

CLASS 408, CUTTING BY USE OF ROTATING AXIALLY MOVING TOOL

SECTION I - CLASS DEFINITION

Class 408 is the residual locus of methods and machines for penetrating material, without substantial reshaping flow of such material, by means of a solid tool that turns about an axis, and moves relative to a workpiece, along that axis during operation.

(1) Note. The phrase “without substantial reshaping flow of such material” is intended to cover the noncutting deformation of material by forcing a tool into or through said material, which method or apparatus is provided for in the class for Metal Deforming (see References to Other Classes, below).

(2) Note. Class 408 is intended to ultimately include all cutting as defined above; however, not all classes have now been screened for such art. Included among such classes likely to include patents proper for Class 408 and not yet screened are Classes 82, 142, 409, and 451.

SCOPE OF THE CLASS

Class 408 is an elemental or basis class. That is, its subject matter is restricted (so far as possible) to means for, or steps of, accomplishing the following functions; cutting something (the “work”); or cutting, and handling the work to be cut; or cutting and handling the product of the cutting operation.

SECTION II - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

- 7, Compound Tools, for a hand supported implement including a portion for performing an operation of this class (408) and including a portion for performing a noncutting operation.
- 12, Boot and Shoe Making, for means or methods particular to the cutting of footgear.
- 29, Metal Working, for (1) a step of our machine for performing a cutting operation combined with or convertible to a step of or machine for performing a noncutting material treatment; (2) a cutting tool or tool-assembly physically limited to use with rotating work; or (3) a cutting

tool or tool-assembly for use alternatively; (a) during rotary plus axial motion relative to the work, (b). during rotary plus radial motion relative to the work, or (c) during rotary plus lateral motion relative to the work.

30, Cutlery, for a cutting structure that is (1) operator supported, (2) work supported, (3) randomly manipulated, or (4) randomly manipulated and combined with a work-support wherein the cutter moves in a manner other than rotary and axial relative to the work during operation. This class (408) is superior to Class 30; therefore, a tool alternatively usable in the structure of either class will be found in this class.

33, Geometrical Instruments, for a device for cutting work to measure physical characteristics of that work, and for a geometrical instrument to be used with a tool of this class.

60, Power Plants, for a prime mover to be used to drive a tool, in the absence of any work-contacting structure other than the tool or of frame structure of particular utility to support a tool.

65, Glass Manufacturing, for the shaping of green ceramic material combined with cutting, in a single or a plurality of operations.

69, Leather Manufactures, for means or methods including cutting, particular to making leather articles.

72, Metal Deforming, for deforming combined with the cutting of metal.

73, Measuring and Testing, for a measuring device to be used with a cutting tool of this class.

74, Machine Element or Mechanism, for structure for causing one machine element to move relative to another and thereby to cause a tool to move, in the absence of any work-contacting structure other than the tool or of frame structure of particular utility to support a tool.

76, Metal Tools and Implements, Making, for cutting in the manufacture of a tool.

79, Button Making, for the manufacture of a button by (1) an operation other than cutting by a rotating, axially moving tool; or, (2) a plurality of steps, one of which is material treatment other than cutting and another of which is cutting.

81, Tools, for a torque applying, hand-held device of general utility; including a device wherein one utility is to transmit torque to a rotary, axially advancing cutting tool.

82, Turning, for the cutting of rotating material, other than wood, by a tool engaging that material in a way affected by such rotation; and for

- the cutting of nonrotating material by a tool having a single cutting edge, wherein the operation is on generally circular cross-section material and wherein the tool turns about the axis of the material and has additional motion other than along that axis, so that the cutting is similar to the action of a nonrotating tool acting on rotating material.
- 83, Cutting, for all cutting not provided for elsewhere.
- 91, Motors: Expansible Chamber Type, for a motor of that class to be used to drive a tool, in the absence of any work-contacting structure other than the tool or of frame structure of particular utility to support a tool.
- 101, Printing, for a printing operation combined with cutting by a rotating, axially moving tool.
- 111, Planting, for cutting into the earth by a rotating, axially moving tool combined with means for depositing on object into the bore.
- 123, Internal-Combustion Engines, for an engine of that class to be used to drive a tool, in the absence of any work-contacting structure other than the tool or of frame structure of particular utility to support a tool.
- 125, Stone Working, for a step of or machine for cutting stone if the operation is other than by use of a rotating, axially moving cutter.
- 128, Surgery, for cutting operations particular to an operation on a live animal body.
- 137, Fluid Handling, for an operation of that class, combined with cutting in the manner of this class (408), except when the fluid handling is ancillary to the cutting operation.
- 140, Wireworking, for cutting of wire combined with other wireworking.
- 142, Wood Turning, for the cutting of rotating wood material by a tool engaging that material in a way affected by such rotation; and for the cutting of nonrotating wood material by a tool having a single cutting edge wherein the operation is on generally circular cross-section material and wherein the tool turns about the axis of the material and has additional motion other than along that axis, so that the cutting is similar to the action of a nonrotating tool acting on rotating material.
- 144, Woodworking, for cutting combined noncutting treatment of wood; and, for cutting of particular utility of wood, except for cutting of wood by a rotating axially moving tool.
- 147, Coopering, for machines which are used exclusively in the manufacture of wooden barrels, fruit boxes, baskets, or crates.
- 157, Wheelwright Machines, for structure for performing a noncutting material treatment combined with a cutting operation in the making of a wheel.
- 173, Tool Driving or Impacting, for structure for moving a tool about an axis and toward a workpiece to effect cutting, in the absence of any work-contacting structure other than the tool or of frame structure of particular utility to support a tool.
- 175, Boring or Penetrating the Earth, for cutting by a rotating axially moving tool particular to cutting into the earth.
- 185, Motors: Spring, Weight, or Animal Powered, for a motor of that class to be used to drive a tool, in the absence of any work-contacting structure other than the tool or of frame structure of particular utility to support a tool.
- 225, Severing by Tearing or Breaking, for the application of tensile forces to a workpiece to cause that workpiece to be divided combined with cutting by a rotating, axially moving tool.
- 234, Selective Cutting (e.g., Punching), for a cutting device which includes a plurality of cutting tool pairs (including cutting structure of this class (408) type) and an actuating power train for each pair (one power train may be common to all), so that power may be delivered to any or all pairs for any cutting cycle, and wherein each and all of the tool pairs assembled in the machine are constantly available to be chosen for cutting or noncutting (in any desired number, from one to the total number available) by (1) a pattern, (2) combinational coding means, or (3) means not a part of the tool actuating power train and which does not partake of all the movements of either tool or the pair; which pattern or means conditions each pair so chosen to (a) enable or (b) prevent a cutting operation thereby when its driving power train is actuated.
- 248, Supports, for structure for supporting a machine, if the supporting structure is of general utility.
- 266, Metallurgical Apparatus, for flame cutting apparatus; and subclass 271 of that class for drilling or cutting the tap-hole plug of a metallurgical furnace.
- 269, Work Holders, for structure to be used to sustain material during a material treatment operation, such as cutting by a rotating axially moving tool, provided there is no tool-supporting structure, tool-guiding structure, tool-cou-

- ple-element, or structure otherwise recognizing the tool of a machine for cutting.
- 279, Chucks or Sockets, for structure for the general utility of holding a tool.
- 299, Mining or In Situ Disintegration of Hard Material, for processes, machines or tools for boring or penetrating into the earth to recover valuable cuttings from a borehole in desirable size or shape.
- 401, Coating Implements With Material Supply, for a coating implement combined with a cutting device (e.g., a pencil with a pencil sharpener).
- 409, Gear Cutting, Milling, or Planing, for cutting by a rotating tool that moves either laterally or radially of the tool-axis relative to the material during the cutting operation; especially subclass 306 for the rifling of a gun barrel.
- 414, Material or Article Handling, appropriate subclasses for bringing work to or taking product from an unspecified cutting machine, generally; and subclasses 222.01+ for apparatus for charging a load holding or supporting element from a source, and means for transporting the element to a working, treating, or inspecting station.
- 433, Dentistry, subclasses 75+ for drill guides; subclasses 103+ for machines; and subclass 165 for tool bits specifically adapted for dental operations.
- 451, Abrading, for abrading involving a tool composed of crystalline, material-removing particles, generally. The combination of a Class 408 cutter with a Class 451 abrading device is to be found in Class 408, subclasses 22+. Note that cutting by a rotating tool that moves axially with respect to a workpiece is included in the definition of Class 408, even if the tool is an abrading tool, but that Class 451 has not been screened for such structure.
- 470, Threaded, Headed Fastener, or Washer Making: Process and Apparatus, for the manufacture of an article of that class by (1) an operation other than cutting by a rotating, axially moving tool; or (2) a plurality of steps, one of which is a material treatment other than cutting and another of which is cutting.
- 483, Tool Changing, generally for a process or apparatus including a tool transfer means combined with either a tool support or storage means, particularly subclasses 30+ for a tool transfer means which bodily transfers tools to or from a rotary spindle machine tool.

SECTION III - GLOSSARY

Terms in the definition of this class followed by an asterisk (*) will be found to be defined in this section. Certain very frequently appearing terms such as Work, Tool, Product and Tool Axis are accompanied by the asterisk only where the exact meaning of the term is deemed particularly important.

CUTTING EDGE

A marginal portion of a tool comprising a line or point on the surface of the tool formed by the intersection of a plurality of planar surfaces, specifically adapted to perform a cutting function.

INFEED

The relative movement of the tool and work along the tool-axis* during the cutting operation. (Compare work-infeed* and tool-infeed*).

MACHINE-FRAME

Structure relative to which a tool moves during operation, which structure is of particular utility due to its physical configuration for supporting the weight of a tool or for counteracting the thrust of the tool, wherein the tool to be supported or the force of which is to be counteracted is adapted to perform an operation of this class type.

PRODUCT

Material which has been treated by the cutting tool; the result of a cutting operation. (Note: Material which is "product" for one cutting operation may be "work" for an ensuing operation).

TOOL

The instrumentality that contacts the work for effecting directly the operation of the class, either by itself or by cooperation with another tool.

TOOL-CYCLE

The elapsed time between and all of the motions traced by the tool between the time the tool leaves any particular datum point in its approach to (or recession from) the work until it again leaves that point in its next succeeding approach to (or recession from) the work, the location of such datum point for a series of recurring cycles being determined without giving significance to mere

positioning movements of the tool with respect to the work. (Note: Positioning movements of the tool are considered to be part of the cycle of motions constituting the tool-cycle, and the time they occupy is part of the span of the cycle. They are disregarded only for the purpose of establishing the datum point of one cycle with respect to that of a preceding or succeeding cycle).

TOOL-INFEED

the motion of a tool relative to work and relative to the base of the cutting machine along the tool-axis toward the work during the cutting operation.

TOOL-SUPPORT

An element connected to the tool for supporting it against gravity and that partakes of all the movement of the tool and has no relative movement with respect to the tool except for purpose of adjustment.

TOOL-AXIS

The longitudinal center about which the cutting tool of this class rotates relative to the work and relative to the machine-frame structure during the cutting operation.

WORK (N)

Article, material, or stuff to be treated (cut). (Compare "product").

WORK-INFEED

The motion of work relative to the tool and relative to the base of the cutting machine along the tool-axis toward the tool during the cutting operation.

SUBCLASSES

- 1 This subclass is indented under the class definition. Method which includes a step of cutting.
- 2 This subclass is indented under the class definition. Device combined with means to determine the weight or other characteristics of the material.
- 3 This subclass is indented under the class definition. Device including structure for utilizing the characteristics (e.g., physical or electrical) of an element, that is separate from the work and is separate from the organized structure of

the device, to influence the operation of the device.

- (1) Note. This subclass includes machines for utilizing a prepared information supply that is to be removably placed in the machine. This subclass does not include structure for utilizing the characteristics of a "permanent" part of the machine, such as a cam or gear to influence the operation of other parts of the machine.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 72+, for a "templet", which merely guides the tool and does not otherwise influence the operation of the device.
- 124+, for a "permanent" cam or gear used to regulate the operation of the device.

- 4 This subclass is indented under the class definition. Device wherein two movable parts of the machine are related such that in at least one position of one of the parts movement of the other part is restricted by the first part.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 148+, for releasable locking structure adapted to secure together two elements of a tool-holder.

- 5 This subclass is indented under the class definition. Device provided with means to bring any or all of the moving parts of the device to a halt, the halting effect being accomplished in response to a signal or impulse caused by an abnormal occurrence during the operation of the device.

- (1) Note. A machine capable of stopping will not be placed here unless the stopping means operates as a result of an unplanned or unpredictable occurrence.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 14+, for stopping means effective on completion of a predictable or planned operation.

6 This subclass is indented under subclass 5. Device in which the signal or impulse is generated by a detector sensing a characteristic of the tool* or the tool-driving means.

- (1) Note. The detector may contact the tool or tool-driving means during the normal operation of the device in which case the stopping signal is generated by failure of the detector to make such contact.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 11, for a similar device including control means that serves to influence the operation of the device in a manner other than by stopping the device randomly.

7 This subclass is indented under subclass 5. Device in which the signal or impulse is generated by a detector sensing a characteristic of the work* or product*.

- (1) Note. The sensed characteristic of the work or product may be shape, presence, absence or attitude.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 12, for a similar device including control means that serves to influence the operation in a manner other than by randomly stopping the device.

8 This subclass is indented under the class definition. Device including means for: (a.) detecting any of the following characteristics: a state or property, a change in a state or property, or the occurrence of a predetermined event, in any of the following: the work, the product of a machine, the machine itself, or the environment of the machine affecting the operation thereof; (b) initiating (as a direct result of such detection) a force or impulse other than that generated or transmitted by the detecting means; and (c) regulating or modifying (as a direct result of such initiation) the operation of said machine.

- (1) Note. The control systems of this and indented subclasses are similar in concept to control systems of other classes;

particularly, Class 72, Metal Deforming, especially subclasses 6+; Class 83, Cutting; Class 173, Tool Driving or Impacting, especially subclasses 2+, and Class 226, Advancing Material of Indeterminate Length, especially subclasses 10+. The total operations and the claimed combinations are, of course, different; but, the control systems, per se, found in these other classes are usually analogous to those herein and may be applicable to the machines of this class (Class 408).

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 3, for a templet responsive control means.
5+, for control structure adapted to stop the operation of the cutting machine.

SEE OR SEARCH CLASS:

- 700, Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for data processing control systems wherein the control system is claimed generically, and subclasses 159-195 for the application of a computer in the manufacturing of a product which includes cutting or punching.

9 This subclass is indented under subclass 8. Device provided with a mechanism to govern the angular velocity of the tool* about the tool-axis*.

- (1) Note. The structure for governing the angular velocity of the tool includes structure for; (a) increasing and/or decreasing the speed of rotation, (b) reversing the direction of rotation, (c) stopping the rotation or, (d) maintaining the speed of rotation constant.

10 This subclass is indented under subclass 8. Device provided with mechanism to regulate or modify the infeed*.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 49, for a device including work-infeed* means for one of a plurality of tools.
62+, for work-infeed* means for a single tool.

- 99+, for tool-infeed* means adapted to move a tool toward an opposing, work-engaging surface.
- 129+, for other tool-infeed means.
- 11** This subclass is indented under subclass 10. Device wherein the detector senses a characteristic of a tool* or of a machine element normally connected to the tool for movement therewith.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
6, for similar device including structure to sense a tool and bring the device to a halt in an abnormal condition thereof.
- 12** This subclass is indented under subclass 10. Device wherein the detector senses a characteristic of the material subjected to the cutting operation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
7, for similar structure adapted to sense the work or product and bring the device to a halt in response to an abnormal condition thereof.
- 13** This subclass is indented under subclass 8. Device including a mechanism to cause relative movement between the tool* and work*, wherein the operation regulated or modified is that of a mechanism for causing relative movement.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
10+, for a device including control structure for regulating positioning of the work and the tool along the tool-axis.
- 14** This subclass is indented under the class definition. Device including means to bring one or more parts of a machine to a halt after the machine or a part thereof has completed an intended operation.
- (1) Note. Only a device including structure of particular utility to bring about stoppage after the completion of an intended operation is placed herein.
- (2) Note. Included in this subclass are those devices sometimes described as a unicyclic.
- 15** This subclass is indented under subclass 14. Device wherein when the intended operation is complete, the halting is effected by a characteristic of the work* or product*.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
7, for similar structure adapted to stop the device, which structure acts in response to the detection of an abnormal occurrence.
- 16** This subclass is indented under the class definition. Device including, in addition to structure for performing a class-type operation, either (1) means to produce a perceptible (e.g., audible or visual) manifestation of a condition of a part (or all) of the machine or of the work; (2) means to designate a characteristic of the device, the work or the product; (3) means to increase the lighting intensity in the vicinity of the device or the work; or; (4) means to modify light waves to make characteristics of the device, the work or the product more readily discernable to the view of the operative.
- (1) Note. The additional structure may be calibrated quantitatively; however, mere calibration of a machine element, not in addition to structure for performing an operation of the class, is not considered proper for this subclass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
116, for a device of this class having provision to receive means for determining and designating a characteristic of the device, work or product.
- SEE OR SEARCH CLASS:
433, Dentistry, subclass 29 for dental drilling apparatus provided with means to illuminate the work.
- 17** This subclass is indented under the class definition. Machines having structure for causing the tool or the tool-support to be fed intermittently or to be fed and withdrawn respectively

in its approach relative to the work along the axis of tool rotation.

- (1) Note. Included in this subclass are devices known as “chip breakers” and devices with special provision to withdraw the tool to discharge chips.

SEE OR SEARCH THIS CLASS, SUBCLASS:

124+, for structure for causing a tool to move along the tool-axis during the cutting operation.

143, for means to impart, to the tool, a vibration characteristic different from the vibration characteristic imparted by the reaction of the tool and work to damp the energy of a vibrating tool.

- 18** This subclass is indented under the class definition. Device in combination with means to treat the tool* and make that tool more suitable to perform its intended function.

- (1) Note. Included herein is means to remove foreign matter from (e.g., clean), and means to prepare the tool by modifying or maintaining characteristics of the tool (e.g., sharpen).

SEE OR SEARCH THIS CLASS, SUBCLASS:

56+, for a tool of the class type combined with means to apply fluid to work to carry loose chips away from the tool.

SEE OR SEARCH CLASS:

15, Brushing, Scrubbing, and General Cleaning, appropriate subclasses for cleaning means adapted to remove foreign material from a tool.

451, Abrading, for abrading means adapted to sharpen a tool of this class type, particularly subclass 420 for an abrading device adapted to be attached to a machine of this class type.

- 19** This subclass is indented under the class definition. Apparatus including means to impart an impermanent change of shape (i.e., within the elastic limit) to work and to hold the work in that shape during the cutting operation.

- (1) Note. This subclass includes devices which deform the work, as above defined, wherein such deformation is prerequisite to effect predetermined line of cut; that is to say, the desired cut could not be effected in the absence of the deformation while operating the machine in the intended manner.

- (2) Note. Means for compressing, or stretching, a resilient workpiece and subsequently cutting a circular opening in same to impart an elliptical product surface configuration thereto upon release of the deforming forces would be properly placed in this subclass.

SEE OR SEARCH CLASS:

83, Cutting, subclass 176, for cutting means of general utility combined with means to temporarily deform the work.

226, Advancing Material of Indeterminate Length, subclass 88, for means to deform material of indeterminate-length to facilitate feeding of the material.

- 20** This subclass is indented under the class definition. Device which, by relative rearrangement of its parts or by the addition or omission of a part is so changed as to perform a cutting operation of a different type.

- (1) Note. The different type cutting function to which the structure of this subclass is convertible includes any means for cutting by a sharp edge except (1) another cutting device under the definition of this class; or, (2) a cutting device that utilizes the same tool used in the first modification to cut while rotating and moving radially of the tool-axis relative to the work. (See the search class notes below).

SEE OR SEARCH CLASS:

30, Cutlery, for a handheld-implement for cutting material by a rotating axially moving tool convertible to an implement for using that same tool for cutting while rotating and moving radially or laterally of the tool-axis.

- 144, Woodworking, for a machine for cutting wood by a rotating axially moving tool convertible to a device for using that same tool for cutting wood while rotating and moving radially or laterally of the tool-axis.
- 409, Gear Cutting, Milling, or Planing, for a device for cutting of material not provided for elsewhere by a rotating axially moving tool for cutting such material while rotating and moving radially or laterally of the tool-axis.
- 21** This subclass is indented under subclass 20. Device including a single cutting tool that, depending on the arrangement of the parts of the device, can selectively be used to perform a cutting operation under the class definition or to performs a cutting operation of a different type.
- 22** This subclass is indented under the class definition. Device combined with additional structure capable of performing a cutting operation of a different type.
- (1) Note. The different type cutting function with which the structure of this subclass is combined includes any means for cutting by a sharp edge except another cutting device under the definition of this class.
- (2) Note. A cutting tool or tool with support (see tool-support*) will be found in this subclass and the subclasses indented hereunder if it includes a portion operable to cut in the manner of this class and a portion operable to cut in a different manner. Such tools are referred to as "compound".
- (3) Note. Generally, the combination of cutting of this class (408) with noncutting work treatment will not be found in this class; but rather, will be found in the class of the other treatment or in a class providing for the combination. (See References to Other Classes, of this Class Definition and the search class notes hereunder for specific class lines.
- SEE OR SEARCH CLASS:
- 7, Compound Tools, for a randomly manipulated implement including a cutting edge for performing an operation of this class and including provision for performing a noncutting material treatment function.
- 29, Metal Working, subclass 26, for a machine including structure for performing a cutting function by a rotating, axially moving tool and including additional structure for performing another function, which other function is a material treatment other than cutting.
- 23** This subclass is indented under subclass 22. Device wherein the additional cutting device is adapted to operate on work turning about an axis.
- SEE OR SEARCH CLASS:
- 82, Turning, for a rotating or a nonrotating cutting tool acting on rotating work.
- 24** This subclass is indented under subclass 22. Device including more than one additional structure capable of performing a cutting operation of a type other than provided for in this class.
- 25** This subclass is indented under subclass 24. Device wherein each of at least two of the additional structures includes a cutting instrumentality that turns about an axis and acts to engage work with its surface(s) farthest from the axis about which it turns.
- 26** This subclass is indented under subclass 22. Device wherein the additional cutting structure include a cutting tool that turns about an axis and acts to engage work with its surface(s) farthest from the axis about which it turns.
- 27** This subclass is indented under subclass 26. Device wherein the work-engaging surface(s) of the additional cutting tool is at least in part of material that is either a natural crystal or is of the character of a natural crystal.

- (1) Note. The “natural crystal” of this subclass definition is not intended to include a stone shaped as a cutting tooth.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
145, for a crystalline cutting (or abrading) tool adapted to operate in the manner of this class (408).
- SEE OR SEARCH CLASS:
451, Abrading, for a machine including a crystalline cutting instrumentality combined with additional work cutting or abrading structure, provided no tool operates in the manner of this class, or for a single abrading instrumentality that moves in a manner than about an axis and along that axis relative to a workpiece. (Note that Class 451 has not been screened for art proper for Class 408.)
- 28** This subclass is indented under subclass 26. Device wherein the additional cutting instrumentality serves to cut all the way through a section of material to subdivide the material.
- 29** This subclass is indented under subclass 28. Device including a carriage for supporting the additional cutting instrumentality or including a work-supporting, advancing carriage, wherein the additional cutting instrumentality is adapted to slice through an entire cross-section of material at one stroke of the carriage supporting the instrumentality or of the work-supporting, advancing carriage.
- 30** This subclass is indented under subclass 22. Device wherein the additional cutting structure includes a cutting instrumentality that moves in a straight line toward the material to be cut and cuts that material in a single movement of the instrumentality by use of a cutting edge facing in the direction of tool movement.
- 31** This subclass is indented under the class definition. Device including a first and second tool, each tool being for the purpose of performing an operation of the class type, wherein the tools are separate from each other (i.e., they are not fixed together) during the cutting operation(s), and including a work-contacting structure which moves relative to the tools along their axes-of-rotation during operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
117+, for a similar device lacking work-contacting structure.
- 32** This subclass is indented under subclass 31. Device wherein the work-engaging structure serves to move the work in a direction lateral of at least one tool-axis and wherein the tool-supporting structure serves to move that tool such that there is not relative lateral motion of that tool and the work during the cutting operation thereof.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
55, for similar structure including the use of a single tool.
- SEE OR SEARCH CLASS:
83, Cutting, subclasses 284+, for a cutter of that class, having a component of motion in the direction of moving work.
- 33** This subclass is indented under subclass 32. Device either (1) including means to move the tool along the tool-axis toward the work and including means to move the work along the tool-axis toward the tool during the cutting operation; or, (2) wherein the first and second tools turn about a common tool-axis* during operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
36, for coaxial tools that do not move with work during operation.
- 34** This subclass is indented under subclass 32. Device including a plurality of work-supporting, work-engaging means for presenting independent portions of work to the tools.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
43+, for plural simultaneously operational tools adapted to successively engage plural workpieces.

- 35** This subclass is indented under subclass 31. Device including a turnable tool-carrying structure for a first and a second tool (or tool group) wherein the carrying structure about an axis to selectively present one or the other tool to operate on the workpiece.
- (1) Note. The first tool (or group of tools) of this subclass is not operational simultaneously with the second tool.
- (2) Note. Included herein are tools supported by a flexible belt or chain.
- SEE OR SEARCH CLASS:
483, Tool Changing, subclass 18 and 30+ for a rotary spindle machine tool combined with a tool transfer means for bodily transferring a tool to or from the spindle.
- 36** This subclass is indented under subclass 31. Device wherein the first and second tools turn about a common tool-axis during operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
33, for similar structure, wherein the tool-axis travels laterally with moving work.
- 37** This subclass is indented under subclass 36. Device wherein the tools are adapted to be positioned on opposite sides of the work along the common axis and, during the cutting operation, move relative to the work and toward each other along the axis.
- 38** This subclass is indented under subclass 37. Device including another tool that moves during its operation toward a point on the axis of the coaxial tools, which point is within the work, during the cutting operation of the tools.
- 39** This subclass is indented under subclass 37. Device including another plurality of tools that are also adapted to be positioned on opposite sides of work, along a second common axis which additional plurality of tools move along the second common axis to engage the work and perform a cutting operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
38, for structure meeting this definition, wherein the second common axis intersects the first.
- 40** This subclass is indented under subclass 37. Device including provision to relatively move first one, then the other of the opposing tools toward the work.
- (1) Note. This subclass is intended to include a pair of tools, both of which are fixed against axial motion and a work-supporting infeed means adapted to move the work, first toward one then toward the other of the tools.
- 41** This subclass is indented under subclass 37. Device including structure constructed to feed both of the tools toward the work at the same time.
- 42** This subclass is indented under subclass 31. Device including structure causing the relative approach of more than one tool and the work to occur at the same time so that a plurality of cutting operations takes place concurrently.
- 43** This subclass is indented under subclass 42. Device including more than one work-supporting surface for presenting more than one piece of work to different tools at the same time.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
34, for similar structure wherein the tool axis moves with the work during operation.
- SEE OR SEARCH CLASS:
409, Gear Cutting, Milling, or Planing, subclasses 221+ for a milling machine including an indexable work support.
- 44** This subclass is indented under subclass 43. Device including means to reposition either the work or the tools between cutting operations, such that a piece of work is presented first to one, then to another of the tools.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 70+, for means to present a succession of workpieces to a single tool.
 88+, for means to shift a tool position to present that tool to a succession of workpieces.
- 45** This subclass is indented under subclass 44. Device wherein the structure for presenting the work to the tools turns about an axis that extends in the same direction as at least one of the tool axes.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 71, for similar means to present a succession of workpieces to a single tool.
- 46** This subclass is indented under subclass 42. Device including means to allow the positional arrangement of one of the tools relative to another of the tools to be changed.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 88, for a tool that is shiftable relative to its support structure and relative to an opposing, work-engaging surface.
- 47** This subclass is indented under subclass 42. Device wherein one (or more) of the tools is caused to rotate by the action of an element which revolves so that any point thereon travels in a circular path within a plane normal to the tool-axis and no two points move in the same path, the driving force of the element being transferred directly to the tool or the tool-support by interengagement of a portion of the tool-support that is offset from the tool-axis with a portion of the element.
- (1) Note. The motion of the tool-driving means defined above is similar to that of a pencil writing the letter "O".
- 48** This subclass is indented under subclass 42. Device wherein rotary motion is transmitted to one (or more) tool either by (1) a driveshaft turning about an axis that intersects and is skewed with respect to the tool-axis, which driveshaft is rotatably connected to the tool at the point where the tool-axis and the drive-shaft-axis intersect so that rotary effort is transmitted from the driveshaft to the tool; or by, (2) a shaft-like member connected to the tool to rotate therewith, which shaft-like member is adapted to bend and transmit rotary effort from a driveshaft turning about an axis other than the tool-axis directly to the tool; wherein the means to apply rotary effort is capable of functioning over a range of tool-axis driveshaft-axis angles.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 127, for flexible drive means for driving a single tool.
- 49** This subclass is indented under subclass 42. Device including a base for supporting the entire device against gravity and including structure for moving the work along a tool-axis relative to the base, toward the tool during the cutting operation of that tool.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 62+, for similar infeed structure for moving the work toward a single tool.
- 50** This subclass is indented under subclass 42. Device including structure for either moving, guiding or otherwise influencing the path along which the material to be subjected to the cutting operation travels.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 45, for work advancing structure to sequentially present the work to different tools.
 69+, for means to influence the movement of work relative to a single tool.
- 51** This subclass is indented under subclass 42. Device with means engaging the work from the same side as the tool so that the work-engaging means tends to push the work along the tool-axis and away from the tool during the cutting operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 95+, for similar structure including a single tool and including a tool-opposing, work-engaging surface.

- 112, for similar structure including a single tool.
- 52** This subclass is indented under subclass 42. Device including structure to contact the work on the side directly opposite the side initially engaged by the operating cutting tool such that the work-contacting structure tends to resist movement of the work away from the tool, along the tool-axis during the cutting operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
87+, for similar structure, including a single tool.
- 53** This subclass is indented under subclass 31. Device with structure to support the tools so that the axes about which the tools turn extend in the same direction.
- 54** This subclass is indented under the class definition. Device with provision for causing the tool to engage the work during less than 360° and to thereby merely notch the work.
- 55** This subclass is indented under the class definition. Device with means to engage and move the work in a direction lateral of the tool-axis wherein tool-supporting structure serves to move the tool such that there is no relative lateral motion of the tool and the work during the cutting operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
32, for similar structure including the use of a plurality of tools.
- SEE OR SEARCH CLASS:
83, Cutting, subclasses 284+, for a cutter of that class, having of motion in the direction of moving work.
- 56** This subclass is indented under the class definition. Device including means for bringing a flowable substance temporarily into engagement with the work*, or product*, which substance may serve any purpose except treatment of the work or product in a manner provided for elsewhere.
- (1) Note. Application of a flowable medium to the cutting edge of a tool is considered to be application of the material to the work.
- (2) Note. Means to apply a vacuum in the vicinity of the work, causing the atmosphere to flow over the work is considered to be means to apply fluent medium to the work.
- (3) Note. The coating of work, other than as provided for herein, combined with a tool of this class will be found either in the appropriate class for the coating device, or in a class providing for the combination. (See References to Other Classes of this class definition for specific lines).
- 57** This subclass is indented under subclass 56. Device wherein the means to apply the flowable substance includes a closed, tubelike passageway through the tool* which is used to carry the flowable substance either to or away from the work.
- (1) Note. A tool, per se, having a passage therethrough which passage is intended for application of fluent medium to the work is proper for this subclass.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
204+, for a tool having a passageway to receive an undisturbed core of the workpiece.
207+, for a tool having a chamber for receiving chips produced by the cutting action of the tool.
- 58** This subclass is indented under subclass 57. Device wherein the means for causing a substance to flow serves to create, at an area, a pressure that is lower than the ambient pressure, so that any surrounding gas is moved toward that area by the ambient pressure.
- 59** This subclass is indented under subclass 57. Device wherein the tool has a cutting edge at its axial tip, and wherein the closed, tube-like passageway includes a port at the tip of the tool.

- (1) Note. The port of a passageway visible in an elevation taken along the tool-axis toward the tool is considered to be at the tip of the tool.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
204+, for a tool having a passageway extending to the tip thereof, which passageway is to receive an undisturbed core of the workpiece.
- 60** This subclass is indented under subclass 57. Device wherein the passageway through the tool terminates in an aperture specifically adapted to eject the flowable medium so that the medium flows beyond the aperture with no restriction, other than that impressed by inertia and/or gravity of the medium, into engagement with the work or the cutting edge of the tool.
- 61** This subclass is indented under subclass 56. Device having a passageway terminating in an aperture specifically adapted to eject the flowable medium so that the medium flows beyond the aperture with no restriction, other than that impressed by inertia and/or gravity of the medium, into engagement with the work or the cutting edge of the tool.
- 62** This subclass is indented under the class definition. Device including a base for supporting the entire device against gravity and active means to move or carry the work relative to the base, toward the tool, along the tool-axis during the cutting operation.
- (1) Note. Included herein is a work- infeed* means, per se; which, as disclosed, cooperates with a tool to perform an operation of this class (408) type.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
99+, for a tool, tool opposing work-engaging means and means to move the tool relative to the work-engaging means.
111, for a tool, work-engaging means and means to move the tool relative to the work-engaging means.
129+, for tool-infeed* means.
- 63** This subclass is indented under subclass 62. Device wherein the work-infeed means is forced to move by the action of a hydraulic or pneumatic prime mover.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
99, for structure of this class, including a fluid motor adapted to move a tool toward an opposing, work-engaging surface.
130, for similar structure including a fluid motor adapted to drive a tool.
702, for an art digest of pneumatic drive structure for use with a device of this class.
- 64** This subclass is indented under subclass 62. Device including a structure moving the infeed means which moving structure includes a surface adapted to contact the infeed means and move relative therewith to force the infeed means to function by a camming-type cooperation therewith.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
100+, for similar structure adapted to move a tool relative to an opposing work-engaging surface.
- 65** This subclass is indented under subclass 62. Device including structure for moving the infeed means, which moving structure includes a rigid element pivotally connected to the infeed means.
- 66** This subclass is indented under subclass 62. Device including structure for moving the infeed means which moving structure includes an annular digitated element interdigitating with ridges on the infeed means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
135, for gear driven tool-infeed means.
- 67** This subclass is indented under the class definition. Device including either means to move the product* means to contain the product, or product guiding means moving relative to the tool during operation.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 200, for chip-guiding structure that partakes of all motion of the tool during operation.
 207, for a tool or tool with support wherein a portion that partakes of all motion of the tool during operation is a product-receiving chamber.
- 68** This subclass is indented under subclass 67. Device including means to move the product off of or out of the tool.
- (1) Note. A stationary device used to block movement of the product as a tool moves is not considered to be a product handling means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 95+, for a presser-foot similar to structure found herein combined with a tool-opposing work-engaging surface, but for purposes other than ejecting a product from the tool.
 112, for structure similar to the ejector of this subclass, but for other purposes.
- 69** This subclass is indented under the class definition. Device including structure for either moving, guiding or otherwise influencing the transportation of the work* from a position remote from the tool to a second position nearer than the first to the tool, or including structure for supporting the work in the vicinity of the tool and additional means to engage the work and move the work relative to the tool and work-supporting structure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 49, for similar structure including plural, simultaneously operational tools.
 89+, for structure including a work-support shiftable about an axis from a first to a second position, both of which positions are within the vicinity of the tool.
 91, for structure including a work-support shiftable rectilinearly from a first to a second position, both of which positions are in the vicinity of the tool.
- 70** This subclass is indented under subclass 69. Device including means to cause the work to move step-by-step from a first position remote from the tool, to a second position remote from the tool, and on to a third position.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 44+, for similar structure adapted to sequentially present work to a plurality of tools.
- SEE OR SEARCH CLASS:
 409, Gear Cutting, Milling, or Planing, subclasses 221+ for a milling machine including an indexable work support.
- 71** This subclass is indented under subclass 70. Device wherein the moving means is fixed to pivot about an axis so that the work that it moves turns about that axis as it is advanced toward the tool-station.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 44+, for similar structure adapted to present work to a plurality of tools.
- 72** This subclass is indented under the class definition. Device with a tool or tool-supporting or guiding structure and structure adapted to contact the work.
- (1) Note. The work-contacting structure of this and the subclasses indented hereunder usually serves to define a kinematic relationship between the tool and the work.
- (2) Note. The tool-supporting or guiding structure and the work-contacting structure may be fixed together to function as a single unit. (See especially subclass 115 and this, the outdent, subclass).
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 241, for a tool-guiding jig (or "Drill Bushing") lacking a work-contacting surface.

- 73** This subclass is indented under subclass 72. Device including a tool, tool-supporting structure, provision to secure the tool in a position to perform a cutting operation of the class type, and means to cause the securing provision to become ineffective so that the tool can move relative to the tool-supporting structure and relative to the work into an inoperative position; wherein the means to cause the securing provision to become ineffective includes a surface adapted to contact the work and thereby cause the means to function.
- (1) Note. The securing provision of this subclass includes a moving means as well as a means to permit movement of the tool.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 8+, for similar structure including "control" means.
- 142, for structure to secure to a tool in position, having means to release the tool in response to movement of a splined shaft relative to the tool.
- 148+, for structure to secure a tool in position, having means to release the tool according to relative movement of machine parts.
- SEE OR SEARCH CLASS:
- 407, Cutters, for Shaping, for a tool or tool-assembly adapted to perform a cutting function while moving radially.
- 409, Gear Cutting, Milling, or Planing, for a cutting machine including a cutting tool which performs a cutting function while moving radially.
- 74** This subclass is indented under subclass 73. Device wherein the work-contacting surface that serves to cause the securing provision to become ineffective abuts the work at the tool-axis*.
- 75** This subclass is indented under subclass 72. Device including means adapted to be in the tool-support prior to the cutting operation so that the device can be precisely positioned, which means is to be removed from the tool-support so that the tool can be positioned therein to function in the cutting operation.
- 76** This subclass is indented under subclass 72. Device wherein the work is attracted to the work-engaging means by either, (1) the action on ferrous work of aligned molecules in the additional means; or, (2) by the reduction of atmospheric pressure in restricted areas between the work-engaging surface and the work to cause the work to be urged toward the surface by atmospheric pressure acting on other areas of the work.
- 77** This subclass is indented under subclass 72. Device wherein the work-contacting structure includes an annular member rotatably connected to the device at the central axis of the member, and adapted to rest upon the work to sustain thereupon at least a substantial portion of the device against gravity during the cutting operation.
- (1) Note. The annular work-contacting structure of this subclass is normally used to support and transport the device when the device is not being used to perform an operation of this class type.
- (2) Note. This subclass is to receive cross-reference copies of portable, wheel-supported cutting machines wherein the wheels are not resting on the work at the time when the cutting operation is taking place.
- 78** This subclass is indented under subclass 77. Device wherein the central axis about which the annular member rotates extends in the same direction as the tool-axis* during the cutting operation.
- 79** This subclass is indented under subclass 72. Device wherein the work-contacting structure is adapted to be received by a passageway through or a recession in the surface of the work so that the work-contacting structure may contact the wall of the passageway or the recession to stabilize a portion of the device relative to the work.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 93+, for a structure that passes through a passageway in the work to secure a tool-opposing, work-engaging means

to the device, wherein there is no disclosure of stabilization of the structure caused by engagement with the walls of the passageway.

80 This subclass is indented under subclass 79. Device wherein the work-contacting means is adapted to contact the wall of a cylindrical opening in the work, the axis of which opening is co-extensive with the tool-axis.

81 This subclass is indented under subclass 80. Device wherein the cutting tool is adapted to engage and modify characteristics of the passageway or recession contacted by the additional work-contacting means.

- (1) Note. The work-contacting means of this subclass may contact the wall of the passageway or recession at a point remote from the operating tool.

82 This subclass is indented under subclass 81. Device wherein the work-contacting structure is adapted to contact the wall of the passageway at a point that will be later subjected to the cutting action if the tool is allowed to continue to progress.

83 This subclass is indented under subclass 81. Device wherein the work-contacting structure is adapted to contact the wall of the passageway at a point that has been subjected to the cutting action of the tool, wherein the radius of the wall of the cylindrical opening contacted by the work-contacting means is the same as the radius being cut by the tool.

83.5 Valve fitting:

This subclass is indented under subclass 80. Apparatus comprising structure particularly adapted to cut a shape on a workpiece to serve in cooperation with an opposing surface to selectively permit passage of fluid therebetween.

84 This subclass is indented under subclass 72. Device wherein the work-contacting structure includes a surface similar to the inside of a cone, which surface is specifically adapted to receive a projecting portion of the work to align that portion of the work relative to the device.

- (1) Note. The “conical” surface of this subclass is not necessarily circular in cross-section. However, it must be three-dimensional. For example, a simple notch adapted to align a rod is not considered to be similar to a cone.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 110+, for a tool combined with a relatively movable work-engaging surface which may have a notch therein to align a rod.

85 This subclass is indented under subclass 72. Device in which the work-contacting structure penetrates the work surface at a point which has not been previously modified.

- (1) Note. The work-penetrating structure of this subclass is not to be confused with the device of Class 83, Cutting, or the device of Class 72, Metal Deforming. To be placed herein, the penetrating means must solely facilitate the securing or aligning of a cutting instrumentality relative to work and the depression formed must be unused at any other time for any other purpose.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 195, for means to “form” a recession in the work that is not separate from the tool or the tool-support, wherein the tool is positionable relative to the tool-support.
208, for a tool of this class including a lead screw adapted to “form” a recession in the work, a product-receiving chamber, and a cutting edge.
214, for a tool of this class including a material penetrating lead screw and a cutting edge.

86 This subclass is indented under subclass 85. Device wherein the work-contacting structure penetrates the work-surface at the tool-axis*.

87 This subclass is indented under subclass 72. Device wherein the work-contacting structure is positioned to contact the work on the side directly opposite the side initially engaged by

the operating cutting tool such that the work-contacting structure tends to resist movement of the work away from the tool, along the tool-axis during the cutting operation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

52, for a tool-opposing, work-engaging surface that is part of a structure of this class including a plurality of tools.

88 This subclass is indented under subclass 87. Device including a base for supporting the device and structure for allowing the device to be modified in such a way that the axis about which the tool turns during the cutting operation is relocated relative to the base.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

35, for means to carry a plurality of tools and to selectively present one or another of the tools to the work.

46, for means to reposition one of a plurality of simultaneously operational tools.

89+, for structure including means for shifting the work-contacting structure about an axis relative to the tool-axis where it is not clear if the tool-axis or the work-engaging structure is shifted.

91, for structure including means for shifting the work-contacting structure laterally relative to the tool-axis where it is not clear if the tool-axis or the work-engaging structure is shifted.

99+, for an axially moving tool loosely mounted and freely positionable in a work-contacting structure, the work-contacting structure serving to merely counteract the thrust of the tool against the work and support only that part of the tool-supporting structure transmitting thrust thereto.

89 This subclass is indented under subclass 87. Device including structure allowing the work-contacting structure to be pivoted relative to the tool, about an axis.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

71, for similar structure adapted to support a workpiece and move it, in a support, to bring the workpiece about an axis from a remote position to a position to be engaged by the tool.

90 This subclass is indented under subclass 89. Device wherein the axis about which the work-contacting structure is allowed to pivot extends in the same direction as the tool-axis.

91 This subclass is indented under subclass 87. Device including structure allowing the tool-opposing work-contacting structure to be moved, relative to the tool, in a direction other than parallel to the tool-axis.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

70+, for similar structure adapted to support a workpiece and move it, in a support to bring the workpiece from a remote position to a position to be engaged by the tool.

92 This subclass is indented under subclass 87. Device wherein the tool-opposing work-contacting surface is constructed either of plain material or of a plurality of interconnected links and is connected to tool guiding or supporting structure at the lateral extremities thereof.

93 This subclass is indented under subclass 87. Device for modifying the bore of a previously existing passageway through the work wherein the work-contacting structure is secured to other parts of the device by means extending into and beyond the passageway.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

80+, for similar structures wherein the securing structure or the work-contacting structure is specifically adapted to frictionally engage the side wall of the passageway.

94 This subclass is indented under subclass 93. Device having an additional work-contacting structure adapted to cooperate with the first

work-contacting structure to grip the work therebetween, wherein the first work-contacting structure engages the work on the side opposite the direction of tool approach resisting movement of the work away from the tool and the second work-contacting structure engages the work on the side initially engaged by the operating tool urging the work away from the operating tool to grip the work between the first and second work-contacting structures.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

95+, for similar structure wherein the tool-opposing surface is connected to the tool than through the passageway being enlarged by the tool.

- 95** This subclass is indented under subclass 87. Device with a second work-contacting structure to engage the work from the same side as the tool so that this second work-contacting structure tends to push the work along the tool-axis, away from the tool and toward the first work-contacting structure during the cutting operation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

51, for a presser-foot used with a plurality of tools.
 68, for a presser-foot adapted to fraction to move the product away from the tool.
 94, for structure including a tool opposing work-engaging structure and a presser-foot connected together through the opening being enlarged by the tool.
 103+, for other cooperating, work-gripping surfaces wherein neither is in tool-opposing position.

- 96** This subclass is indented under subclass 95. Device wherein the second work-contacting means includes a surface for engaging the work in the vicinity of the tool-axis as the tool sweeps in a circle extending radially beyond the second work-contacting structure and wherein the tool is void of a cutting edge in the vicinity contacted by the second work-contacting structure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

68, for a presser-foot encompassed by the tool, wherein the presser-foot also serves to eject a piece of product out of the confines of the tool.

- 97** This subclass is indented under subclass 95. Device including a tool-encircling structure advanced of any tool-driving structure along the tool-axis, which encircling structure is adapted to slidingly engage the tool and thereby restrict the tool from moving or flexing laterally.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

72, for nonadjustable structure that is similar to the device found herein, but lacking a tool-opposing work-engaging structure.
 115, for adjustable structure that is similar to the device found herein, but lacking a tool-opposing work-engaging structure.
 241, for similar structure lacking any work-engaging structure.

- 98** This subclass is indented under subclass 95. Device supported by structure adapted to rest on a generally stationary surface remote from the tool during operation.

- 99** This subclass is indented under subclass 87. Device including structure to cause relocation of the tool with respect to the work-contacting structure in the direction parallel with the tool-axis.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

62+, for similar structure, including a machine-supporting base and means to move the work, relative to the base, toward the tool, along the tool-axis.
 92, for similar structure wherein the tool-opposing work-contacting structure is flexible or concatenated.
 111, for similar structure having a work-contacting surface that does not oppose the tool.

- 129+, for tool-moving structure lacking a work-engaging means in addition to the tool.
- 100** This subclass is indented under subclass 99. Device wherein the structure for causing relocation includes a surface adapted to contact either tool or work-contacting means and move relative thereto to cause relocation by a camming or wedging cooperation therewith.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
64, for similar structure adapted to move work toward a tool and relative to a base caring operation.
- 101** This subclass is indented under subclass 100. Device wherein the camming means includes a helically disposed inclined plane rotatable about an axis in alignment with the tool-axis.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
137, for a screw used to drive a tool to move axially in the absence of a work-contacting structure.
- 102** This subclass is indented under subclass 87. Device including a helically ribbed tool or tool-support adapted to interfit with nonrotating structure of the frame of the machine supporting the entire assemblage so that the tool moves axially relative to the nonrotating structure and the work-engaging structure as it rotates to perform a cutting function.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
138, for similar structure lacking work-engaging means in addition to the tool.
- 103** This subclass is indented under subclass 72. Device including structure for supporting a pair of surfaces and means to move one of the surfaces toward the other to grippingly contact a workpiece held therebetween.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
95+, for a device including work gripping surfaces wherein one surface of the pair is a tool-opposing surface.
- 104** This subclass is indented under subclass 103. Device wherein the work-contacting surfaces are shaped to grip cylindrical work and hold that work so that the cylindrical axis thereof is in substantial alignment with the tool-axis.
- 105** This subclass is indented under subclass 104. Device including means to move both of the work-contacting surfaces simultaneously toward each other.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
108, for oppositely moving clamps adapted to grip other than coaxially.
- 106** This subclass is indented under subclass 105. Device including more than two surfaces having means to cause them to simultaneously move to converge upon and grip the cylindrical workpiece.
- 107** This subclass is indented under subclass 104. Device wherein the work-contacting surfaces are supported by structure adapted to rest on a generally stationary surface, remote from the tool during operation.
- 108** This subclass is indented under subclass 103. Device including means to move both of the work-contacting surfaces simultaneously toward each other.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
105+, for oppositely moving clamps adapted to grip round work.
- 109** This subclass is indented under subclass 103. Device including means to permit the structure supporting the work-contacting surfaces to be repositioned laterally relative to the tool-axis.
- 110** This subclass is indented under subclass 72. Device including means to support the tool while permitting the tool to rotate relative thereto, which supporting means is fixed to travel axially with the tool as the tool travels relative to the work-contacting structure and the work.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 92, for similar structure combined with a work-encircling flexible or concatenated member.
- 111** This subclass is indented under subclass 110. Device including structure to cause relocation of the tool with respect to the work-contacting structure in the direction parallel to the tool-axis.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 62+, for tool-moving structure including a machine supporting base and means to move the work relative to the base toward the tool along the tool-axis.
 99+, for tool-moving structure combined with a tool-opposing, work-engaging surface.
 129+, for similar structure lacking a work-contacting surface in addition to the tool.
- 112** This subclass is indented under subclass 110. Device including yieldable means adapted to urge the tool along the tool-axis in the direction away from the work during the cutting operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 51, for means to bias work away from a plurality of simultaneously acting tools.
 68, for means to bias work away from a tool and eject the product of the cutting operation away from the tool.
 95+, for a biased presser foot combined with a tool and a tool-opposing work-engaging surface.
- 113** This subclass is indented under subclass 72. Device including means to axially secure the work-contacting structure to the tool while permitting relative rotation therebetween so that for any axial advance of the tool, there is equal axial advance of the work-contacting surface.
- 114** This subclass is indented under subclass 113. Device wherein the portion of the work-contacting structure that meets the work is gener-
- ally planar and is positioned such that one dimension thereof extends in the same direction as the tool-axis.
- 115** This subclass is indented under subclass 72. Device including a tool-encircling structure advanced of any tool-driving structure along the tool-axis, which encircling structure is adapted to slidingly engage the tool and thereby restrict the tool from moving or flexing laterally, which device includes provision to permit the work-contacting structure to be repositioned relative to the tool-encircling structure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 72, for similar structure lacking provision for adjustment.
 97, for similar structure including a tool-opposing, work-engaging surface,
 241, for a tool-guiding jig (or “drill-bushing”) lacking a work-contacting surface.
- 116** This subclass is indented under the class definition. Device including structure specifically provided to receive means for determining and designating a characteristic of the device, work or product.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 16, for the combination of a device of this class type with an indicator.
- 117** This subclass is indented under the class definition. Device including structure adapted to sustain a plurality of separately formed tools, consisting of (1) a plurality of tools of this class type adapted to operate simultaneously, which are not fixed to move together during the cutting operation; or, (2) a plurality of independent tools adapted to be used separately.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 31+, for a complete machine (i.e., work-supporting structure in combination with tool-supporting structure, including a plurality of tools.
 188+, for a device having a tool that is movable about an axis to expose different areas of the tool, which areas are to be

used in the cutting operation, wherein only one cutting station is operatable at a given time.

118 This subclass is indented under subclass 117. Device wherein separately formed tools are mounted to simultaneously turn about a same tool-axis, which tools are not fixed to move together during the cutting operation.

119 This subclass is indented under subclass 118. Device including resilient means urging the tools to move together along the tool-axis.

120 This subclass is indented under the class definition. Device including a tool or a tool-support and means fixed thereto, including means for supplying torque to the tool, and including means located between the tool and the means for supplying torque thereto for locking the tool to the torque-supplying means when torque is supplied in one direction, which locking means is inoperative for transmitting torque when attempt is made to transmit torque in the opposite direction.

SEE OR SEARCH CLASS:

81, Tools, subclasses 60+, for ratchet structure of general utility, especially ratchet structure adapted to rotate a wrench or screwdriver.

121 This subclass is indented under subclass 120. Device including means acting to urge the tool along the tool-axis toward the work.

(1) Note. A resilient member may be considered to "urge the tool" as required herein.

(2) Note. A ratchet type, torque-applying means combined with means to apply thrust will be found herein, even if the device would otherwise be considered to be torque applying ratchet of general utility such as is found in Class 81, subclasses 60+.

122 This subclass is indented under subclass 121. Device including provision to allow the locking means to be operative to transmit torque selectively in either direction (and correspondingly to be inoperative in the respective opposite direction).

(1) Note. A ratchet device that is simply turned over to reverse the output is not considered proper for this subclass.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

123, for a reversible ratchet without a thrust-applying means.

122.5 This subclass is indented under subclass 121. Device including additional provision to cause the torque-supplying means to continue to act on the tool in the same direction when the supplying means is moved in the reverse direction.

123 This subclass is indented under subclass 120. Device including provision to allow the locking means to be operative to transmit torque selectively in either direction (and correspondingly to be inoperative in the respective opposite direction).

(1) Note. A ratchet device that is simply turned over to reverse the output is not considered proper for this subclass.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

122, for a reversible ratchet combined with thrust-applying means.

124 This subclass is indented under the class definition. Device including tool-sustaining structure and means to move the tool axially and/or to rotate the tool against the work during the cutting operation wherein the moving means comprises either (1) structure that moves relative to the tool and relative to the tool-sustaining structure, or comprises (2) resilient stored energy means, electrical (e.g., magnet or solenoid) means, or hydraulic means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

17, for drive structure particularly adapted to transmit to the tool reciprocating motion of increasing stroke length or of changing datum such that the tool is progressively advanced toward the work.

- 125** This subclass is indented under subclass 124. Device including a tool having a particular, claimed structure for performing an operation of this class type.
- (1) Note. Because of the placement of this subclass, it serves as a filter through which only drive means brought into this class by machine-frame* structure may pass. (See the lines between this class and classes of drive structure expressed in References to Other Classes of the definition of this class).
- 126** This subclass is indented under subclass 124. Device wherein the means to drive the tool includes first and second rotatable members, each of which has a generally uniform surface of revolution, wherein the first member is supplied with rotary effort and the second member is connected to the tool, the two members being adapted to engage each other at a portion of their respective surfaces of revolution to transmit rotary effort from the first to the second (and thereby to the tool) in proportion with the pressure applied to force the surfaces into engagement with each other.
- 127** This subclass is indented under subclass 124. Device including either (1) a driveshaft turning about an axis that intersects and is skewed with respect to the tool-axis, which driveshaft is rotatably connected to the tool at the point where the tool-axis and the driveshaft-axis intersect so that rotary effort is transmitted from the driveshaft to the tool; or including (2) a shaft-like member connected to the tool to rotate therewith, which shaft-like member is adapted to bend and transmit rotary effort from a driveshaft turning about an axis other than the tool-axis directly to the tool; wherein the means to apply rotary effort is capable of functioning over a range of tool-axis/driveshaft-axis angles.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
48, for flexible drive structure for plural tools, combined with work-contacting structure.
- 128** This subclass is indented under subclass 124. Device wherein the tool driving structure includes an annular drum rotatable about an axis and includes an endless, flexible band adapted to be wrapped about the drum to transmit rotary effort from a remote rotating body to the drum by frictional engagement therewith.
- (1) Note. Because of the particular relationship of the band and drum of the device in this subclass, it is deemed that a device including a specific drum combined with a band that is merely implied is proper for placement in this subclass.
- 129** This subclass is indented under subclass 124. Device including structure to cause relocation of the tool in the direction parallel with the tool-axis.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
62+, for work-infeed* means similar in construction to the device of this subclass.
99+, for drive structure combined with a tool-opposing, work-engaging means.
111, for means to drive a tool along the tool-axis, combined with work-engaging means other than the tool.
- 130** This subclass is indented under subclass 129. Device wherein the structure to cause relocation of the tool includes a motor driven by hydraulic or pneumatic pressure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
63, for work-infeed means driven by a fluid motor.
124, for fluid means to cause a tool to rotate.
702, for a digest specific to pneumatic drive means.
- 131** This subclass is indented under subclass 129. Device including frame structure for supporting the tool and tool-drive structure against gravity and including provision to allow the tool to be selectively shifted relative to the frame, in a direction other than parallel to the tool-axis, so that the tool-axis is relocated.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 88, for a laterally adjustable tool combined with tool-opposing work-engaging surface.
 234+, for adjustable machine frame structure lacking tool-drive means.
- SEE OR SEARCH CLASS:
 144, Woodworking, for a device wherein a tool is shifted laterally during the cutting operation and wherein the material cut is wood.
 409, Gear Cutting, Milling, or Planing, for structure including a tool shifted laterally during the cutting operation, generally.
- 132** This subclass is indented under subclass 129. Device including means for transmitting rotary effort to a driven shaft from a driving shaft, the transmitting means including a first part fixed to move with the driven shaft and a second part fixed to move with the driving shaft, the parts being arranged to selectively be connected together, so that rotary effort can selectively be transmitted from the driving shaft to the driven shaft.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 139+, for structure of this class including a torque-applying clutch.
- 133** This subclass is indented under subclass 132. Device including an input means connected to a remote source of power and an output means adapted to transmit power from that source to the tool, wherein the drive means includes provision to change the velocity of the output means without a corresponding change in velocity of the input means.
- (1) Note. An “input” means is any moving part of a device to which power is applied; whereas an “output” means is any moving part of that device from which power is supplied to another device; therefore, the “output” of one device may be the input of the other device.
- 134** This subclass is indented under subclass 132. Device including provision to cause the means for transmitting rotary effort selectively to be triggered to function in accord to the position of the tool along the tool-axis.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 9, for similar structure including control means.
- 135** This subclass is indented under subclass 129. Device wherein the tool or a portion of the tool-support includes an elongate, transversely grooved surface that is parallel with the tool-axis; which device includes a member rotatable about an axis generally parallel to the undulations of the grooved surface, having ribs adapted to interdigitate with the grooves of the surface of the tool or tool-support in order to cause infeed of the tool in reaction to rotation of the ribbed member.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 66, for gear driven work-infeed* means.
- 136** This subclass is indented under subclass 129. Device including a generally elongated member having a portion at one end thereof adapted to be engaged by and receive force from the hand or foot of an operative, a portion at the other end of the member adapted to engage and receive force from the frame of the machine, and including a third portion intermediate the other two portions adapted to move the tool responsive to the applied forces.
- 137** This subclass is indented under subclass 129. Device wherein the structure which moves relative to the tool and relative to the tool-sustaining structure for causing relocation is rotatable about an axis in alignment with the tool-axis and includes a helically disposed, inclined surface adapted to contact either the tool or tool-sustaining structure and move relative thereto to cause relocation by a camming or wedging cooperation therewith.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
101, for a drive screw coaxial with the tool, combined with a tool-opposing work-engaging surface.
- 138** This subclass is indented under the class definition. Device including a helically-ribbed tool or tool-support adapted to interfit with nonrotating structure of the frame of the machine supporting the entire assemblage so that the tool moves axially relative to the nonrotating structure as it rotates to perform a cutting function.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
102, for similar structure including a tool-opposing, work-engaging surface.
- 139** This subclass is indented under the class definition. Device including a tool or a tool-support combined with means for transmitting rotary effort to the tool from a driving shaft that is coaxial with the tool, the transmitting means including a first part fixed to move with the tool and a second part fixed to move with the driving shaft, the parts being arranged to selectively be connected together, so that rotary effort can selectively be transmitted from the driving shaft to the tool.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
124+, for similar structure wherein the tool-axis and the axis of the driving shaft are not coextensive.
129, for a torque-applying clutch combined with tool-drive means.
- 140** This subclass is indented under subclass 139. Device wherein the first and second parts include generally planar surfaces that abut so that they yieldably rub against each other to transmit rotary effort, the rotary effort transmitted being proportional to the pressure used to force the part into abutment.
- 141** This subclass is indented under the class definition. Device including a tool or tool-support combined with means for transmitting rotary effort to the tool from a driving shaft that is coaxial with the tool, the transmitting means including a rib, groove, or pin in either the tool-support or the driving shaft extending parallel to the tool-axis and including means on the other element to slidably interengage therewith, so that the shaft and tool-support are rotatably fixed together, but axially movable, one relative to the other.
- 142** This subclass is indented under subclass 141. Device including means actuated by movement of the driving shaft and the tool-support, the actuated means serving to permit the tool to move relative to the tool-support and out of operative relationship with the work.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
73+, for similar means actuated by contact with the work.
148+, for similar means actuated relative movement of machines parts.
- 143** This subclass is indented under the class definition. Device including structure to sustain a tool against gravity and partake of substantially all of the tool motion during the cutting operation and including either (1) means to impart to the tool a vibration characteristic different from that vibration characteristic imparted by the reaction of the tool and work, such that the resultant vibration characteristic of the tool is less than that imparted by the reaction of the tool and work, or (2) means specifically to absorb the energy of a vibrating tool.
- (1) Note. The purpose of the device of this subclass is to reduce or eliminate resultant vibration of the tool.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
17, for a tool-carrier with means to cause the cutting edge of the tool to vibrate progressively toward the work.
- 144** This subclass is indented under the class definition. Device including a tool composed of a plurality of particularly recited materials.
- (1) Note. This subclass is intended to serve as the locus of devices including a tool for performing an operation of this class type, which tool is constructed of a plurality of materials which may be secured

together by releasable means, bonded together, or welded together so that the resultant properties of such a composite tool are considered to be better than those of a tool made of a single material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

713, for a digest of tools having a detachable cutting edge, which may be of different material than the tool body.

145 This subclass is indented under the class definition. Device including a tool, the cutting edge of which is at least in part of material that is either a natural crystal or is the character of a natural crystal.

(1) Note. The “natural crystal” of this subclass definition is not intended to include a stone shaped as a cutting tooth.

SEE OR SEARCH CLASS:

451, Abrading, for a machine including a crystalline cutting instrumentality other than as provided for in the definition of Class 408. (Note that Class 451 has not been screened for art proper for Class 408.)

146 This subclass is indented under the class definition. Device including structure to sustain a tool against gravity during the cutting operation, and mechanical means to displace the tool and hold the tool in position relative to the sustaining structure.

(1) Note. It is to be understood that the “means to move” of this subclass requires merely that the structure reasonably may be utilized to force a tool to move relative to a tool-support.

(2) Note. A simple spring or gravity-type tool-urging device is not considered to be “means to move” as required herein.

SEE OR SEARCH CLASS:

409, Gear Cutting, Milling, or Planing, for a machine including a rotating cutter that is moved laterally and/or radially of the tool-axis during operation.

147 This subclass is indented under subclass 146. Device wherein the mechanical means serves to displace the tool so that the cutting edge thereof is moved toward or away from the tool-axis.

148 This subclass is indented under subclass 147. Device including structure for moving the tool radially, structure for locking the tool in an extended (i.e., operatable) position and, including provision to release the locking means in response to the occurrence of an anticipated condition.

(1) Note. In most of the patents herein the tool or the tool-moving means is resiliently biased against the locking device by a spring adapted to move the tool out of operative position upon movement of the device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

4, for locking structure similar to that found herein, but for interlocking one machine member and then releasing that member in response to the position of another machine element.

5+, for means for sensing condition and provision to terminate operation of a machine in response thereto.

8+, for control means energized by a detector.

149 This subclass is indented under subclass 148. Device including provision to activate the structure for locking the tool and provision to release the locking structure wherein the activating provision and the releasing provision are separate and independently operating, so that the operation of either does not bring about a corresponding operation of the other.

150 This subclass is indented under subclass 147. Device wherein the tool is secured to the tool-sustaining structure so that actuation of the displacing means causes the tool to be moved relative to the tool-sustaining structure about an axis parallel to, but not concentric with the tool axis.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 159, for similar structure wherein the tool is displaced by the action of an axially slidable means and wherein the tool is displaced about an axis that is not parallel to the tool-axis.
- 180, for similar structure wherein the axis about the tool is displaced not parallel to the tool-axis.
- 187+, for similar structure lacking means to displace the tool.
- 151** This subclass is indented under subclass 150. Device including, in addition to the tool-sustaining and tool-displacing means, provision to permit the tool to be positioned relative to the tool-support.
- 152** This subclass is indented under subclass 147. Device wherein the tool or a portion of the tool-support contacting the tool includes an elongate, transversely grooved surface; which device includes a member rotatable about an axis generally parallel to the undulations of the grooved surface, having ribs adapted to interdigitate with the grooves of the surface of the tool or tool-support in order to cause the tool to move radially in reaction to rotation of the ribbed member.
- 153** This subclass is indented under subclass 147. Device in which the displacement of the tool is caused either (1) by a member comprising a first and a second face, the faces meeting at an acute angle, adapted to be actuated substantially parallel to the first face, so that a tool slidably engaging the second face is displaced; (2) by a member having a helically-ribbed surface rotatable relative to a cooperating surface so that the ribbed surface and the cooperating surface are relatively displaced along the axis about which the helically ribbed surface rotates; whereby, a tool connected to one of the surfaces is displaced; or, (3) by a member which oscillates or rotates relative to the tool about a center and carries a surface composed of fixed points of varying distance from the center, which surface imparts motion to a follower in contact therewith, which motion varies in accordance with the varying distances of the fixed points on the surface from the center of the member.
- 154** This subclass is indented under subclass 153. Device including an element adapted to yield without exceeding the elastic limit thereof, which element is operatively connected to the tool to project said tool in opposition to said displacing means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 714, an art digest, for similar structure lacking means to move the tool radially, but including resiliently yieldable structure to allow the tool to move relative to tool-support structure or relative to other portions of the tool.
- 155** This subclass is indented under subclass 154. Device wherein said tool is inwardly urged against the displacing means by an annular, tool-encompassing, resilient means which restrains said tool against radial expansion.
- 156** This subclass is indented under subclass 154. Device wherein the resilient member is a flexible portion of the tool or tool-support.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 714, an art digest, for a resilient tool lacking tool moving means.
- 157** This subclass is indented under subclass 153. Device including a pair of cutting tools, each mounted to be displaced radially outwardly from the tool-axis and axially toward the work, which tools are interconnected so that movement of one of the tools is accompanied by a similar movement of the other tool.
- 158** This subclass is indented under subclass 153. Device wherein the displacing member is actuated to move in a direction parallel to the tool-axis.
- (1) Note. The displacing member provided for in this subclass may rotate relative to the tool as it moves along the tool-axis, but otherwise is not to move other than parallel to the tool-axis.
- 159** This subclass is indented under subclass 158. Device wherein the tool is secured to the tool-sustaining structure so that actuation of the

- tool-displacing means causes the tool to be moved about an axis relative to the tool-sustaining structure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 150, for similar structure wherein the tool is displaced about an axis that is parallel to the tool-axis.
- 180, for similar structure wherein the tool is displaced by means other than an axially slidable moving means.
- 187+, for a pivotable tool lacking means to displace the tool relative to the sustaining means.
- 160** This subclass is indented under subclass 158. Device wherein the displacing member includes a plurality of successive inclined surfaces adapted to correspond and coact with oppositely inclined surfaces on the tool to effect displacement of said tool.
- 161** This subclass is indented under subclass 158. Device including means to actuate the displacing member comprising a helically ribbed element adapted to mesh with helical grooves in the tool-support or in the displacing member so that rotation of the ribbed element relative to the grooved member serves to move the displacing member relative to the tool-support.
- 162** This subclass is indented under subclass 161. Device wherein the helically-ribbed element is adapted to turn about an axis that is parallel to, but not concentric with the tool-axis.
- 163** This subclass is indented under subclass 161. Device wherein said mechanism for displacing the tool comprises a ring member concentric with the tool-axis embracing the tool, adapted for movement along the tool-axis relative to the tool-sustaining structure to contact the tool with an inclined surface on the ring member and move the tool radially.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 172, for similar structure wherein the ring member is displaced by means other than a helically-ribbed element.
- 164** This subclass is indented under subclass 163. Device including a second ring member of structure and function similar to the first, which second ring member is adapted to simultaneously engage the same cutter in a different position along the tool-axis from the first ring member.
- 165** This subclass is indented under subclass 164. Device including, in addition to the ring members, a mandrel movable along the tool-axis having a tapered surface adapted to engage a cooperating surface of the tool and urge the tool toward the inclined surfaces of the ring members.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 168, for similar structure including a traveling wedge but lacking axially-spaced tool-retaining wedge collars.
- 166** This subclass is indented under subclass 164. Device wherein the tool is provided with a recess to receive the ring member as the ring member moves axially into engagement with the tool.
- 167** This subclass is indented under subclass 164. Device wherein one of the ring members is provided with a secondary ring member in contact therewith and adapted to displace the primary ring member along the tool-axis.
- 168** This subclass is indented under subclass 161. Device wherein the tool-displacing member is a mandrel movable along the tool-axis including a tapered surface adapted to engage a cooperating surface of the tool and to thereby displace the tool radially.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 165, for a traveling wedge cooperating with axially-spaced wedge collars.
- 169** This subclass is indented under subclass 168. Device wherein the axially- movable mandrel is shaped to conform to the shape of the tool so that a portion thereof interdigitates with a portion of the tool to restrict relative motion therebetween to motion along the tapered surface of the mandrel.

- 170** This subclass is indented under subclass 169. Device wherein the portion of the tool or mandrel which serves to restrict relative motion therebetween is detachable from both the tool and the mandrel.
- 171** This subclass is indented under subclass 168. Device wherein said displacing member includes a helically-grooved extension adapted to cooperatively mesh with a helically-ribbed actuating element or with a helically-ribbed portion of the tool-support so that relative rotation of the cooperatively meshing parts serves to move said displacing member.
- 172** This subclass is indented under subclass 158. Device wherein said mechanism for displacing the tool comprises a ring member concentric with the tool-axis embracing the tool, adapted for movement along the tool-axis relative to the tool-sustaining structure to contact the tool with an inclined surface on the ring member and move the tool radially.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
163+, for similar structure wherein the ring member is displaced by a helically-ribbed element.
- 173** This subclass is indented under subclass 153. Device in which displacement of the tool is caused by a member which oscillates or rotates relative to the tool about a center and carries a surface composed of fixed points of varying distances from the center, which surface imparts motion to follower in contact therewith, which motion varies an accordance with the varying distances of the fixed points on the surface from the center of the member.
- 174** This subclass is indented under subclass 173. Device wherein the displacing member turns about the tool-axis and carries first and second surfaces, parallel to one another and of fixed points of varying distance from the axis, which surfaces cooperate with a follower to impart motion to the follower and to restrict movement of the follower.
- 175** This subclass is indented under subclass 174. Device wherein the first and second surfaces extend through at least 360° and progressively vary in distance from the center.
- 176** This subclass is indented under subclass 174. Device with mechanical means to cause the displacing member to move about its said center.
- 177** This subclass is indented under subclass 174. Device including structure adapted to determine the extent of movement about a center that the tool-displacing member turns which determining structure can be regulated to vary the extent of movement of the tool-displacing member.
- 178** This subclass is indented under subclass 173. Device wherein the tool-displacing member is mounted to turn, relative to the tool-sustaining structure, about the tool-axis.
- 179** This subclass is indented under subclass 153. Device in which the displacement of the tool is caused by a member comprising a first and a second face, the faces meeting at an acute angle, adapted to be actuated substantially parallel to the first face, so that a tool slidably engaging the second face is displaced; wherein, the displacing member is moved radially relative to the tool-support in a plane normal to the tool-axis.
- 180** This subclass is indented under subclass 153. Device wherein the tool is secured to the tool-sustaining structure so that actuation of the tool-displacing means causes the tool to be moved about an axis relative to the tool-sustaining structure.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
150, for similar structure wherein the tool is displaced about an axis that is parallel to the tool-axis.
159, for similar structure wherein the tool is displaced by an axially-slidable moving means.
187+, for a pivotable tool lacking means to displace the tool relative to the sustaining means.

181 This subclass is indented under subclass 153. Device in which the displacement of the tool is caused by a member having a helically-ribbed surface rotatable relative to a cooperating surface so that the ribbed surface and the cooperating surface are relatively displaced along the axis about which the helically-ribbed surface rotates; whereby, a tool connected to one of the surfaces is displaced; wherein, the member having a helically-ribbed surface is rotatable about an axis that intersects and is normal to the tool-axis.

182 This subclass is indented under subclass 181. Device including a second tool adapted to be displaced by a second means as described under clause (2) of the definition of subclass 153 wherein the second member having a helically-ribbed surface is rotatable about the same axis as the first similar member.

183 This subclass is indented under subclass 182. Device wherein the first member having a helically-ribbed surface and the second similar member are fixed together so that rotation of one directly results in rotation of the other.

184 This subclass is indented under subclass 181. Device wherein the tool or tool-support includes a body portion having a crest formed in the peripheral surface thereof, said crest extending along a spiral path deflected along the tool-axis and serving to engage the work and to thereby guide the tool during cutting.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

215+, for a tool or tool-support having spiral tool-guiding crests.

185 This subclass is indented under subclass 181. Device including movable means to grip and thereby secure the tool to the tool-sustaining structure and including mechanical means adapted to move the gripping means to effect the gripping action.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

197, for similar structure not including means to move the tool relative to the tool-support.

186 This subclass is indented under the class definition. Device including structure to sustain a tool against gravity during cutting operation and including manually-operated securing or holding means which allows the tool to assume various positions relative to its sustaining structure prior to cutting operation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

146+, for similar structure wherein the securing means may be used to move the tool relative to the tool-support; or for similar structure combined with means to move the tool relative to the tool-support.

SEE OR SEARCH CLASS:

407, Cutters, for Shaping, for an adjustable tool and support physically restricted to cut rotating work; and for an adjustable tool and support usable alternatively to cut while rotating and moving axially and moving laterally or radially of the tool-axis toward the work during operation.

187 This subclass is indented under subclass 186. Device wherein the sustaining structure includes a connection permitting movement of the tool about an axis allowing the tool to assume various preselected positions relative to the tool-sustaining structure prior to cutting operation.

(1) Note. Included among the patents of this subclass is a device having a cutting tool that is positionable in a retracted, inoperable state and in an extended, operable state.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

150+, for an eccentrically-mounted tool with means to move the tool relative to the tool-support.

159, for a pivotable tool with an axially-slidable tool moving means.

180, for structure including a pivotally-mounted tool combined with means to move the tool relative to the tool-sustaining structure.

- 188** This subclass is indented under subclass 187. Device wherein the tool is movable about the axis to expose different areas of the tool, which different areas are to be used in the cutting action.
- 189** This subclass is indented under subclass 186. Device including a plurality of cutting edges disposed about the tool-axis and positioned at different radial distances from the tool-axis.
- (1) Note. This subclass is not intended to include a reamer having a section wherein the cutting edge(s) is in a cylinder parallel with the tool-axis and a tapered lead section wherein the cutting edge(s) lie in a cone concentric with the tool-axis because it cannot be said that the cutting edges are different radial distances from the tool-axis.
- (2) Note. Included herein is a tool having a cutting edge(s) in a first cone concentric with the tool-axis and a cutting edge(s) in a second cone also concentric with the tool-axis, even if the cutting edges meet.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
206, for a tool having stepped cutting edges and a core receiving central portion.
223+, for a tool, per se, having stepped cutting edges.
- 190** This subclass is indented under subclass 189. Device including a first means to permit one of the cutting edges to be displaced radially toward or away from the tool-axis to modify the diameter of the circle described by that cutting edge and including a second means to permit the same cutting edge to be displaced longitudinally along the tool-axis.
- 191** This subclass is indented under subclass 189. Device in which said cutting edges can be displaced toward and from each other along the tool-axis without changing the radial sweep of the edge.
- 192** This subclass is indented under subclass 191. Device including means detachably positioned on the tool-support adapted to abut the surface of a workpiece after a predetermined amount of travel of the tool into the workpiece.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
200, for similar devices wherein there is no means to permit positioning of the tool relative to the tool-support.
- 193** This subclass is indented under subclass 191. Device wherein one of the cutting-edges is at the tool-axis and wherein manually-operated securing means allows the tool-element that supports that cutting edge to assume various positions along the tool-axis.
- 194** This subclass is indented under subclass 189. Device wherein one of the cutting edges of the tool diverges from the tool-axis radially outwardly in the direction in which the tool is advanced toward the work.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
211+, for a tool or tool with support including an inversely angled cutting edge.
- 195** This subclass is indented under subclass 186. Device including a work-contacting structure adapted to penetrate the work-surface at a point which has not been previously modified.
- (1) Note. The device of this subclass is not to be confused with the device of Class 83, Cutting, or the device of Class 72, Metal Deforming. To be placed herein, the penetrating means must be disclosed solely as means facilitating the securing or aligning of a cutting instrumentality relative to the work and the depression formed must be unused at any other time for any other purpose.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
85, for the combination of a tool of this class type with a work-penetrating means that is movable relative to the tool during the cutting operation.
208, for a tool of this class including a lead screw adapted to "form" a recession in the work, a product-receiving chamber, and a cutting edge.

- 214, for a tool of this class including a material-penetrating lead screw and a cutting edge.
- 196** This subclass is indented under subclass 186. Device including a work-engaging protuberance, concentric with the tool-axis, axially advanced of all cutting edges of the tool and specifically adapted to fit into an existing surface configuration of the work and thereby restrict the tool while in operation to move in a path according to configuration.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 82, for similar structure wherein the central-lead pin does not partake of all the motion of the tool during the cutting operation.
- 201, for a non-adjustable tool including a removable central lead.
- 209, for a tool having a product receiving chamber and a central lead.
- 225, for a tool having axially spaced, stepped cutting edges and a central lead.
- 197** This subclass is indented under subclass 186. Device including movable means to grip and thereby secure the tool to the tool-sustaining structure and including mechanical means adapted to move the gripping means to effect the gripping action.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 185, for similar structure including a screw perpendicular to the tool-axis to move the tool radially relative to the tool-support.
- 198** This subclass is indented under subclass 197. Device wherein the mechanical means serves to urge the tool-gripping means in a direction parallel with the tool-axis to effect the gripping action.
- 199** This subclass is indented under the class definition. Device comprising a tool* or a tool combined with a tool-support*.
- SEE OR SEARCH CLASS:
- 407, Cutters, for Shaping, for a tool or tool with support physically restricted to cut rotating work; and for a tool or tool with support usable alternatively to cut while rotating and moving axially or to cut while rotating and approaching the work by moving radially or laterally of the tool-axis during operation.
- 200** This subclass is indented under subclass 199. Device including a member mounted on the tool-support adapted to contact the work and including a margin adapted to perform a cutting operation of the class type wherein either the work-contacting member or the margin is adapted to be removed from the tool-support.
- 201** This subclass is indented under subclass 200. Device wherein said removable member is axially advanced of all cutting edges of the tool and is specifically adapted to fit into an existing surface configuration of the work and thereby restrict the path of the tool while in operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 196, for an adjustable tool having a central lead.
- 200, for a tool having a removable central lead-screw.
- 209, for a tool having a nondetachable central lead and a product receiving chamber.
- 225, for a tool having axially spaced, stepped, cutting edges and a nondetachable central lead.
- 202** This subclass is indented under subclass 200. Device wherein the work-contacting member is specifically adapted to abut the surface of the work after a predetermined amount of axial advance of the tool relative to the work to thereby limit the cutting action of the tool.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 192, for similar structure wherein the tool is adjustable.
- SEE OR SEARCH CLASS:
- 433, Dentistry, subclass 75 for dental drills or broaches having a depth-limiting member.

- 203** This subclass is indented under subclass 200. Device wherein said work-contacting member can be repositioned relative to the cutting edge.
- 203.5 Hollow milling tool:**
This subclass is indented under subclass 199. Device including an axially facing recession, and including a cutting edge adapted to rotate about that recession and machine away the entire radially outer surface of a rod-like work-piece passing, undisturbed on its axial extent, into the recession.
- 204** This subclass is indented under subclass 199. Device having a forwardly projecting cutting end portion which delimits a longitudinally extending opening or groove coaxial with the tool-axis and having a diameter smaller than that of the cylinder of revolution generated by the rotating cutting end portion of the tool whereby a center section of work is undisturbed during operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
703, for a digest of structure peculiar to the operation of the tool of this subclass.
- 205** This subclass is indented under subclass 204. Device wherein the longitudinally extending opening is connected to a radially extending passageway to the outside of the device, which passageway is adapted to permit passage or removal of the undisturbed center section from the opening.
- 206** This subclass is indented under subclass 204. Device including a plurality of cutting edges disposed about the tool-axis and positioned at different radial distances from the tool-axis.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
189+, for an adjustable tool having stepped cutting edges.
223+, for a tool having stepped cutting edges, but no core-receiving portion.
- 207** This subclass is indented under subclass 199. Device including a compartment completely enclosed, when viewed as a cross-section normal to the tool-axis, the function of said com-
- partment being to store, temporarily, the product of the cutting operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
67, for a device of this class type, combined with a product receiving chamber that does not move with the tool during operation.
- 208** This subclass is indented under subclass 207. Device including a work-engaging protuberance positioned on the tool axis, having a sharp helically disposed edge, which protuberance is axially advanced of the cutting edges of the tool and specifically adapted to penetrate the work-surface and both stabilize the tool against lateral displacement and pull the rotating tool through the work.
- (1) Note. The device of this subclass is not to be confused with the device of Class 83, Cutting, or the device of Class 72, Metal Deforming. To be placed herein, the penetrating means must be disclosed solely as means facilitating the securing or aligning of a cutting instrumentality relative to the work and the depression formed must be unused at any other time for any other purpose.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
85+, for structure including means to "form" a depression in work, which means is movable relative to the tool during operation.
195, for similar structure wherein there is provision to permit the tool to be positioned relative to the tool-support.
214, for similar structure lacking a product-receiving chamber.
- 209** This subclass is indented under subclass 207. Device including a work-engaging protuberance, concentric with the tool-axis, axially advanced of all cutting edges of the tool and specifically adapted to fit into an existing surface configuration of the work and thereby restrict the tool while in operation to move in a path according to the configuration.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 196, for an adjustable tool having a central lead.
 201, for a tool having a central lead that is detachable from the tool-support.
 225, for a tool having a central lead, but lacking a product receiving chamber.
- 210** This subclass is indented under subclass 199. Device consisting of a helical-coil element, the axis of which is co-extensive with the tool-axis, terminating at the axial extremity thereof in a cutting edge, so that the tool is constructed of a single, helically-wound element.
- 211** This subclass is indented under subclass 199. Device wherein a cutting edge* of the tool diverges from the tool-axis radially outward and in the direction in which the tool is advanced toward the work.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 194, for similar structure including a tool having stepped cutting edges and means to permit positioning of one of the edges.
- 212** This subclass is indented under subclass 211. Device having an additional cutting edge extending axially at the radially outermost extremity of the leading portion of the tool, which cutting edge projects axially beyond the other cutting edges of the tool.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 213, for similar structure lacking an inversely angled cutting edge.
- 213** This subclass is indented under subclass 199. Device having a first and a second cutting edge, wherein the first cutting edge extends at least somewhat radially of the tool-axis and wherein the second cutting edge extends axially at the radially outermost extent of the leading portion of the tool, which second cutting edge projects axially beyond the other cutting edge of the tool.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 212, for similar structure including an inversely angled cutting edge.
- 214** This subclass is indented under subclass 199. Device including a work-engaging protuberance positioned on the tool-axis, having a sharp helically-disposed edge, which protuberance is axially advanced of the cutting edge of the tool and is specifically adapted to penetrate the work-surface and both stabilize the tool against lateral displacement and pull the rotating tool through the work.
- (1) Note. The device of this subclass is not to be confused with the device of Class 83, Cutting or the device of Class 72, Metal Deforming. To be placed herein, the penetrating means must be disclosed solely as means facilitating the securing or aligning of a cutting instrumentality relative to the work and the depression formed must be unused at any other time for any other purpose.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 85+, for similar structure including means to "form" a depression in work, which means is movable relative to the tool during operation.
 195, for similar structure wherein there is provision to permit the tool to be positioned relative to the tool-support.
 208, for similar structure having a product receiving chamber.
- 215** This subclass is indented under subclass 199. Device wherein the tool or tool-support includes a body portion having a crest formed in the peripheral surface thereof, said crest extending along a spiral path deflected along the tool-axis, and serving to engage the work and thereby guide the tool during cutting.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 184, for similar structure combined with a tool-adjusting screw that is perpendicular to the tool-axis.

- 216** This subclass is indented under subclass 215. Device including a surface for performing a class-type operation that is at a distance from the tool-axis different from the distance that the crest is from the tool-axis and is spaced from the crest so that there is a void in the cutting action between the crest and the operating surface.
- 217** This subclass is indented under subclass 215. Device having a plurality of cutting extremities adapted to follow one another in a common kerf wherein a subsequently acting extremity serves to make the kerf broader at a given level in the work than a previously acting extremity.
- 218** This subclass is indented under subclass 217. Device wherein the cutting extremities are formed at the surface of the tool and are disposed along the tool-axis so that the base of one extremity is at a distance from the tool axis different from that of another extremity.
- 219** This subclass is indented under subclass 215. Device including a plurality of crests, each of which is part of a cutting extremity or tooth wherein the teeth are positioned along the tool-axis and wherein the crest of the teeth nearest to the leading end of the tool are disposed to lie in a cone.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
217+, for a tool having pitch stabilizing ridges on teeth of differing width, which teeth are disposed to lie in a cone.
- 220** This subclass is indented under subclass 219. Device wherein at least one of said crests is formed specifically so that the trailing portion thereof will either not touch the kerf of the cutting edge or will touch it only in a specified manner.
- SEE OR SEARCH CLASS:
72, Metal Deforming, subclass 71, for a cutting device similar to that found in this subclass wherein the trailing portion of the crest serves to stress the work beyond its elastic limit.
- 221** This subclass is indented under subclass 219. Device wherein said tool body portion comprises cutting crests which are formed in the surface of said tool body portions and are inwardly directed toward the tool-axis.
- (1) Note. The device of this subclass is commonly called threading die.
- 222** This subclass is indented under subclass 215. Device wherein the crests are formed in the radially outer surface of the tool body portions and are outwardly directed, extending along a spiral deflected along the tool-axis.
- (1) Note. The device of this subclass is commonly called a threading tap.
- 223** This subclass is indented under subclass 199. Device including a plurality of cutting edges disposed about the tool-axis and positioned at different radial distances from the tool-axis.
- (1) Note. This subclass is not intended to include a reamer having a section wherein the cutting edge(s) is in a cylinder parallel with the tool-axis and a tapered lead section wherein the cutting edge(s) lie in a cone concentric with the tool-axis because it cannot be said that the cutting edges are at different radial distances from the tool-axis.
- (2) Note. Included herein is a tool having a cutting edge(s) in a first cone concentric with the tool-axis and a cutting edge(s) in a second cone also concentric with the tool-axis, even if the cutting edges meet.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
189+, for similar structure having means to permit positioning of the tool relative to the tool-support.
206, for a tool having stepped cutting edges and a core receiving central portion.
- 224** This subclass is indented under subclass 223. Device wherein said cutting edges are separated one from the other, when viewed as an elevation normal to the tool-axis.

- 225** This subclass is indented under subclass 224. Device including a bearing member axially advanced of said cutting edges and specifically adapted to fit into an existing surface configuration of the work and thereby restrict the path of the tool while in operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 196, for an adjustable tool having a central lead.
 201, for a tool having a removable central lead.
 209, for a tool having a central lead and a product receiving chamber.
- 226** This subclass is indented under subclass 199. Device including detailed characteristics of a portion of the tool or tool-support generally concentric with the tool-axis and adapted to be readily attached to or detached from a torque transmitting tool-supporting member.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 238, for a tool-support having portions of configuration to supportingly engage a particular tool.
 713, for an art grouping of patents reciting a separable tool and tool-support wherein the details do not include details of an element that is generally concentric with the tool-axis.
- 227** This subclass is indented under subclass 199. Device including a plurality of cutting-edges* disposed about the tool-axis and separated, one from the other, when viewed in a direction parallel to the tool-axis.
- 228** This subclass is indented under subclass 227. Device including a plurality of cutting edges each of which is formed by a pair of radially extending, planar faces, each of which planar faces is disposed on an angular attitude such that, when the tool is viewed along the tool-axis, both of the faces can be seen.
- 229** This subclass is indented under subclass 227. Device wherein the tool is provided with a void area of axial dimension to permit passage of product of the cutting operation therealong.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 56+, for a tool having a void for conveying fluid material to the work.
 204+, for a tool having a void for permitting a portion of undisturbed work to inter into the tool.
 207+, for a tool having a chamber for storage of chips.
- 230** This subclass is indented under subclass 229. Device wherein the void area is of axial dimension and of circumferential dimension so that it extends helically along the tool-axis.
- 231** This subclass is indented under subclass 227. Device including the combination of a tool-support*, a tool carried by said support and means for securing said support and said tool together.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 238+, for a tool-support, per se, of particular utility of this class.
- 232** This subclass is indented under subclass 231. Device wherein the securing means comprises a member having a first and a second planar surface intersecting at an acute angle, which member serves to secure the tool to the tool-support by the first surface being slid along a cooperating surface on the tool-support so that the other surface of the member, by a camming action serves to bind the tool against movement relative to the tool-support.
- 233** This subclass is indented under subclass 231. Device wherein said securing means is separate from the tool and is a helically-ribbed member rotated about the axis of the helix to hold the tool in position by interengagement between the tool and the tool support.
- 234** This subclass is indented under the class definition. Device comprising machine-frame* structure.
- (1) Note. Included in this subclass is the combination of machine-frame structure with means for moving or securing one element of the machine frame relative to

another if this action does not cause a tool* to function.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

124+, for similar structure in combination with means to move one machine element relative to another to cause a tool to function.

199+, for similar structure combined with a tool of this class type.

SEE OR SEARCH CLASS:

248, Supports, appropriate subclasses, for frame structure of general utility.

235 This subclass is indented under subclass 234. Device including weights and suspension apparatus for counter-balancing the weight of the tool and vertically-moving tool-sustaining structure.

236 This subclass is indented under subclass 234. Device including a member adapted to support the tool-carrying or tool-thrust counteracting structure and allow that structure to assume various angular positions relative to said member.

237 This subclass is indented under subclass 236. Device wherein the tool-carrying or tool-thrust receiving structure includes a radially extending arm adapted to support said tool and permit radial positioning of said tool therealong.

238 This subclass is indented under the class definition. Device comprising structure to be connected to a tool for sustaining the tool against gravity; which sustaining structure is to partake of all movements of the tool and have no movement relative to the tool during the operation of the tool.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

199+, especially subclasses 226 and 231+, for similar structure in combination with a tool.

SEE OR SEARCH CLASS:

279, Chucks or Sockets, appropriate subclasses, for a tool-holding chuck or socket of general utility. Examples of holding means of "general utility" are

as follows; (a) a holding means having two or more separately classified, disclosed but unclaimed utilities, (b) a holding means having two or more separately classified utilities recited in the same claim, and (c) a holding means of no particular utility at all. A claim to a holding means of the specific utility of this class (408) will be found in this subclass even if the total disclosure is to a holding means of general utility. (Usually a patent reciting a chuck having a plurality of jaws that converge on a common axis are deemed to be of general utility and therefore will be found in Class 279 while other type tool-holders are deemed to be specific to use with a tool of this class and are therefore to be found herein.)

239 This subclass is indented under subclass 238. Device having means mounted thereon to secure a tool to the sustaining structure.

240 This subclass is indented under subclass 239. Device including mechanical structure to move the securing means into engagement with the tool and to cause the securing means to gripably engage the tool.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

197, for similar structure combined with a tool that is adjustable relative to the tool-support.

241 This subclass is indented under the class definition. Apparatus which is not in conformance with the definition of any prior subclass in this schedule.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

1, for a miscellaneous process step for performing an operation of this class.
72+, especially the outdent subclass and subclass 115, for a tool-guiding jig similar to the tool-guiding jig in this subclass but adapted to contact a workpiece and establish a relationship between the tool and the workpiece.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 104+, for apparatus for process for testing a cutting edge.
- 384, Bearings, subclasses 7+ for linear bearing which can guide a rotating shaft during linear movement.

CROSS-REFERENCE ART COLLECTIONS

The following subclasses are collections of published disclosures pertaining to various specified aspects of the cutting by rotating, axially moving tool art which aspects do not form appropriate bases for subclasses in the forgoing classification (i.e., subclasses superior hereto in the schedule), wherein original copies of patents are placed on the basis of proximate function of the apparatus. These subclasses assist a search based on remote function of the apparatus and may be of further assistance to the searcher, either as a starting point in searching this class or as an indication of further related fields of search inside or outside the class. Thus, there is here provided a second access for retrieval of a limited number of types of disclosures. Disclosures are placed in these subclasses for their value as references and as leads to appropriate main or secondary fields of search, without regard to their original classification or their claimed subject matter. The disclosures found in the following subclasses are examples, only, of the indicated subject matter and no instance do they represent the entire extent of the prior art. See subclass 77+ for an art collection of all wheel mounted machines of this class type, collected in a subclass providing for devices normally supported on work by a wheel.

- 700** A step of or apparatus for performing an operation of the class type by the application of vibrational energy at frequencies above the range of human hearing (i.e., over, 20,000 hz.).
- (1) Note. This digest subclass is intended as an aid to the searcher for locating structure for performing cutting operations by a tool of the class type, or for other operations similar in result, (e.g., drilling holes in a workpiece by application of ultrasonic energy without the use of a rotating, axially moving tool.)
- 701** A step or apparatus for performing an operation similar to the class type by the application of energy emitted by molecules and atoms

because of internal changes, which energy travels in straight lines with the speed of light.

- (1) Note. This digest subclass is intended to aid the searcher to locate structure for cutting operations similar in result to cutting of the class type such as cutting by the application of laser or maser rays.

- 702** A step of or apparatus for performing an operation of the class type by use of a tool driven to operate by a motor powered by compressed air.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 63, for a fluid motor adapted to drive a work-infeed means.
- 130, for a fluid motor combined with a tool of the class type or with a machine frame structure of the class type wherein the motor is adapted to move the tool along the tool-axis.

- 703** This subclass is indented under the class definition. A step or apparatus particularly for removing material from the work by forming an annular trench therein, which trench is made progressively deeper as the tool proceeds.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 204+, for a tool, per se, for performing an operation of the type of this subclass.

- 704** This subclass is indented under the class definition. A step or apparatus particularly adapted to cut openings into work, which openings are of unusually narrow cross-section.

- 705** This subclass is indented under the class definition. A step or apparatus particularly adapted to cut openings into work, which openings have an exceptionally high ratio of depth to diameter.

- 706** This subclass is indented under the class definition. A step or apparatus particularly adapted to cut openings in an article composed of friction material to be utilized to secure that article to a brake shoe.

- 707** This subclass is indented under the class definition. A step or apparatus particularly adapted to machine the wrist pin opening in the piston

- of a conventional reciprocating piston engine or particularly adapted to machine either the wrist pin opening or the crankshaft opening in the connecting rod of such an engine.
- 708** This subclass is indented under the class definition. A step or apparatus particularly adapted to machine the bearings or the bearing supporting openings of a power plant, which bearings or openings are for supporting the primary power output shaft of such a power plant.
- 709** This subclass is indented under the class definition. A step or apparatus particularly adapted to machine the portion of a conventional reciprocating piston engine through which the piston, during operation of the engine reciprocates.
- 710** This subclass is indented under the class definition. A step or apparatus including structure or provision to make the operation less dangerous to the welfare of a man in the vicinity of the apparatus or for protecting a part of the machine against breakage or other damage.
- 711** This subclass is indented under the class definition. An accessory for use with a device of the ... of particular utility to make a broken tool* serviceable by the addition of such accessory to the device.
- 712** This subclass is indented under the class definition. Device including a work-support and including provision to support an integral unit consisting of a handle, a motor, output shaft and a tool-holding chuck as the tool support and power supply thereof, which integral unit is a conventional motorized hand-drill capable of operation independent of the remainder of the structure.
- 713** This subclass is indented under the class definition. Device including an assemblage having the general configuration of a tool, per se, wherein the cutting edge thereof is adapted to be removed from the remainder of the assemblage.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
144, for similar structure wherein the portion of the assemblage including the cutting edge and the remainder of the
- assemblage are of different, claimed materials.
- 714** This subclass is indented under the class definition. Device including a tool and tool-support assemblage which includes an element adapted to give sustaining effort to the tool and further adapted to yield without exceeding the elastic limit thereof and thereby allow the cutting edge of the tool to move relative to other portions of the assemblage; or including a tool, a portion of which is adapted to yield without exceeding the elastic limit thereof and thereby to allow the cutting edge of the tool to move relative to another portion of the tool.
- (1) Note. By the definition of a tool-support*, any motion of the cutting edge relative thereto must be at a time when the tool is not in operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
124+, for a resilient means connected at one end thereof to a tool or a tool-support, which resilient means is adapted to store energy therein and to release that energy to drive the tool.
143, for yieldable means which may be resilient and is particularly adapted to absorb vibration transmitted from the tool.
154+, for a tool, including means to move that tool radially and including resilient means adapted to act in opposition to the moving means.
- END