electrical or magnetic characteristic of a torque delivering electric motor:
This subclass is indented under subclass 862.191. Subject matter wherein the determination is made from a measured electrical or magnetic operating parameter of a torque delivering electric motor.

(1) Note. Examples of a parameter are current, voltage or magnetic flux, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
116+, for testing a motor or an engine, per se.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclass 158 for electrical testing of a motor or a generator.

862.194 By measuring tension in a drive belt or chain:
This subclass is indented under subclass 862.191. Subject matter wherein the determination is made by measuring the tautness of a drive belt or chain.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.453, for testing for tension in a drive belt, per se.

862.195 By converting transmitted torque into axial force:
This subclass is indented under subclass 862.191. Subject matter wherein the determination is made by converting a torque about an axis into an axial force along the axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.381, for measuring force, work or power by means of a sensing means responsive to a load or a reaction force applied along a particular axis.

862.21 For making or breaking threaded connections (e.g., torque measuring wrenches):
Subject matter under subclasses 862.191+ wherein the sensing means is incorporated in or combined with a tool for tightening or loosening threaded fasteners or couplings.

SEE OR SEARCH THIS CLASS, SUBCLASS:
761, for measuring the strain of a threaded fastener.

SEE OR SEARCH CLASS:
173, Tool Driving or Impacting, subclasses 176+ for power-operated tools comprising torque responsive control means.

862.22 With variable capacity or sensitivity:
This subclass is indented under subclass 862.21. Subject matter wherein the measuring range or responsiveness of the sensing means is adjustable.

862.23 With detection of specific torque value or condition (e.g., peak torque):
This subclass is indented under subclass 862.21. Subject matter comprising means for indicating (a) the maximum value of the transmitted torque or (b) when the transmitted torque attains a desired value or condition.

SEE OR SEARCH CLASS:
81, Tools, subclasses 52.4+ for tools which yield on predetermined overload; and subclass 52.5 for such tools combined with overload signals.

862.24 Rate of change:
This subclass is indented under subclass 862.23. Subject matter comprising means for detecting a predetermined torque gradient.

(1) Note. Torque gradient is the rate of change of torque with respect to rotation or time.

862.25 Power tongs:
This subclass is indented under subclass 862.21. Subject matter wherein the tool comprises power means for screwing or unscrewing sections of a tubular assembly.

(1) Note. Most tubular assemblies in this subclass comprise threaded sections of drill pipe, casing, tubing, and rods used in the drilling and operation of wells.

862.26 Bending beam type:
This subclass is indented under subclass 862.21. Subject matter wherein the tool comprises an elongate, resilient member acting as a torque transmitting lever arm and the flexing of said member is indicative of the transmitted torque.

862.27 With recording or totalizing means:
Subject matter under subclasses 862.191+ comprising means for (a) making a permanent record of measured torque, work or power or (b) registering the total torque, work or power over a period of time.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.51, for devices which are responsive to force with recording means.

SEE OR SEARCH CLASS:
346, Recorders, appropriate subclasses for recorder structure.

862.28 With electrical computation of horsepower:
Subject matter under subclasses 862.191+ comprising electrical means for combining torque and speed signals to produce a signal indicative of horsepower.

862.29 By measuring reaction forces of a prime mover:
Subject matter under subclasses 862.191+ wherein the sensing means senses reaction forces exerted by a torque delivering motor or engine on its mounts or support means, which forces are indicative of the delivered torque.

862.31 By measuring reaction forces of transmission gearing:
Subject matter under subclasses 862.191+ wherein the sensing means senses reaction forces experienced by a torque transmitting gear or gear train, which forces are indicative of the transmitted torque.

862.321 By measuring elastic deformation of a torque transmitting member:
This subclass is indented under subclass 862.191. Subject matter wherein the determination is made by sensing the deflection or distortion of an elastic member that transmits a torque from the source to the load.

(1) Note. The elastic member usually comprises a spring element or a torsionally flexible shaft.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.471+, for measuring elastic deformation to determine tension on a stretched flexible member.

862.621+, for measuring force, work or power by measuring an elastic deformation responsive to force.

862.322 With rotary to linear conversion:

This subclass is indented under subclass 862.321. Subject matter including means for converting a change in relative angular displacement into linear motion.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, appropriate subclasses, for a rotary to linear conversion means, per se.

862.323 Using a flowing fluid (e.g., using a shaft mounted nozzle and baffle):

This subclass is indented under subclass 862.321. Subject matter wherein the deflection or distortion is sensed by detecting a change in a characteristic of a fluid in motion.

862.324 Using a light sensor:

This subclass is indented under subclass 862.321. Subject matter wherein the deflection or distortion is sensed by detecting a change in a characteristic of a radiated ray or reflected beam of light.

SEE OR SEARCH CLASS:

250, Radiant Energy, appropriate subclasses for a measuring device using invisible light which produces light modified by a force being applied and wherein the modified light is further measured.

356, Optics: Measuring and Testing, appropriate subclasses for testing using visible light and involving no other manipulations other than those necessary for an optical test.

359, Optics: Systems (Including Communication) and Elements, appropriate subclasses for an optical device, per se.

862.325 Using an electrical sensor:

This subclass is indented under subclass 862.321. Subject matter including a sensing means for converting the deflection or distortion of the elastic member into an electrical current or voltage.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.324, for determining a reaction force by measuring elastic deformation by use of photoelectric sensing means.

862.326 Phase angle detection:

This subclass is indented under subclass 862.325. Subject matter wherein a time relationship of electrical signals which is indicative of the angular position of spaced sections of the elastic member is sensed.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 83+, for phase measuring and indicating, per se.

862.327 Vernier type:

This subclass is indented under subclass 862.326. Subject matter wherein the electrical signals have slightly different frequencies and the number of full cycles of one signal between a time reference point and a phase coincidence with the other signal is sensed.

862.328 By plural toothed or notched sensing means:

This subclass is indented under subclass 862.326. Subject matter wherein the sensing means comprises a pair of rotating elements having regular projections or indentations on the circumference thereof.

862.329 Interlaced teeth:

This subclass is indented under subclass 862.328. Subject matter wherein the teeth of one rotating element extend between the teeth of the other rotating element.

862.331 Inductance or reluctance sensor:

This subclass is indented under subclass 862.325. Subject matter wherein the sensing means is responsive to either (a) the change of a property of an electrical circuit by which an electromotive force is induced in it by a variation of current either in the circuit itself or in a

neighboring circuit, or (b) the change in a property of an electric nonconductor that permits the storage of energy as a result of the displacement when opposite surfaces of the nonconductor is maintained at a different potential.

SEE OR SEARCH THIS CLASS, SUBCLASS:
779, for measuring strain using inductance.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 280+ for a pressure responsive capacitor, per se.

862.332 Variable air gap in a magnetic core:
This subclass is indented under subclass 862.331. Subject matter wherein the change is caused by a variation in a spacing between relatively movable parts of a magnetic core.

862.333 Detecting magnetostrictive or magnetoelastic property:
This subclass is indented under subclass 862.331. Subject matter wherein the sensing means senses a change in a magnetic property of; (a) the elastic member, or (b) a layer on the elastic member, or (c) an element encircling and rigidly attached to the torque transmitting member.

SEE OR SEARCH THIS CLASS, SUBCLASS:
779, for measuring stress in a specimen which causes a variation in the strength of magnetic flux intercepted by a sensor or a change in reluctance of a magnetic circuit including a sensor and wherein the specimen is mechanically coupled to the sensor.
862.69, for a force measuring device sensing a magnetic property of a stressed member.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclass 209 for stress measurement by a magnetic field in which a specimen directly interacts with the magnetic field.
336, Inductor Devices, subclass 20 for a magnetostrictive device, per se.

862.334 Grooved or slotted torsion shaft:
This subclass is indented under subclass 862.333. Subject matter wherein the torque transmitting member is a torsion shaft having a groove or a slot on the surface thereof.

862.335 Magnetic sleeve or layer:
This subclass is indented under subclass 862.333. Subject matter wherein the sensing means detects a change in the magnetic property of the layer or the rigidly attached element.

862.336 Particular constituent:
Subject matter under 862.335 wherein at least one constituent of a material comprising the layer or the rigidly attached element is specified.

SEE OR SEARCH CLASS:
252, Compositions, subclass 62.51 for a magnetic composition, per se.

862.337 Capacitance sensor:
Subject matter under 862.325 wherein the sensing means is responsive to a change in a property of an electric nonconductor that permits the storage of energy as a result of the displacement when opposite surfaces of the nonconductor are maintained at a different potential.

SEE OR SEARCH THIS CLASS, SUBCLASS:
780, for using a capacitor for measuring stress, per se.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 280+ for a pressure responsive capacitor, per se.

862.338 Resistance strain gage:
This subclass is indented under subclass 862.325. Subject matter wherein the determination is made by measuring a change in electrical resistance of a sensing means comprising an electrical conductor or semiconductor that is stressed by the deflection or distortion of the torque transmitting member.

(1) Note. For purposes of this subclass, a disclosure of strain detecting means affixed to a surface of the elastic member

is presumed to be of the resistive type unless otherwise stated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

763+, for determining stress or strain of a test specimen with a strain gage.

862.044, 862.045, 862.474, and 862.627+, for torque or force responsive devices having elastically deformable members using resistance strain gages.

SEE OR SEARCH CLASS:

177, Weighing Scales, subclass 211 for a weigher using a strain gage.

338, Electrical Resistors, subclasses 2 through 6 for a resistance strain gage, per se.

862.339 With noncontact coupling (e.g., rotary transformer):

This subclass is indented under subclass 862.338. Subject matter comprising a stationary electrical circuit nonmechanically connected to the sensing means.

862.37 By measuring the fluid pressure of a hydraulic coupling:

Subject matter under subclasses 862.191+ wherein the sensing means senses the fluid pressure of a fluid coupling that transmits the torque to the load.

862.381 Responsive to force:

This subclass is indented under subclass 862. Subject matter for measuring or determining force, work or power comprising sensing means responsive to a load or reaction force applied along a particular axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

117.4, for measurement of engine thrust.

152.48, for a downhole apparatus for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring force during drilling.

152.49, for a nondownhole-type apparatus for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring force during drilling.

152.59, for a downhole-type apparatus for determining a characteristic of a borehole, a well casing, or a drill rigging by measuring a response due to force while drilling is not taking place.

172, for orthopedic pressure distribution.

379, for measuring a force exerted by animals.

862.041+, for dynamometers comprising means responsive to plural forces.

865.4, for investigating forces or motion involved in a specific bodily activity.

SEE OR SEARCH CLASS:

177, Weighing Scales, appropriate subclasses, for a force responsive measuring device having a claimed platform.

862.382 With detail of overload protection:

This subclass is indented under subclass 862.381. Subject matter wherein significance is attributed to a means for guarding against damage to the measuring means once the applied load exceeds a safe load for which the measuring means has been rated.

862.391 To determine tension on a flexible element:

This subclass is indented under subclass 862.381. Subject matter wherein the determination of the force is indicative of the tautness of a line, belt, web or the like flexible element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.07, for measuring tension at plural, laterally spaced points.

862.392 By measuring axial force or stretch:

This subclass is indented under subclass 862.391. Subject matter wherein the tension is determined by measuring the longitudinal force along or the elongation of the flexible element.

862.393 Pulling force on an anchoring device:

Subject matter under 862.392 wherein the tension is determined by measuring a force which is exerted on means used to firmly hold one end of the flexible element.

862.41 By measuring vibrations (e.g., resonant frequency):

Subject matter under subclasses 862.391+ wherein the flexible element is vibrated and the sensing means senses the amplitude or frequency of the vibrations.

SEE OR SEARCH THIS CLASS, SUBCLASS:

517, 581, 704, 778, and 862.59, for other measuring devices comprising vibratory flexible elements.

862.42 By applying a measured tensioning force:
Subject matter under subclasses 862.391+ comprising tensioning means for applying a stretching force to the flexible element which is sensed by the sensing means.

862.43 Racket stringing:
This subclass is indented under subclass 862.42. Subject matter used for tensioning the strings of sporting rackets.

SEE OR SEARCH CLASS:

473, Games Using Tangible Projectile, subclass 534 for a tennis racket having adjustable string-tensioning means and subclasses 556 and 557 for an accessory device used for stringing a tennis racket or for an accessory device for stretching the strings of a tennis racket.

862.44 With winding or reeling means:
This subclass is indented under subclass 862.42. Subject matter wherein the tensioning means comprises a rotatable drum or spool and the flexible element is wrapped therearound.

862.451 By measuring deflection or a deflecting force:
This subclass is indented under subclass 862.391. Subject matter wherein the sensing means detects either (a) the deflection of the element produced by a predetermined deflecting force, or (b) a deflecting force required to produce a predetermined deflection.

(1) Note. For the purposes of this subclass, pulleys, rollers, and the like means for guiding a traveling flexible element comprise deflecting means that produce a predetermined deflection.

862.452 For testing racket stringing:
This subclass is indented under subclass 862.451. Subject matter wherein the element comprises strings of a racket.

862.453 For testing a drive belt:
This subclass is indented under subclass 862.451. Subject matter wherein the element comprises the belt of a mechanical drive.

862.454 Using a fluid for deflection or force measuring:
This subclass is indented under subclass 862.451. Subject matter wherein a liquid or gas material is used to either deflect the element or to measure the deflection of the element.

862.46 With angular deflection:
Subject matter under subclasses 862.451+ wherein the deflecting means applies a force-couple to opposite sides of the flexible element to angularly deflect a longitudinal segment thereof about a transverse axis.

862.471 Using an elastically deformable force measuring means:
This subclass is indented under subclass 862.451. Subject matter wherein the sensing means detects the deflection or distortion of an elastic member which is stressed by the deflecting force.

862.472 With pivoted deflecting member between spaced guides or supports:
This subclass is indented under subclass 862.471. Subject matter wherein the deflecting force is produced by a deflecting means rotatable about an axis and located between spaced members which contact the element.

862.473 Electrical sensor:
This subclass is indented under subclass 862.471. Subject matter wherein the deflection or distortion of the elastic member is converted into an electrical current or voltage by the sensing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.325+, for measuring torque by use of an elastically deformable member having electrical sensing means.

862.625+, for determining force by measuring elastic deformation by use of an electrical sensor.

862.474 Resistance strain gage:
This subclass is indented under subclass 862.473. Subject matter wherein the determination is made by measuring a change in electrical resistance of a sensing means comprising an electrical conductor or semiconductor that is stressed by the deflection or the distortion of the elastic member.

(1) Note. For the purposes of this subclass, a disclosure of strain detecting means affixed to a surface of the elastic member is presumed to be of the resistive type unless otherwise stated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
763+, for determining stress or strain of a test specimen with a strain gage.
862.044, 862.045, 862.338+, and 862.627+, for other torque or force measuring devices using an elastically deformable member combined with a resistive strain gage.

SEE OR SEARCH CLASS:
177, Weighing Scales, subclass 211 for a weigher using a strain gage.
338, Electrical Resistors, subclasses 2 through 6 for a strain gage, per se.

862.49 To determine axial thrust on a rotating machine element:
Subject matter under subclasses 862.381+ for measuring the force acting along the axis of rotation of a rotating machine component.

(1) Note. The sensing means usually coacts with a thrust bearing for the rotating component.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.31, for measuring torque by sensing the axial thrust on transmission gears.

862.51 With recording means:
Subject matter under subclasses 862.381+ comprising means for making a permanent record of the measured force, power or work.

SEE OR SEARCH CLASS:
346, Recorders, appropriate subclasses for recorder structure.

862.52 With variable capacity or sensitivity:
Subject matter under subclasses 862.381+ wherein the measuring range or responsiveness of the sensing means is adjustable.

862.53 With detection of specific force value or condition (e.g., peak force):
Subject matter under subclasses 862.381+ comprising means for indicating (a) the maximum value of the applied force, or (b) when the applied force attains a desired value or condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.01, for indicating the force required to release a force biased connection.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 665+ for indicating systems responsive to force or stress.

862.541 Combined:
This subclass is indented under subclass 862.381. Subject matter combined with structure of a device classifiable elsewhere, per se, but wherein only so much of said device is included as is necessary to define the force, work, or power to be measured or determined.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.49, for dynamometers combined with rotating machine elements or thrust bearings.
862.391+,for dynamometers combined with structure for tensioning or deflecting a flexible element.

862.542 With jack or press:
This subclass is indented under subclass 862.541. Subject matter wherein the device is a jack or a press.

SEE OR SEARCH CLASS:
100, Presses, subclass 99 for a press whose details are disclosed beyond that which is necessary to define the force,

work, or power to be measured in combination with a testing means.

254, Implements or Apparatus for Applying Pushing or Pulling Force, appropriate subclasses for a jack, per se.

862.543 With pumping unit:
This subclass is indented under subclass 862.541. Subject matter wherein the device is a pump.

SEE OR SEARCH CLASS:
417, Pumps, appropriate subclasses for a pump including more detail than that necessary to describe a force measurement being made.

862.55 With pressure applying roller (e.g., mill roll):
Subject matter under subclasses 862.541+ wherein the device comprises at least one rotatable cylinder and the sensing means senses the compressive force between the cylinder and an opposing surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.451+,for rotatable rolls for deflecting a travelling flexible element.

862.56 With hoisting means:
Subject matter under subclasses 862.541+ wherein the device comprises means for applying a vertical lifting force to a suspended load.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.391+,for determining the tension of hoisting ropes or cables.

SEE OR SEARCH CLASS:
177, Weighing Scales, subclass 147, for weighers with hoists.
212, Traversing Hoists, subclass 283 for hoists with weighers.

862.57 With towing means:
Subject matter under subclasses 862.541+ wherein the device comprises means for applying a tractive force to a mobile load.

862.581 By measuring a fluid pressure:
This subclass is indented under subclass 862.381. Subject matter wherein the determination is made by sensing hydraulic or pneumatic pressure which is indicative of the applied load or force.

(1) Note. The force is represented by the fluid pressure sensed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
700+, for fluid pressure gages, per se.

862.582 Using a load responsive valve or restrictor:
This subclass is indented under subclass 862.581. Subject matter wherein the load or force changes the opening of a valve or a restrictor which in turn changes the fluid pressure being sensed.

862.583 Pneumatic:
This subclass is indented under subclass 862.582. Subject matter wherein the fluid is a gas.

862.584 Using a piston:
This subclass is indented under subclass 862.581. Subject matter wherein the fluid pressure being sensed affects or is effected by the movement of a piston.

862.59 By measuring vibrations (e.g., resonant frequency):
Subject matter under subclasses 862.381+ wherein the sensing means comprises a stressed vibratory member that produces a mechanical oscillation having a frequency or amplitude that is indicative of the applied force.

(1) Note. Usually, the applied force changes the resonant frequency of the member and the frequency is measured electrically.

SEE OR SEARCH THIS CLASS, SUBCLASS:
514.29, for an accelerometer having an inertia mass and including a sensor having a vibrating element.

651, 704, 778, and 862.41, for other measuring devices having a stressed vibratory member.

862.61 By measuring a counterbalancing or restoring force:
Subject matter under subclasses 862.381+ comprising a member that is displaceable by the applied force and wherein the sensing means inhibits displacement of the member by exerting an equal and opposite force thereon, whereby the magnitude of the force exerted by the sensing means in indicative of the applied force.

SEE OR SEARCH THIS CLASS, SUBCLASS:
514.17+, for a null balance accelerometer including a specific type of electric or magnetic sensor.
701, for null balance pressure gages.
862.581+, for null balance dynamometers that employ a fluid pressure readout.

862.621 By measuring elastic deformation:
This subclass is indented under subclass 862.381. Subject matter wherein the sensing means detects the deflection or the distortion of an elastic member which is stressed by the applied force.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.321, for means measuring torque, work or power comprising elastically deformable force measuring means.
862.391+, and 862.471, for tension measuring dynamometers comprising elastically deformable force measuring means.
862.581+, for fluid pressure means used to measure elastic deformation.
862.59, for vibratory means used to measure elastic deformation.
862.636, for details of an elastic member whose distortion or deflection due to stress applied by a force is sensed by the sensing means.

862.622 With compensation:
This subclass is indented under subclass 862.621. Subject matter including means for offsetting an undesirable influence on or in the means for making the determination.

862.623 Temperature:
This subclass is indented under subclass 862.622. Subject matter wherein the influence which is being offset is temperature.

862.624 Using a light sensor:
This subclass is indented under subclass 862.621. Subject matter wherein the sensing means detects a change in a characteristic of a radiating or reflected beam of light in order to determine elastic deformation.

SEE OR SEARCH CLASS:
250, Radiant Energy, appropriate subclasses for a measuring device using invisible light which produces light modified by a force being applied and wherein the modified light is further measured.
356, Optics: Measuring and Testing, appropriate subclasses for testing using visible light and involving no other manipulations other than those necessary for an optical test.
359, Optics: Systems (Including Communication) and Elements, appropriate subclasses for an optical device, per se

862.625 Using a specific type of electrical sensor:
This subclass is indented under subclass 862.621. Subject matter wherein the sensing means is responsive to a change in a particular electrical parameter.

(1) Note. Electromagnetic and photoelectric sensing means are included in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.325, for other elastically deformable members having electrical sensing means.
866.5, for a probe or probe mounting, per se.

862.626 Inductance or capacitance sensor:
This subclass is indented under subclass 862.625. Subject matter wherein the sensing means is responsive to either (a) the change of a property of an electrical circuit by which an electromotive force is induced in it by a variation of current either in the circuit itself or in a neighboring circuit, or (b) the change in a prop-

erty of an electric nonconductor that permits the storage of energy as a result of the displacement when opposite surfaces of the nonconductor is maintained at a different potential.

SEE OR SEARCH THIS CLASS, SUBCLASS:
779, for measuring strain using inductance.

SEE OR SEARCH CLASS:
336, Inductor Devices, subclass 30 for a condition responsive inductor, per se.
361, Electricity: Electrical Systems and Devices, subclasses 280+ for a pressure responsive capacitor, per se.

862.627 Resistance strain gage:
This subclass is indented under subclass 862.625. Subject matter wherein the determination is made by measuring a change in electrical resistance of a sensing means comprising an electrical conductor or semiconductor that is stressed by the deflection or distortion of the elastic member.

(1) Note. For purposes of this subclass, a disclosure of strain detecting means affixed to a surface of the elastic member is presumed to be of the resistive type unless otherwise stated.

SEE OR SEARCH THIS CLASS, SUBCLASS:
763+, for determining stress or strain of a test specimen with a strain gage.
862.044, 862.045, 862.338+, and 862.474, for other torque or force measuring devices using a resistance strain gage.

SEE OR SEARCH CLASS:
177, Weighing Scales, subclass 211 for a weigher using a strain gage.
338, Electrical Resistors, subclasses 2 through 6 for a strain gage, per se.

862.628 Including a specific type of electrical circuit:
This subclass is indented under subclass 862.627. Subject matter wherein an arrangement of electrical elements connected to the sensing means is specified.

862.629 Specific type of elastic member:
This subclass is indented under subclass 862.627. Subject matter wherein a shape of or a physical property of the elastic member is specified.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.636, for a specific type of elastic member for measuring applied force and which is not combined with a specific electrical sensor.

862.631 Axle or pivot pin:
This subclass is indented under subclass 862.629. Subject matter wherein the force being determined is applied to the elastic member by an element rotatively or pivotally mounted thereon.

862.632 Flexible element (e.g., beam, plate, or web):
This subclass is indented under subclass 862.629. Subject matter wherein the elastic member comprises an element whose flexing or bending due to the applied force causes the stress in the conductor or semiconductor.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.629, for an elastic element which undergoes torsion or twisting.

862.633 Parallel:
This subclass is indented under subclass 862.632. Subject matter wherein the flexible element comprises two members each having a main longitudinal axis extending parallel to the longitudinal axis of the other.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.638, for a parallel beam, plate or web type flexible element whose deformation is a measure of an applied force and which is not combined with a resistance strain gage.

862.634 Cantilever:
This subclass is indented under subclass 862.632. Subject matter wherein the flexible element comprises a projecting portion having only one end thereof fixedly attached to a support therefor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.639, for detail of a cantilever type flexible element whose flexing or bending is a measure of the applied force and which is not combined with a resistance strain gage.

862.635 Closed loop (e.g., ring or tube):

This subclass is indented under subclass 862.629. Subject matter wherein the flexible element is a hollow symmetrically shaped body.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.642, for detail of a closed loop flexible element whose flexing or bending is a measure of the applied force and which is not combined with resistance strain gage.

862.636 Specific type of elastic member:

This subclass is indented under subclass 862.621. Subject matter wherein the shape or the physical property of the elastic member is specified.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.629, for a specific type of elastic member whose deformation is measured by a resistance strain gage.

862.637 Flexible element (e.g., beam, plate, or web):

This subclass is indented under subclass 862.636. Subject matter wherein the elastic member flexes or bends due the applied force.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.632, for an elastic element combined with a resistance strain gage for measuring applied force.

862.636, for an element which undergoes torsion or twisting.

862.638 Parallel:

This subclass is indented under subclass 862.637. Subject matter wherein the flexible element comprises two portions each having a main longitudinal axis extending parallel to the longitudinal axis of the other.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.633, for other parallel flexible elements whose deformation is measured by a resistance strain gage in order to indicate the applied force.

862.639 Cantilever:

This subclass is indented under subclass 862.637. Subject matter wherein the flexible element comprises a projecting portion having only one end thereof fixedly attached to a support therefor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.634, for detail of a cantilever type flexible element whose flexing or bending is sensed by a resistance strain gage in order to indicate the applied force.

862.641 Helical or spiral:

This subclass is indented under subclass 862.636. Subject matter wherein the elastic member is of a helical or spiral shape.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.629, for a specific type of elastic member combined with a resistance strain gage to measure applied force.

862.642 Closed loop (e.g., ring or tube):

This subclass is indented under subclass 862.636. Subject matter wherein the elastic member is a hollow symmetrically shaped body.

SEE OR SEARCH THIS CLASS, SUBCLASS:

862.635, for a closed loop type of flexible element combined with a resistance strain gage for measuring an applied force.

862.68 By measuring electrical properties:

Subject matter under subclasses 862.381+ wherein the sensing means senses an electrical property of a member that is stressed by the applied force.

SEE OR SEARCH THIS CLASS, SUBCLASS:
862.59, for sensing vibrations electrically.
862.625+,for sensing elastic deformation electrically.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 600+ for measuring electrical properties.

862.69 By measuring magnetic properties:
Subject matter under subclasses 862.381+ wherein the sensing means senses a magnetic property of a member that is stressed by the applied force.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 200+ for measuring magnetic properties.

863 SAMPLER, SAMPLE HANDLING, ETC.:
This subclass is indented under the class definition. Subject matter for obtaining a predetermined portion of a mass of material to be tested.

(1) Note. The portion of a mass of material of this subclass type may be predetermined by volume, volumetric ratio of the portion to the total mass, composition or condition of the mass.

(2) Note. This is the generic locus for sampling, and, as such, includes the following subject matter not provided for elsewhere: (a) treatment of samples in preparation for analysis; (b) transporting or handling previously obtained samples in preparation for analysis; and (c) introducing previously obtained samples into analyzers.

(3) Note. Subject matter similar to subject matter of this subclass type in proximate function (i.e., obtaining a predetermined portion of a mass of material) but differing in ultimate function (i.e., to be tested) is classified herein if not classifiable elsewhere, e.g., “tollers”.

(4) Note. A sampler combined with a test apparatus or art device is classified with the test apparatus or art device.

(5) Note. Patents issued before 1940 have been placed hereunder by total disclosure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
28, for a gas analysis combined with isolation of particles from a gas.
61.55, for a chromatographic liquid analyzer combined with sampling, sample handling, or sample preparation.
61.59, for a liquid analyzer determining the content or the effect of a constituent of a liquid mixture combined with detail of sampling, sample handling, or sample preparation.
61.68, for a liquid analyzer for determining sedimentation rate of a liquid suspension and including detail of sampling, sample handling, or sample preparation.
64.56, for a liquid or liquid suspension analyzer including a sampler, constituent separation, sample handling, or sample preparation.
152.07, for a borehole formation logging being made by measuring density, porosity, or permeability by core sample analysis.
152.09, for a borehole formation logging being made by measuring oil, gas, or water saturation by core sample analysis.
152.11, for a borehole formation logging being made by measuring a characteristic of a core sample.
152.23+,for determining a characteristic of a borehole, a casing, or a drill rigging by sampling combined with (a) measuring a flow rate of fluid or (b) analyzing a fluid.
170.01+,for measurement of atmospheric or oceanographic phenomena combined with sampling the atmosphere or ocean.

SEE OR SEARCH CLASS:

4, Bath, Closets, Sinks, and Spittoons, for a urine or feces sampler combined with a toilet or means to attach the sampler to the toilet.

23, Chemistry: Physical Processes, for a sampling process wherein a step of causing or promoting a chemical reaction, or regulating or controlling a chemical reaction, are claimed.

30, Cutlery, subclass 174 for coring-type cutting tools having plural cooperating blades.

33, Geometrical Instruments, subclass 126.4 for distance measuring devices of the sounding type having sampling means.

68, Textiles: Fluid Treating Apparatus, subclasses 185+ for subject matter of that class type combined with sampling means.

96, Gas Separation: Apparatus, for gas separation apparatus, per se, and subclass 413 for gas separation apparatus with sampling means.

119, Animal Husbandry, subclasses 14.01+ for milking machines.

128, Surgery, subclasses 749+ and 760+ for body fluid samplers having means to contact the living body.

137, Fluid Handling, generally and especially subclasses 561+ for other fluid-handling systems.

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, for a device or method of filling a receiver which is not part of a sampling system. Note in particular subclasses 21+, 29, 110, and 130.

159, Concentrating Evaporators, subclass 30, for a combination of a concentrating evaporator vessel with means for withdrawing a quantity of liquid for examination.

166, Wells, for an apparatus or method for sampling well fluids (including gas), particularly subclasses 107+, 142+, 162+, and 264.

175, Boring or Penetrating the Earth, subclasses 232+, 244+ and 308+ for means to receive and retain a sample from the formation, including solid earth, in an earth-boring tool.

210, Liquid Purification or Separation, subclasses 513+ for gravitational separators; especially subclasses 514+ for milk and cream separators.

222, Dispensing, for subject matter of that class type which may include an apparatus or process for obtaining a predetermined portion of material from a mass but not for testing purposes. See also the note to Class 222 in this class (73), subclass 864.01, Pipettes.

250, Radiant Energy, subclass 288 for mass spectrometers with sample supply.

277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 317+ for a seal combined with an indicator, sampler, or inspection feature.

356, Optics: Measuring and Testing, subclasses 36+ for subject matter of that class type including sample preparation; and subclasses 244+ for sample holders.

374, Thermal Measuring and Testing, subclass 157 for a thermometer combined with a sample cup; and subclass 140 for a molten metal lance which may include a sample chamber.

417, Pumps, for sample pumps, per se.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for a sampler wherein means for causing, promoting, regulating or controlling a chemical reaction are claimed.

435, Chemistry: Molecular Biology and Microbiology, subclasses 309.1+ for inoculators, streakers, or samplers adapted for use with microorganisms and enzymes; and subclass 288.6 for a microorganism or enzyme measuring and testing apparatus including a column separation means.

604, Surgery, subclasses 181+ for syringes.

GLOSSARY

CAPTURE ELEMENT

That structure which physically contacts the source to separate it into sample and residue portions.

RESIDUE

The portion of the source that remains after the sample is removed.

SOURCE

The material or bulk from which the sample is removed.

SAMPLE

A portion of material which is physically separated from the source.

SAMPLING SYSTEM

A complete sampling system includes a capture device, a transport or handling means, and a receiver.

863.01 Automatic control:
This subclass is indented under subclass 863. Subject matter combined with a sensing element for sensing a condition of the source or sample, and means to modify the operation of the sampler in response thereto.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 87+ for self-proportioning or correlating fluid-handling systems.

863.02 Quantity or rate of flow responsive:
This subclass is indented under subclass 863.01. Subject matter wherein the condition sensed is either the source flow volume or source speed relative to the sampler.

(1) Note. The sensor is frequently a pressure or level-responsive element.

863.03 Rate of sample flow continuously controlled:
This subclass is indented under subclass 863.02. Subject matter including means to constantly control the rate of movement of the sample.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.02, for quantity or rate of flow-responsive samplers with means controlling the frequency of sample-taking events.

863.11 With heating or cooling:
This subclass is indented under subclass 863. Subject matter including means to actively change or maintain the temperature of the source or sample.

(1) Note. The use of heat insulation alone is insufficient basis for classification in this subclass.

(2) Note. A sampler which changes or maintains the temperature of a sample due to eutectic or latent heat (phase change) is included here, but a device utilizing solely the thermal capacity of thick-walled molds are found in subclasses 864.53+.

863.12 And separation:
This subclass is indented under subclass 863.11. Subject matter further including isolation of individual components of the source or sample.

(1) Note. The separation may or may not be enhanced by the heating or cooling, as by a change of state of one or more of the components; for example, condensation, vaporization, freezing, etc.

863.21 With constituent separation:
This subclass is indented under subclass 863. Subject matter including isolation of individual components of the source or sample.

(1) Note. The isolating means can, in itself, be a capture element or merely be a means to further refine the source or sample.

SEE OR SEARCH CLASS:
23, Chemistry: Physical Processes, subclass 232 for a process of gas sampling involving the use of sorbents or chemical treatment.
96, Gas Separation: Apparatus, for gas separation apparatus, per se, and subclass 413 for gas separation apparatus with sampling means.

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 83+ for an apparatus for gas sampling involving use of sorbents or chemical treatment.

863.22 Particle impact:
This subclass is indented under subclass 863.21. Subject matter wherein separation is accomplished by directing a fluid current containing particles toward a solid surface, the isolated particles remaining on the surface.

863.23 Sieve, filter, or semipermeable membrane:
This subclass is indented under subclass 863.21. Subject matter including a barrier having interstices, pores or micropores through which at least part of the source or sample flows but which trap some components of the flow, usually particulate.

863.24 Cleaning:
This subclass is indented under subclass 863.23. Subject matter having means to remove particulate matter from the barrier.

863.25 Changing feature:
This subclass is indented under subclass 863.23. Subject matter having means to facilitate replacement of the barrier.

863.31 Plural parallel systems:
This subclass is indented under subclass 863. Subject matter including more than one sampling system.

(1) Note. A multiplicity of at least two components is required; for example, plural capture elements feeding separate transport or handling means leading to a receiver is included here, while a single tube (transport means) having a plurality of sidewall openings (capture elements) is not included.

(2) Note. Plural systems in series, that is, a system for taking a primary sample and subsequently taking a secondary sample from the primary sample, are not included here.

863.32 Pipette:
This subclass is indented under subclass 863.31. Subject matter wherein the plural capture elements are tubes sufficiently small to retain liquid against the pull of gravity by surface tension.

863.33 Plural capture, single receiver:
This subclass is indented under subclass 863.31. Subject matter wherein the separately captured samples are fed to a common receiver.

863.41 Flow divider, deflector, or interceptor:
This subclass is indented under subclass 863. Subject matter wherein a capture element separates a sample from a moving source by utilizing the kinetic energy of the source.

(1) Note. Subject matter of this subclass type includes a capture element which deflects the residue and allows the sample to continue undisturbed.

(2) Note. Subject matter of this subclass type does not include a capture device which would not function without a moving source.

863.42 Attached to mouth of dumpable receptacle:
This subclass is indented under subclass 863.41. Subject matter wherein a capture element is mounted adjacent an opening of a source container, the capture element sampling material issuing from the opening as the receptacle is inverted.

(1) Note. Subject matter of this subclass type includes a sampler attached to railroad car dumping mechanisms.

863.43 Having precapture flow guide or homogenizer:
This subclass is indented under subclass 863.41. Subject matter including means for contacting the moving source material upstream from the capture element, the contacting means either rendering the flow pattern more uniform or changing the flow direction with respect to the capture element.

(1) Note. The contacting means can be a fluid current (e.g., compressed air).

(2) Note. Mere contact with a conduit or flow confining means through which the source flows in an undisturbed manner is not sufficient for classification herein.

863.44 Oscillating or reciprocating:
This subclass is indented under subclass 863.43. Subject matter wherein the contacting means is mounted for back and forth movement.

863.45 Rotary:
This subclass is indented under subclass 863.43. Subject matter wherein the contacting means is mounted to pivot about an axis for at least one revolution.

863.51 Having an upstream-facing-opening-type capture element:
This subclass is indented under subclass 863.41. Subject matter wherein the capture element or elements define an aperture or slot facing the direction of origin of source flow at the time a sample is taken.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.41, for a single blade movable capture element which deflects a sample to one side of a flowing source and the residue to the other side.

863.52 With receptacle:
This subclass is indented under subclass 863.51. Subject matter wherein the opening is an entrance to a container which receives the sample.

(1) Note. Means may be provided for emptying the container immediately upon filling.

863.53 Mounted for flow zone traverse:
This subclass is indented under subclass 863.52. Subject matter having means for mounting the receptacle for movement in a path entirely across a stream of flowing material.

863.54 Mounted for reciprocation:
This subclass is indented under subclass 863.51. Subject matter having means for mounting the capture element for back and forth movement in a linear path into or across the stream of flowing source material.

863.55 Oscillating:
This subclass is indented under subclass 863.51. Subject matter having means for mounting the capture element for back and forth movement in a substantially arcuate path into or across the stream of source material.

863.56 Rotary:
This subclass is indented under subclass 863.51. Subject matter wherein the capture element is mounted to pivot about an axis for at least one revolution.

863.57 With blocking means:
This subclass is indented under subclass 863.51. Subject matter having movable means adjacent the capture element which selectively obstructs or permits capture.

863.58 Pitot tube type:
This subclass is indented under subclass 863.51. Subject matter wherein the capture element is in the form of the end of a conduit facing substantially upstream toward the direction of origin of the source.

(1) Note. The sample enters the conduit and the residue flows past its exterior.

863.61 Branched conduit:
This subclass is indented under subclass 863.41. Subject matter comprising a flow-confining means which splits into at least two paths, the sample flowing into one and the residue flowing into another.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864, for a conduit having a three-way valve for intermittently diverting the full flow of the source to an alternative conduit.

863.71 Conduit or passageway section capture chamber:
This subclass is indented under subclass 863. Subject matter comprising means to isolate a fluid sample within a finite length of flow channel and means to withdraw the isolated sample from the length of flow channel.

(1) Note. Source fluid normally flows through the flow channel, and isolation means are frequently in the form of valves at both ends of a section of the flow channel.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.81+, for a capture chamber movable through a conduit wall.

SEE OR SEARCH CLASS:
137, Fluid Handling, for fluid flow confining systems not specialized to sampling.

863.72 Single valve unit:
This subclass is indented under subclass 863.71. Subject matter wherein the isolation means is a single movable valve.

SEE OR SEARCH CLASS:
251, Valves and Valve Actuation, for a valve, per se.

863.73 Capture chamber within valve unit:
This subclass is indented under subclass 863.72. Subject matter wherein the isolatable section of flow channel is located within the single movable valve element.

863.81 Withdrawing through conduit or receptacle wall:
This subclass is indented under subclass 863. Subject matter comprising a capture device mounted in contact with source-confining structure to capture and transport a sample through a wall of the confining structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.01+, particularly 864.23, 864.24+ and 864.85 for pipette devices, many of which have means for piercing a portable receptacle closure made of elastomeric material.

SEE OR SEARCH CLASS:
159, Concentrating Evaporators, subclass 30 for a sampler combined with a closed evaporating chamber.

863.82 Capture element movable to plural loci:
This subclass is indented under subclass 863.81. Subject matter including a capture element which is movable to plural locations within the source receptacle or conduit to obtain samples at each location.

863.83 With metering means or pump:
This subclass is indented under subclass 863.81. Subject matter comprising a positive displacement means moving or permitting movement of a sample at a controlled rate or frequency from a capture element within the source receptacle or conduit to an external receiver.

(1) Note. The positive displacement means can be inter alia, an auger, expansible chamber or trap chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.02, for a sample metering means or pump responsive to a flow sensor.
864.34, for a sample metering means or pump, per se.

863.84 Expansible chamber:
This subclass is indented under subclass 863.83. Subject matter wherein the positive displacement means is a compartment including means to change its volume.

863.85 Lock or seal for sampler insertion or removal:
This subclass is indented under subclass 863.81. Subject matter including means to prevent loss of source fluid when the capture device moves through the source-confining wall.

SEE OR SEARCH THIS CLASS, SUBCLASS:
86, for means to insert a test piece into a closed system.

SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 315.01 through 329.4 with repair, tapping, assembly, or disassembly means.

863.86 Valve or restriction:
This subclass is indented under subclass 863.81. Subject matter having a conduit in communication with the source side of the wall and means to selectively close off or to restrain the sample flow to a receiver.

(1) Note. Remote valve actuators combined with a sampling cup are included here.

863.91 Conveyor coacting:
This subclass is indented under subclass 863. Subject matter combined with a movable source-advancing apparatus and including a capture element for removing a sample as the source is advanced.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.41+, for a sampler which obtains a sample after the source has been discharged from a conveyor or chute.
863.51, for samplers comprising an opening in a conveyor belt through which the sample passes as the source is loaded onto the belt.
863.81+, for a sampler for withdrawing a sample through a source-confining wall.
864.32, for a sampler having a scoop mounted to cyclically sample a source.

SEE OR SEARCH CLASS:
198, Conveyors: Power-Driven, for subject matter of that class type, particularly subclass 339 for conveyors with inspection means.

863.92 Integral with conveyor structure:
This subclass is indented under subclass 863.91. Subject matter wherein the capture element is built into the conveyor, functioning in cooperation with or in some cases in place of the source-advancing means.

864 Capture device:
This subclass is indented under subclass 863. Subject matter comprising a capture element for separating a sample from its source and one other element to either transport or receive a sample therefrom.

864.01 Pipette or cannula:
This subclass is indented under subclass 864. Subject matter wherein the capture device is a tube of sufficiently small dimension to retain liquid therein by surface tension.

(1) Note. A pipette of general utility is included here.

(2) Note. A pipette having a point designed to penetrate a sample container or test apparatus is included here.

SEE OR SEARCH CLASS:
23, Chemistry: Physical Processes, for a process of using a pipette wherein a step of causing, promoting, regulating or controlling a chemical reaction is claimed.
128, Surgery, for similar subject matter (e.g., hypodermic needles) designed to be used with a living body.
141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclasses 22+ and 29 for a pipette combined with a supply container.
222, Dispensing, for similar subject matter of that class type not involving sampling; particularly subclass 420 for drop formers.
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for a pipette wherein means to cause, promote, regulate, or control a chemical reaction is claimed.

864.02 Self-filling or self-limiting:
This subclass is indented under subclass 864.01. Subject matter comprising a tube of such size or material that liquid will be drawn thereinto without application of a suction thereto or which tends to stop filling at a predetermined point.

(1) Note. The disclosure of such a relationship will be sufficient for placement here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

864.72, for a capture element comprising a body having pores in interstices into which liquid is drawn or held by capillary attraction.

864.03 With user mouth protection:

This subclass is indented under subclass 864.01. Subject matter wherein the tube includes a mouthpiece comprising means to prevent movement of liquid to the mouthpiece when an operator applies suction to the tube.

(1) Note. The disclosure of such a function will be sufficient for placement here.

864.11 With suction applying and liquid discharge means:

This subclass is indented under subclass 864.01. Subject matter having means for controlling the pressure within the pipette to a first reduced pressure for loading the pipette and a second higher pressure to unload the pipette.

(1) Note. The higher pressure need not be greater than atmospheric pressure.

864.12 With separate diluent supply:

This subclass is indented under subclass 864.11. Subject matter comprising means to supply a secondary liquid, usually a diluent, to the interior of the proximal end of the tube for delivery through the distal end after the sample is unloaded therefrom.

SEE OR SEARCH CLASS:

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, for apparatus for mixing reagents for analysis.

864.13 Piston within pipette:

This subclass is indented under subclass 864.11. Subject matter wherein the pressure-controlling means is a plunger contacting the interior walls of the tube.

SEE OR SEARCH THIS CLASS, SUBCLASS:

864.16, for similar subject matter wherein the piston is within a cylinder which is separate from the pipette.

864.14 With particular connection or release means:

This subclass is indented under subclass 864.11. Subject matter including a connector between the pipette and the suction pressure applying means which either includes a particular sealing feature or a means for disconnecting the two parts.

864.15 With valve for connection to external pressure source:

This subclass is indented under subclass 864.11. Subject matter wherein the pressure-controlling means includes a means to open or close communication to a pressure source or ambient air.

(1) Note. An opening intended to be closed by an operator's finger is included here.

864.16 Piston and cylinder:

This subclass is indented under subclass 864.11. Subject matter wherein the suction applying and liquid discharge means is a sliding piece closely fitting within a tubular vessel to form an expansible chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:

864.13, for similar subject matter wherein the cylinder is a pipette.

864.17 Plural:

This subclass is indented under subclass 864.16. Subject matter including more than one piston and cylinder expansible chamber.

864.18 Plural or adjustable limit stops:

This subclass is indented under subclass 864.16. Subject matter including means for changing the stroke of the piston with respect to the cylinder so that the change of size of the expansible chamber can be varied.

864.21 With sample supply to analyzer:

This subclass is indented under subclass 864.01. Subject matter including means to introduce or inject the sample captured by the pipette to or into an analyzer.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.81, for a device, per se, which supplies or injects a sample to or into an analyzer.

864.22 With pipette contacting second fluid supply:
This subclass is indented under subclass 864.01. Subject matter having means either integral with or embracing the pipette for providing a fluid other than the sample.

(1) Note. The second fluid is usually for cleaning or rinsing the tube, or diluting or dividing the sample into segments.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.12, for pipettes with interior diluent supply means.
864.25, for sampling devices wherein the tube is mounted for both longitudinal movement and transverse movement, the transverse movement being to a position to pick up a secondary fluid.

864.23 Pipette fixed; source movable:
This subclass is indented under subclass 864.01. Subject matter having a nonmovable pipette, and a receptacle containing a source mounted for movement relative to the pipette.

864.24 Pipette longitudinally movable:
This subclass is indented under subclass 864.01. Subject matter wherein the pipette is mounted for movement substantially lengthwise.

SEE OR SEARCH CLASS:
141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclass 130 for an apparatus which fills successive receivers from a continuously flowing source.

864.25 And transversely movable:
This subclass is indented under subclass 864.24. Subject matter wherein the pipette is additionally mounted for movement substantially transverse to its longitudinal axis.

864.31 With capture device transporter:
This subclass is indented under subclass 864. Subject matter including means for mounting the capture device for movement alternately between a position to contact and capture a sample from source to a remote delivery location (receiver).

(1) Note. A mere handle, line or lead to be grasped by an operator is not included here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.81+, for structure for moving a capture device through a containment wall.

864.32 Cyclically operated scoop:
This subclass is indented under subclass 864.31. Subject matter wherein the capture device is an open-topped receptacle mounted for repetitive travel from the sample capture location to the sample delivery location (receiver).

864.33 Capture by fluid current:
This subclass is indented under subclass 864. Subject matter comprising means for directing a fluid current toward a source material so that the sample is captured and entrained therein for transport to a receiver.

864.34 Sample meter or pump:
This subclass is indented under subclass 864. Subject matter including a device comprising a positive displacement means moving or permitting movement of the sample at a controlled rate or frequency from a capture element to a receiver.

(1) Note. Examples of displacement devices are a screw conveyor, an expansible chamber, trap chamber, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.02, for meters or pumps driven by flow-responsive means.
863.83, for sample metering or pumping devices combined with a source containment means.

864.35 Chamber with alternate pressure or vacuum applier:
This subclass is indented under subclass 864.34. Subject matter having a chamber and means to sequentially apply at least two different pressures to the chamber.

(1) Note. Usually during the application of the lower pressure or vacuum the sample flows into the chamber and during the application of the higher pressure the sample flows out of the chamber.

SEE OR SEARCH CLASS:
417, Pumps, subclasses 118+ for pumps, per se.

864.41 Cutter, tearer, or scraper:
This subclass is indented under subclass 864. Subject matter wherein the capture element is a means to cut, tear, or scrape a sample from its source.

SEE OR SEARCH CLASS:
83, Cutting, subclass 919 for a cross-reference art collection of sample-taking by cutting.
175, Boring or Penetrating the Earth, for samplers of the earth.

864.42 Jaw:
This subclass is indented under subclass 864.41. Subject matter wherein the cutting or tearing element is opposable members that sever material.

864.43 Auger or drill:
This subclass is indented under subclass 864.41. Subject matter wherein the cutting or tearing element is a cutting edge usually at the end of a helical blade rotatable about an axis which cuts across the full cross section of the sample as it advances into the source.

SEE OR SEARCH CLASS:
408, Cutting by Use of Rotating Axially Moving Tool, for augers, drills, etc., per se.

864.44 Corer:
This subclass is indented under subclass 864.41. Subject matter wherein the cutting or tearing element cuts only the periphery of the sample as it is advanced into the source material, leaving a sample in the form of an undisturbed, central portion.

SEE OR SEARCH CLASS:
175, Boring or Penetrating the Earth, subclasses 403+ and the search there noted for a bit for cutting an earth core.
408, Cutting by Use of Rotating Axially Moving Tool, subclasses 204+ for other corer.

864.45 With corer advancing means:
This subclass is indented under subclass 864.44. Subject matter including means to move the corer along its length.

864.51 Receptacle type:
This subclass is indented under subclass 864. Subject matter comprising a container which is either integral with a capture element or acts in itself as a capture element.

(1) Note. The subject matter of this and indented subclasses usually captures a sample in a single event.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.31, for a capture receptacle combined with a transport means.

SEE OR SEARCH CLASS:
141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclass 110 for ladles.
166, Wells, subclasses 162+ and the subclasses there noted for a receptacle for sampling well fluid; and subclass 264 for a process of sampling well fluid.
175, Boring or Penetrating the Earth, subclasses 308+ for an earth-boring tool combined with a receptacle to catch the earth cuttings.

864.52 Preevacuated:
This subclass is indented under subclass 864.51. Subject matter wherein the receptacle is a chamber which has been evacuated prior to its use as a sampler.

SEE OR SEARCH CLASS:
166, Wells, subclass 163, for receptacles with separate air chambers for sucking in well fluid.

864.53 Mold:
This subclass is indented under subclass 864.51. Subject matter wherein the receptacle is in the form of a cavity for receiving a liquid sample which solidifies therein to form a solid sample.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.11, for a sampler having a cooling means.

SEE OR SEARCH CLASS:
249, Static Molds, for molds of general utility.

864.54 With suction applier:
This subclass is indented under subclass 864.53. Subject matter having means for applying a reduced pressure to the mold.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.11, for a pipette sampler having a separate suction-applying means.
864.52, for a sampler wherein the receiving chamber is preevacuated.

864.55 With diminutive fill passageway:
This subclass is indented under subclass 864.53. Subject matter wherein the mold cavity has an opening or conduit of reduced cross section through which liquid flows before solidifying in the cavity.

864.56 Mating sections:
This subclass is indented under subclass 864.55. Subject matter wherein the mold is formed by plural separable elements each of which has a recess which together form a mold cavity.

864.57 Labyrinth:
This subclass is indented under subclass 864.56. Subject matter wherein the mold includes additional chambers or passageways to form a complex sample structure.

864.58 With sample conditioner:
This subclass is indented under subclass 864.53. Subject matter having means for altering the condition of the sample before, after or during its flow into the mold chamber.

864.59 With holder or connector:
This subclass is indented under subclass 864.33. Subject matter having means to hold the mold or connect it to a manipulative handle.

864.61 Fluid displacement:
This subclass is indented under subclass 864.51. Subject matter wherein the receptacle contains a fluid immiscible with the sample, and the sample is caused to enter the container by controlled removal of the fluid (can be air) from the receptacle.

864.62 Expansible chamber:
This subclass is indented under subclass 864.51. Subject matter wherein the receptacle includes means to change its volume.

SEE OR SEARCH CLASS:
166, Wells, subclasses 107+ for receptacles with pump or plunger means for sampling well fluid.

864.63 With valve or closure:
This subclass is indented under subclass 864.51. Subject matter wherein the receptacle is combined with means to close an opening in the receptacle.

SEE OR SEARCH CLASS:
220, Receptacles, subclasses 200+ for a receptacle closure, per se.
251, Valves and Valve Actuation, for valves, per se.

864.64 Side opening:
This subclass is indented under subclass 864.63. Subject matter wherein the receptacle comprises a tubular element and the valve includes a side opening in the tubular element.

(1) Note. Concentric tubes having alignable openings are included here.

864.65 Contact actuated:
This subclass is indented under subclass 864.63. Subject matter wherein the receptacle valve is actuated by means responsive to impinging upon an object.

(1) Note. Included herein are fluid samplers which capture a sample upon hitting the bottom of an ocean, lake, river, tank, etc.

864.66 Support force or inertia actuated:
This subclass is indented under subclass 864.63. Subject matter wherein the receptacle valve is actuated by means responsive to the tension or change in tension of the receptacle support structure.

(1) Note. Usually the valve is actuated by a jerk on a string.

864.67 Messenger actuated:
This subclass is indented under subclass 864.63. Subject matter wherein the receptacle valve is actuated by a separate element released by an operator.

(1) Note. Included here is a weight slidable upon a support cable. which travels from the operator to the sampler.

864.71 Material for particulate adhesion:
This subclass is indented under subclass 864. Subject matter wherein the capture element contains a material to which sample dust sticks.

864.72 Capillary attraction retention:
This subclass is indented under subclass 864. Subject matter wherein the capture element is a body having pores or interstices into which liquid is drawn and held by capillary attraction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.02, for a pipette which utilizes capillary attraction.

864.73 Conduit:
This subclass is indented under subclass 864. Subject matter wherein the capture devices comprises a tube through which a sample is drawn to a receiver.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.58, for Pitot tube type flow deflectors.
864.33, for similar devices for entraining sample material in a fluid current.
864.44, for a cylindrical coring device having a cutting edge.
864.61, for pipettes.

864.74 With penetrating means:
This subclass is indented under subclass 864.73. Subject matter wherein the end of the conduit is provided with means to penetrate a substantially solid material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.85, for sampling from a containment means through a septum seal by means of a pointed cannula.

864.81 Analyzer supplier:
This subclass is indented under subclass 863. Subject matter comprising means to introduce a previously obtained sample into a testing apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.21, for a pipette-type capture device combined with means to inject the sample into a analyzer.

864.82 Having sample capsule support:
This subclass is indented under subclass 864.81. Subject matter wherein the means to introduce includes means for supporting a sample capsule and means to penetrate or fracture the capsule to release the sample to the analyzer.

864.83 Having sample confining chamber:
This subclass is indented under subclass 864.81. Subject matter wherein the means to introduce includes a sample isolating compartment and valve means to release the sample from the compartment to the analyzer.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.71, for samplers in which a conduit section is isolated to capture a sample,

many of which introduce the captured sample into an analyzer.

864.84 Connector for separable holder:
This subclass is indented under subclass 864.83. Subject matter having means to connect a separate sample holder to the chamber so that the sample to be analyzed can be transferred from the sample holder to the chamber.

(1) Note. A pipette or tube which merely dips into a receptacle containing a sample is not included here.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.85+, for means to connect a separate sample holder directly to an analyzer.

864.85 Connector for separable holder:
This subclass is indented under subclass 864.81. Subject matter having means to connect a separate sample holder directly to an analyzer input.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.84, for means to connect a separate sample holder to a sample confining chamber.

864.86 Septum structure:
This subclass is indented under subclass 864.85. Subject matter wherein the means to connect the separate holder is a continuous membrane intended to be pierced by a hollow needle.

SEE OR SEARCH THIS CLASS, SUBCLASS:
863.85, for sampling from containment means through a septum.
864.84, and 864.87, for a sample supply device which may include a septum as part of a connector.

864.87 Syringe with connector:
This subclass is indented under subclass 864.85. Subject matter wherein the sample holder includes a contractible section.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.21, for a pipette-type capture device combined with means to inject the sample into an analyzer.

864.91 Sample holder:
This subclass is indented under subclass 863. Subject matter comprising means for receiving and storing a sample.

SEE OR SEARCH THIS CLASS, SUBCLASS:
864.51+, for a sample holder operatively associated with a capture device, or which in itself acts as a capture device.
864.62, for an expansible chamber capture device.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclass 244 for a holder or support for a sample undergoing an optical test.
422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 102 for a container specifically designed for use in a laboratory.

865 MASS:
This subclass is indented under the class definition. Subject matter for making a quantitative determination of the amount of matter in a body of material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
37, for testing dimension, shape or size by the application of fluid pressure.
156, for verification of statistical records such as holes in cards.
157, for verification of apertures in picture film or record strips.
163, for testing coins, which may involve testing of size or weight.
861.5+, for a device for measuring the rate of flow of a moss of fluent material.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, for devices or processes for making geometrical measurements.

177, Weighing Scales, subclass 51, for coin weighers which also measure dimensions.
209, Classifying, Separating, and Assorting Solids, subclass 509, for classifying and assorting special items.
453, Coin Handling, for coin sorters.

865.1 HUMAN STRESS LIMIT (E.G., DECOMPRESSION GAUGE FOR DIVERS):
This subclass is indented under the class definition. Subject matter responsive to parameters to which humans may be subjected for indicating the approach of theoretical limits which they can withstand.

SEE OR SEARCH THIS CLASS, SUBCLASS:
23, for gas analysis.
299, for bathometer type of hydrostatic level gauge.
384+, for altimeters.
700+, for pressure gauges, per se.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclass 102, for time temperature relationship measuring; and subclass 109 for climate related measuring.

865.2 HYDRAULIC ALTIMETER:
This subclass is indented under the class definition. Subject matter for measuring the difference between a reference elevation and an unknown elevation by means of a pressure developed by a liquid.

(1) Note. The liquid is usually contained within a conduit extending from the higher to the lower elevation.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, subclass 377 for liquid type horizontal or level determining devices and subclasses 366.15+ for a liquid type horizontal or level determining device with an electrically controlled indicator.

865.3 TESTING BY IMPARTING MOTION:
This subclass is indented under the class definition. Subject matter in which a specimen as a whole is subjected to a predetermined movement or acceleration.

(1) Note. Included here are devices for simulating zero gravity or high G conditions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1.75+, for proving or calibrating a device which measures an angle, direction, or inclination.
1.79+, for proving or calibrating a device which measures displacement, movement, distance, or position.
12.01, for testing by impact or shock.
570+, for vibration testing, and particularly, subclasses 662+ for vibrating a specimen.

865.4 ANALYZING BODILY MOVEMENT (E.G., SKILLS OR KINETICS OF HANDWRITING):
This subclass is indented under the class definition. Subject matter investigation the forces or motion involved in a specific bodily activity.

SEE OR SEARCH THIS CLASS, SUBCLASS:
172, for orthopedic pressure distribution.
379.01, for muscular strength measuring.

SEE OR SEARCH CLASS:
128, Surgery, subclass 774, for diagnostic for measuring the force exerted by the body.
473, Games Using Tangible Projectile, for a practice or training device combined with means for analyzing bodily movement which is used by a player of a projectile game to improve or perfect his or her skills in playing the game (e.g., a swing training device used by a player to practice for, or train in, swinging a baseball bat, golf club, or tennis racket, etc.).

865.5 PARTICLE SIZE:
This subclass is indented under the class definition. Subject matter for measuring diameter of small pieces of material such as found in powder of granular of other finely divided material. The determination may be of the average, or the proportion of the total of each of a plurality of sizes distributed through a range.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61, for determining the solid material contained in a liquid.

61.4, for measuring the setting or filtering ability of a liquid.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclass 71.4 for counting particles in a liquid using electrical means.

865.6 SIMULATED ENVIRONMENT (E.G., TEST CHAMBERS):

This subclass is indented under the class definition. Subject matter for testing by surrounding a specimen with conditions which mimic or exaggerated normal conditions which surrounds the object which the specimen represents.

SEE OR SEARCH THIS CLASS, SUBCLASS:

7, for testing by abrasion, milling, rubbing or scuffing.

35.01+, for measuring engine knock or detonation.

35.14+, for testing of an explosive.

35.17, for a safety feature or a containment structure detail for use while testing an explosive.

37, for testing by application of fluid pressure.

147, for wind tunnels.

148, for model basins.

150, for tests of a coating material, ink, adhesive or plastic, some of which simulate an environment.

159, for tests of sheet material, or fabric, some of which simulate an environment.

570, for testing by applying a vibration to a specimen.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, for test involving thermal simulation of conditions surrounding the object being tested.

865.7 TOUCH OR TASTE:

This subclass is indented under the class definition. Subject matter for testing of materials or objects to determine their properties utilizing either the tactual sense or those associated with oral contact.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23, for the analysis of gases utilizing the sense of smell.

SEE OR SEARCH CLASS:

128, Surgery, subclass 630 and appropriate indented subclasses for diagnostic testing of the various senses.

865.8 INSPECTING:

This subclass is indented under the class definition. Subject matter not provided for elsewhere including apparatus or processes for sensing and signaling or indicating physical conditions.

SEE OR SEARCH CLASS:

277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 317+ for a seal combined with an indicator, sampler, or inspection feature.

324, Electricity: Measuring and Testing, subclass 200 for magnetic sensing; subclasses 323+ for sensing the presence or location of small objects of a geophysical surface or subsurface in site; subclasses 51+ for electrical fault sensing and location; and subclasses 76.11+ for sensing electricity, per se.

865.9 TESTING OF APPARATUS:

This subclass is indented under the class definition. Subject matter for investigating a tool or machine to determine its proper functioning.

(1) Note. Included here is apparatus for simulation of the normal actuation of the apparatus or simulation of the object or material upon which the apparatus works.

(2) Note. Included here are monitoring devices for machines not otherwise classified.

SEE OR SEARCH THIS CLASS, SUBCLASS:

11.04, for test of shock absorbing apparatus.
52, for test of sealed receptacle.
66+, for test of rotor unbalance.
112+, for power plant or unit efficiency.
116+, for motor or engine testing.
121+, for brake testing.
146, for tire tread or roadway testing.
156, for statistical record verifying.
157, for record strip sprocket hole.
158, for testing hoisting cable.
161, for spring testing.
162, for toothed gear testing.
163, for coin tests.
164, for miner's lamp testing.
167, for ordnance or projectile testing.
168, for blower pump or hydraulic equipment testing.

SEE OR SEARCH CLASS:

116, Signals and Indicators, for a nonelectrical signalling means or indicating means, per se.
340, Communications: Electrical, for electrical signal of indicators responsive to a condition of and apparatus.

866 TESTING OF MATERIAL:

This subclass is indented under the class definition. Subject matter not provided for elsewhere for investigating a substance to determine its properties.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19, for testing a material for its gas content.
23, for gas analysis.
32+, for specific gravity or density determination.
36, for illuminating fluid testing.
53+, for liquid or liquid suspension of solid measuring and testing.
73+, for moisture content or absorption characteristic determining.
78+, for hardness testing.
86, for embrittlement or erosion testing.
87, for ductility or brittleness testing.
104+, for surface and cutting edge testing.
150, for testing of ink, adhesive or plastic coating material.
159+, for stress or strain testing.
169, for flour, dough or bread testing.
760+, for stress or strain testing.
865.5, for determining particle size.

866.1 INSTRUMENT MECHANISM OR TRANSMISSION:

This subclass is indented under the class definition. Subject matter for transmitting or modifying a signal or movement produced by a condition sensing element and for applying it to an indicator or read out device.

(1) Note. The signal may be mechanical, electrical or optical.

(2) Note. The particular sensing element is either not specified, not otherwise provided for in Class 73, or there are plural sensing elements which include or do not include a sensor provided for in Class 73.

(3) Note. Included here are perfecting devices for measuring instruments such as means for reducing the effects of friction.

SEE OR SEARCH THIS CLASS, SUBCLASS:

430, for instrument mechanism dampening.
496, 497, 498, and 530+, for speed or acceleration measuring devices with particular transmission structure.
861.01+,861.43+, 861.48, for volume or rate of flow meters with particular transmission structure.

866.2 Rate of change:

This subclass is indented under subclass 866.1. Subject matter for modifying a signal produced by a sensing element to indicate a variation of the sensed condition during a unit of time.

(1) Note. The particular sensing element is either not claimed, not otherwise provided for in this class, or there are plural sensing elements, some of which are provided for in this class.

(2) Note. Included here are electrical, mechanical, or pneumatic mechanisms.

(3) Note. Included here are devices which have two sensing elements, one of which responds to changes in the sensed condition quickly and one of which responds to the sensed condition slowly.

SEE OR SEARCH THIS CLASS, SUBCLASS:
179, for rate of climb meters.
514.01+, for a device for utilizing an inertia element for measuring the rate of change in speed.
861+, for volume or rate of flow meters.

SEE OR SEARCH CLASS:
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclass 335 for circuits having an output proportional to a rate of change of voltage input.

866.3 DISPLAY OR DISPLAY DEVICE DETAILS:
This subclass is indented under the class definition. Subject matter including means which indicate a quantity of measurement or aids in the observation thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
178, for navigation devices many of which indicate a plurality of conditions.
291, for liquid level gauges combined with other measuring devices.
336, for hygrometers combined with other measuring devices.
714, for pressure gauges combined with other measuring devices.

SEE OR SEARCH CLASS:
116, Signals and Indicators, subclass 280, for diverse indicators, per se.
340, Communications: Electrical, for electrical indicators, per se.
374, Thermal Measuring and Testing, subclasses 142+ for the thermometers combined with other measuring devices.

866.4 SPECIMEN MODEL OR ANALOG:
This subclass is indented under the class definition. Subject matter not provided for elsewhere comprising an object having a special shape or form of or being a representation of a test piece or simulation of the response of an object being investigated indirectly.

SEE OR SEARCH THIS CLASS, SUBCLASS:
147, for models of aircraft to be tested in wind tunnels.
148, for models of ships to be tested in model basins.

866.5 PROBE OR PROBE MOUNTING:
This subclass is indented under the class definition. Subject matter which includes structure of a measuring probe or a mounting for a measuring probe.

(1) Note. The particular sensing element is either not specified, not otherwise provided for in this class, or there are plural sensing elements, none of which are provided for in this class.

(2) Note. The mounting may be either stationary or movable.

SEE OR SEARCH THIS CLASS, SUBCLASS:
65.06, and 65.09, for sensors for determining center of gravity, turning moment, or metacentric height.
86, for means for mounting an erosion or embrittlement sensing probe.
147, for means for mounting a model in a wind tunnel.
159, for means for mounting a sheet material sensing element.
618+, and 633, for means for mounting a vibration transducer.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, subclasses 140, 155, and 208, for temperature sensing probes and mounting therefor.

CROSS-REFERENCE ART COLLECTIONS

The following subclasses are a collection of cross-references of published disclosures pertaining to various specified aspects of the measuring and testing of or by vibrations with beamed waves which aspects do not necessarily form appropriate bases for subclasses in the foregoing classification (i.e., subclasses superior hereto

in the schedule). These subclasses may be of further assistance to the searcher as a starting point in further related fields of search either inside or outside the class. Thus, there is here provided a second access for retrieval of a limited number of types of disclosures.

(1) Note. Disclosures are placed in these subclasses for their value as references and as leads to appropriate main or appropriate main or secondary fields of search without regard to their original classification.

(2) Note. The disclosures cross-referenced into the following subclasses are examples only of the indicated subject matter and in no instance do they represent the entire extent of the prior art.

900 AUTOMATIC GAIN CONTROL:
Subject matter pertaining to vibration measuring or testing with beamed waves wherein an automatic gain control is provided to vary the gain in the receiving means to compensate for loss of received signal due to conditions, as attenuation by the test body, other than that which is to be measured or indicated.

(1) Note. The gain may also be controlled in effect by varying the power of the transmitted signal.

901 DIGITAL READOUT:
Subject matter pertaining to vibration measuring or testing with beamed waves wherein the measurement is in the form of a digital readout.

FOREIGN ART COLLECTIONS

The definitions for FOR 100 - FOR 105 below correspond to the definitions of the abolished subclasses under Class 73 from which these collections were formed. See the Foreign Art Collection schedule 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
Foreign art collection for investigating physical conditions of well bores, casings and drill rigging, such as misalignments, stuck pipe sections, drill loading factors, determination of the proper placement of liners, determining the rate at which drilling is proceeding, etc.

FOR 101
Foreign art collection for measuring the rate at which the drill cuts through the formations, or for periodically determining the depth of the cutting tool, so that said rate could be computed.

FOR 102
Foreign art collection for strata identification, as by bore hole studies of pressure derivatives or of pressure-temperature derivatives, etc.

FOR 103
Foreign art collection for correlating depth with occurrence of representative sample obtained from the formation, with conventional means or procedure for inspecting or analyzing the sample for its oil-gas-water content or ratio.

FOR 104
Foreign art collection for evaluating possible production potentials from different strata, or for identifying the geologic structure of encountered strata, by measuring the thermal responses opposite those strata, either by direct measurement of formation temperatures or by measuring the temperature modification by drill mud lying opposite different strata.

FOR 105
Foreign art collection for ascertaining rates, directions and magnitudes of fluid flow, either from the formation into the bore hole or from the bore hole into the formation, under natural or controlled pressure and/or temperature conditions. Production indices are here included.

END