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219, Electric Heating, subclasses 121.11+ for a method of metal heating using an electron beam, laser or plasma under the class definition.

**888.044 With assembly or composite article making:**

This subclass is indented under subclass 888.04. Process wherein the manufactured article is (1) composed of a plurality of interrelated attached components or subcombination elements, some of which are associated or dissociated from the other components or elements during the manufacture or (2) a unitary structure composed of at least two different materials or compositions with each material or composition retaining its identity.

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

890.124, for a process of assembling a valve or making a composite valve other than an I.C. engine or poppet valve.

**888.045 With thermal barrier or heat flow provision:**

This subclass is indented under subclass 888.044. Process wherein the manufactured piston has structure especially adapted for (1) preventing heat flow or heat build up, (2) dissipating heat or (3) transferring heat.

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

890.045+, for a process of making a tube with heat transfer means.

**888.046 With fiber reinforced structure:**

This subclass is indented under subclass 888.044. Process wherein filament or elongated particles are employed to strengthen or otherwise improve the mechanical integrity of the manufactured piston.

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

419.1+, for a process of shaping fibrous material.

**888.047 By composite casting or molding:**

This subclass is indented under subclass 888.044. Process wherein the piston is fabricated using a plurality of distinct materials

integrated to produce at least one piston element, e.g., a squeeze-cast piston enveloping a fiber material, which material is disposed through at least a portion of the piston body.

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

527.5+, for a process of metal casting in combination with a diverse manufacturing operation.

**SEE OR SEARCH CLASS:**

164, Metal Founding, subclasses 91+ for a process of casting a metal composite article.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 241+ for a process of molding a composite article under the class definition.

**888.048 By coating or cladding:**

This subclass is indented under subclass 888.044. Process wherein the piston is subjected to an operation wherein (1) fluent material is deposited upon or within a base material or (2) a preformed metal sheath or layer of material is attached to the surface of the base material.

(1) Note. The claimed recitation of a chemical reaction will generally bar placement of the original reference in this subclass.

**SEE OR SEARCH CLASS:**

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 80+ for a process of electrolytic coating (e.g., electroplating, etc.).

427, Coating Processes, for a process of coating including perfecting steps for coating.

**888.049 Ring groove forming or finishing:**

This subclass is indented under subclass 888.04. Process wherein the manufactured piston has a slot or recess especially adapted for receiving a piston ring or seal means therein.

**888.05 Gudgeon pin, wrist pin, piston pin, or boss therefor:**

This subclass is indented under subclass 888.04. Process for manufacturing (1) a fastening member such as a wrist pin or a gudgeon pin or (2) a circular protuberance or shaped area on the piston especially adapted for use with (1).

**888.051 With other attaching provision for connecting rod:**

This subclass is indented under subclass 888.04. Process wherein the piston is secured to a connecting rod without the use of a fastening element, per se, such as by casting about a connecting rod and the piston by swaging or by staking.

**888.06 Cylinder, cylinder head or engine valve sleeve making:**

This subclass is indented under subclass 888. Process wherein the manufactured article is (1) a tube in which a piston moves and where a work is done on the piston by the conversion of various forms of energy into mechanical force and motion as in an internal combustion engine or fluid pump; (2) a cap that serves to close the end of the piston chamber of a reciprocating engine; (3) a cylindrical part especially adapted for fitting inside (1) or (2); or (4) a covering or deposited layer for the inner surface of (1) or (2).

- (1) Note. A method of making a cylinder block by diverse manufacturing steps is found in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

888.01, for a process of making an internal combustion engine.

**888.061 With liner, coating or sleeve:**

This subclass is indented under subclass 888.06. Process wherein the manufactured engine cylinder or cylinder head (1) has its surface covered by a cylindrical preform or covered with deposited material; or (2) manufacturing such preform.

**888.07 Piston ring or piston packing making:**

This subclass is indented under subclass 888. Process for manufacturing a circular sealing element or component especially adapted for fitting around a piston and extending to the cylinder wall thus preventing leakage.

SEE OR SEARCH THIS CLASS, SUBCLASS:

888.3, for a process of making a seal having plural district layers.

SEE OR SEARCH CLASS:

72, Metal Deforming, appropriate subclass for a process of shaping or working metal stock material.

277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 434+ for a piston ring or piston ring expander or seat therefor, subclasses 922+ for a seal manufactured by bonding or joining or subclass 924 for a seal manufactured by deformation, material removal, or molding.

**888.071 Including forging or hammering:**

This subclass is indented under subclass 888.07. Process wherein the manufactured ring is shaped or worked by compressive impact force which produces plastic deformation.

**888.072 Including casting or molding:**

This subclass is indented under subclass 888.07. Process wherein the manufactured ring is produced by shaping a liquid or plastic substance into a fixed shape utilizing a forming surface or mold.

**888.073 Including rolling or die forming e.g., drawing, punching:**

This subclass is indented under subclass 888.07. Process wherein the manufactured ring is shaped or worked (1) by compressive force exerted by opposed rotating rollers or (2) by plastic deformation in a tool used to impart shape.

**888.074 Including coating or plating:**

This subclass is indented under subclass 888.07. Process wherein the manufactured ring is made by depositing a layer of fluent material upon or within a base material.

**888.075 Including grinding or honing:**

This subclass is indented under subclass 888.07. Process wherein the manufactured ring is shaped or polished by abrading which removes surface material.

**SEE OR SEARCH CLASS:**

451, Abrading, subclasses 51+ for process of grinding a piston or packing ring.

**888.076 Including machining or angular cutting:**

This subclass is indented under subclass 888.07. Process wherein the manufactured ring is (1) shaped by milling, broaching, or planing or (2) severed on a bias or in a manner other than transverse to the longitudinal axis of the ring.

**888.08 Crankshaft making:**

This subclass is indented under subclass 888. Process of (1) manufacturing an axial member having at least one portion thereof adapted for applying torque thereto for changing reciprocating motion into circular motion or vice versa (2) performing other operation upon such an axle or (3) manufacturing a part especially adapted for (1) or (2) which is not elsewhere classified.

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

6.01, for a machine for making a crankshaft.

**888.09 Connecting rod making:**

This subclass is indented under subclass 888. Process of manufacturing a link which transmits motion or power from one linkage to a second linkage within the prime mover or the power device.

**888.091 Including metallurgical bonding:**

This subclass is indented under subclass 888.09. Process wherein the manufactured connecting rod is produced utilizing a soldering, brazing or welding step.

**888.092 Including metal forging or die shaping:**

This subclass is indented under subclass 888.09. Process wherein the manufactured connecting rod is metal which has been plastically deformed (1) by compressive forces into a desired shape or (2) by a tool used to impart shape.

**888.1 Camshaft making:**

This subclass is indented under subclass 888. Process wherein the manufactured article is (1) a rotating axle to which is attached a plate or cylinder that communicates motion to a follower by means of its edge or a groove cut in its surface or (2) a part especially adapted for (1) which is not elsewhere classified.

**888.2 Push rod or rocker arm making:**

This subclass is indented under subclass 888. Process wherein the manufactured article is (1) a bar or slender shaft which is actuated by a cam to open and shut valves such as in an I.C. engine (2) a lever that is pivoted near its center and is operated at one end by a push rod as defined in (1) which causes the other end of the lever to raise and depress a valve stem such as in an I.C. engine or (3) a part especially adapted for (1) or (2) which is not elsewhere classified.

**888.3 Seal or packing making:**

This subclass is indented under subclass 888. Process wherein the manufactured article is (1) especially adapted to close or make secure against unwanted fluid leakage or fluid passage or (2) a part of (1) which is not elsewhere classified.

**SEE OR SEARCH CLASS:**

277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 922+ for a seal manufactured by bonding or joining or subclass 924 for a seal manufactured by deformation, material removal, or molding.

**888.4 Poppet or I.C. engine valve or valve seat making:**

This subclass is indented under subclass 888. Process wherein the manufactured article is (1) a device that regulates fluid flow by means of a movable part that opens, shuts or partially

obstructs a port or passageway, i.e., a valve which device rises perpendicularly to or from a circular ring on which the device rests when closed; (2) the circular ring for such a device; or (3) a part especially adapted for (1) or (2) which is not elsewhere classified.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

890.12, for a process of making a valve, per se.

**888.41 Valve guide making:**

This subclass is indented under subclass 888.4. Process wherein the manufactured article is especially adapted for maintenance of alignment of a stem of a poppet valve or I.C. engine valve.

**888.42 Repairing, converting, servicing or salvaging:**

This subclass is indented under subclass 888.4. Process wherein an existing valve or valve seat is (1) restored or otherwise put in a more functional, stable or improved working condition; (2) mechanically modified or altered to produce an article of substantially different capacity, size, function or type of operation; or (3) treated to recover a portion or the whole thereof which would otherwise constitute discarded material or using such material in a process of mechanical manufacturing.

(1) Note. See the definition of repair in Class 29 Glossary in the Class Definition.

(2) Note. Making a replacement part, per se, is not found in this subclass unless that part is claimed as being installed in the device being repaired.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

401.1, for a process of converting. Also see the search notes thereunder.

402.01+, for a process of repairing. Also see the search notes thereunder.

403.1+, for a process including scrap recovery or utilization. Also see the search notes thereunder.

890.121, for a process of repairing, converting, servicing or salvaging a valve in general.

**888.43 Valve tappet making:**

This subclass is indented under subclass 888.4. Process wherein the manufactured article is (1) a lever or oscillating member moved by a cam and intended to tap or touch for purpose of operation of a valve or part thereof or (2) a part especially adapted for (1) which is not elsewhere classified.

**888.44 Valve seat making:**

This subclass is indented under subclass 888.4. Process wherein the manufactured article is the circular ring on which the poppet valve or I.C. engine valve rests when closed.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

890.122, for a process of making a valve seat, per se, not for a poppet or I.C. engine valve.

**888.45 Composite or hollow valve stem or head making:**

This subclass is indented under subclass 888.4. Process wherein the manufactured article is a disk part of the poppet or I.C. engine valve or a rod part which operates to open or close the valve, which disk part or rod part is (1) a unitary structure composed of at least two different materials or compositions with each material or composition retaining its identity or (2) a structure which is concave or has a cavity within.

(1) Note. Composite valves include both solid and substantially solid valves having metal or ceramic inserts; and they may contain a heat exchange fluid or a particulate material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

890.123, for a process of making a valve stem, per se.

890.124+, for a process of assembling a valve or making a composite valve.

**888.451 Including forging:**

This subclass is indented under subclass 888.45. Process wherein the manufactured article is shaped or worked by compressive impact force which produces plastic deformation.

**888.452 Including extruding:**

This subclass is indented under subclass 888.45. Process wherein the manufactured article is shaped by forcing solid material, such as metal, through the orifice of a die to produce a continuously formed piece.

**888.453 Including casting:**

This subclass is indented under subclass 888.45. Process wherein the manufactured article is produced by shaping liquid metal into a fixed shape utilizing a forming surface or mold.

**888.46 With assembly or composite article making:**

This subclass is indented under subclass 888.4. Process wherein the manufactured article is (1) composed of a plurality of interrelated attached components or subcombination elements, plurality of interrelated attached components or subcombination elements some of which are associated or disassociated from the other components or elements during the manufacture or (2) a unitary structure composed of at least two different materials or compositions with each material or composition retaining its identity.

SEE OR SEARCH THIS CLASS, SUBCLASS:

890.124, for a process of assembling a valve or making a composite valve other than an I.C. engine or poppet valve.

**889 Impeller making:**

This subclass is indented under subclass 592. Process of manufacturing a device including a rotor (e.g., rotary bladed spindle) for imparting motion in connection with fluid flow.

SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), for particular fluid flow devices.

**889.1 Repairing or disassembling:**

This subclass is indented under subclass 889. Process wherein an existing impeller device is restored to a more functional, stable or improved working condition or wherein its parts are disassociated.

(1) Note. See the definition of repair in Class 29 Glossary in the Class Definition.

(2) Note. Making a new replacement part, per se, is not found in this subclass unless that part is claimed as being installed in the device being repaired.

SEE OR SEARCH THIS CLASS, SUBCLASS:

402.01+, for a process of repairing. Also see the search notes thereunder.

**889.2 Turbomachine making:**

This subclass is indented under subclass 889. Process for manufacturing a device for enclosing and directing fluid flow with respect to an axially mounted rotary member including flow interacting members thereon (e.g., blades, vanes, buckets, etc.).

SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), subclasses 204+ for turbomachine assembly.

**889.21 Assembling individual fluid flow interacting members, e.g., blades, vanes, buckets, on rotary support member:**

This subclass is indented under subclass 889.2. Process wherein the manufacturing includes the permanent association of the flow interacting members with the rotary support member.

SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), for specific blade assembly under subclass 204.

**889.22 Assembling fluid flow directing devices, e.g., stators, diaphragms, nozzles:**

This subclass is indented under subclass 889.2. Process wherein the manufacturing includes the permanent association of the parts of the fluid flow devices.

**889.23 Shaping integrally bladed rotor:**

This subclass is indented under subclass 889.2. Process including altering the configuration or dimensions of a rotor to form thereon portions serving as a fluid interacting member such as a blade or vane.

## SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), subclass 234 for blade structure integrally shaped or blended into hub or rotor.

**889.3 Axial blower or fan:**

This subclass is indented under subclass 889. Process of fabricating an impeller of the type wherein the fluid flow discharge is substantially in the direction of the rotational axis of the rotor.

## SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), especially subclasses 189+ for axially extending shroud ring or casing and subclasses 198+ for multiple axially spaced working members.

**889.4 Centrifugal blower or fan:**

This subclass is indented under subclass 889. Process for manufacturing an impeller of the type wherein the fluid flow discharge is substantially outwardly in radial direction from the central portion of the rotor.

## SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), subclass 178 for perimetric blading extending axially between annular members (e.g., squirrel cage type, etc.).

**889.5 Fluid coupling device:**

This subclass is indented under subclass 889. Process of manufacturing a device including impeller means for transmitting force, i.e., a coupling by means of fluid to a device such as a turbine, e.g., hydraulic type of torque converter.

## SEE OR SEARCH CLASS:

60, Power Plants, subclasses 330+ for impeller and turbine unit type torque transmitting apparatus.

**889.6 Propeller making:**

This subclass is indented under subclass 889. Process for manufacturing a device consisting of a central hub with radiating blades twisted to form part of a substantially helical surface that

is used to propel a vehicle, e.g., airplane or ship.

## SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), subclasses 223+ for specific blade structure.

**889.61 Utilizing hollow tube blank:**

This subclass is indented under subclass 889.6. Process wherein a propeller blade portion is made from an open cylindrical workpiece.

## SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), subclasses 232 and 233 for hollow blade structure.

**889.7 Blade making:**

This subclass is indented under subclass 889. Process of manufacturing the individual fluid flow interacting members utilized in an impeller device.

## SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), subclasses 223+ for specific blade structure.

**889.71 Composite blade:**

This subclass is indented under subclass 889.7. Process wherein a blade is made of distinctly different and identifiable portions or materials.

## SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), subclasses 229+ for laminated, embedded member or encased material type blade structure.

**889.72 Hollow blade:**

This subclass is indented under subclass 889.7. Process wherein the interior of the blade includes substantial open space.

## SEE OR SEARCH CLASS:

416, Fluid Reaction Surfaces (i.e., Impellers), subclasses 232 and 233 for hollow blade structure.

**889.721 With cooling passage:**

This subclass is indented under subclass 889.72. Process wherein the interior open space serves to allow fluid to flow within the blade for heat dissipation purposes.

**889.722 Passage contains tubular insert:**

This subclass is indented under subclass 889.721. Process wherein the cooling passage receives therein a hollow cylindrical member.

**890 Catalytic device making:**

This subclass is indented under subclass 592. Process for manufacturing an article which utilizes a substance that alters the velocity of a chemical reaction and which substance may be recovered essentially unaltered in form and amount at the end of the reaction.

- (1) Note. A recited chemical reaction, per se, will generally bar original placement in this subclass.
- (2) Note. Prior to the establishment of this subclass (890), this subject matter was indented under "Gas and Water Device Making" (old 29/157+). Other subclasses under Class 29 subclasses 592+ have not been screened for this subject matter.

SEE OR SEARCH THIS CLASS, SUBCLASS:

890.08, for a method of making a muffler, manifold or exhaust pipe.

**890.01 Rocket or jet device making:**

This subclass is indented under subclass 592. Process for manufacturing an article especially adapted for producing a strong, well-defined stream of fluid which issues from an orifice or nozzle or moves within a contracted duct.

- (1) Note. Generally a rocket or jet is utilized for propulsion purposes.
- (2) Note. No method of making carburetor or fuel injector device, per se, is found within this subclass.
- (3) Note. Prior to the establishment of this subclass (890.01) this subject matter was indented under "Gas and Water Device

Making" (old 29/157+). Other subclasses under Class 29 subclasses 592+ have not been screened for this subject matter.

**890.02 Burner, torch or metallurgical lance making:**

This subclass is indented under subclass 592. Process for manufacturing an article especially adapted for (1) consuming fluid fuel to produce a flame or to cut material or (2) consuming fluid or gaseous fuel to combust or otherwise remove undesired material.

- (1) Note. A process of making carburetor or fuel injector, per se, is not considered appropriate subject matter for this subclass since the combustion reaction occurs at a latter stage of the engine.
- (2) Note. Prior to the establishment of this subclass (890.02) this subject matter was indented under "Gas and Water Device Making" (old 29/157+). Other subclasses under Class 29, subclasses 401.1+ have not been screened for this subject matter.

**890.03 Heat exchanger or boiler making:**

This subclass is indented under subclass 592. Process for manufacturing (1) a water heater for generating steam or (2) an article especially useful for recovery of thermal energy or for transferring thermal energy from one fluid to another fluid or to the environment.

- (1) Note. This subclass and the subclasses indented hereunder include a method of making a subcombination not elsewhere provided for, which are especially useful in heat exchanger or boiler devices.
- (2) Note. Prior to the establishment of these subclasses (890.03+), this subject matter was indented under "Gas and Water Device Making" (old 29/157+). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.
- (3) Note. Making a heat sink device, per se, or heat absorbing material, per se, is not included in this subclass or indented subclasses.

**SEE OR SEARCH CLASS:**

- 73, Measuring and Testing, especially subclass 113.01 for measuring or testing a steam or water operated engine; related engine system or engine component, subclass 114.68 for measuring or to the cooling system of an internal combustion engine and subclass 700 for a fluid pressure gauge, generally.
- 110, Furnaces, for a heating system, generally.
- 122, Liquid Heaters and Vaporizers, for a heating unit specific to that class.
- 126, Stoves and Furnaces, for a heating unit, generally.
- 137, Fluid Handling, for a fluid system, generally.
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 60+ for a method of making a heat exchanger or boiler by means of adhesive or nonmetallic bonding where no metalworking takes place.
- 159, Concentrating Evaporators, for an evaporator for cooling, and Digest 18 an art collection specific to an accumulator.
- 205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclass 73 for an electrolytic method of making a hollow body such as a heat exchanger or boiler.
- 264, Plastic and Nonmetallic Article Shaping or Treating: Processes, appropriate subclass for a process of shaping or treating nonmetallic material under the class definition.

**890.031 Repairing, converting, servicing or salvaging:**

This subclass is indented under subclass 890.03. Process wherein an existing heat exchanger or boiler is (1) restored or otherwise put in a more functional, stable or improved working condition; (2) mechanically modified or altered to produce an article of substantially different capacity, size, function or type of operation; or (3) treated to recover a portion or the whole thereof which would otherwise constitute discarded material or using such material in a process of mechanical manufacturing.

- (1) Note. See the definition of repair in Class 29 Glossary in the Class Definition.
- (2) Note. Making a replacement part, per se, is not found in this subclass unless that part is claimed as being installed in the device being repaired.

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

- 401.1, for a process of converting. Also see the search notes thereunder.
- 402.01+, for a process of repairing. Also see the search notes thereunder.
- 403.1+, for a process including scrap recovery or utilization. Also see the search notes thereunder.

**890.032 Heat pipe device making:**

This subclass is indented under subclass 890.03. Process wherein the article made is a heat-transfer device consisting of a sealed receptacle which absorbs radiant energy at one end by vaporization of a liquid and releases energy at the other end by condensation of the vapor.

**890.033 Solar energy device making:**

This subclass is indented under subclass 890.03. Making wherein the article made is especially useful for capturing, transmitting, storing or otherwise utilizing radiation from the sun.

**890.034 Regenerator or recuperator making:**

This subclass is indented under subclass 890.03. Process wherein the article made is especially useful for recovering thermal energy from effluent or exhaust fluids, which thermal energy is usually transferred to incoming fluids.

- (1) Note. These articles generally are either reversible--one is in a heat absorbing cycle whereas a second is in a heat transmitting cycle, or utilize counter principles.

**890.035 Cooling apparatus making, e.g., air conditioner, refrigerator:**

This subclass is indented under subclass 890.03. Process wherein the article made is especially useful for (1) removing thermal energy from an enclosed chamber and its contents or (2) comfort treating an ambient area by lowering the air temperature and reducing the humidity.

**SEE OR SEARCH CLASS:**

159, Concentrating Evaporators, for an evaporator for cooling, and Digest 18 an art collection specific to an accumulator.

**890.036 Tube inside tube:**

This subclass is indented under subclass 890.03. Process wherein the heat exchanger or boiler made has an elongated hollow generally cylindrical structure housed inside a similar structure.

**890.037 Tube wound about tube:**

This subclass is indented under subclass 890.03. Process wherein the heat exchanger or boiler made comprises a first elongated hollow generally cylindrical structure wrapped around a second elongated hollow generally cylindrical structure.

**890.038 Tube joined to flat sheet longitudinally, i.e., tube sheet:**

This subclass is indented under subclass 890.03. Process wherein the heat exchanger or boiler made comprises a broad generally flat member attached to an elongated hollow generally cylindrical structure which passageways constitute substantially all of the heat exchanger or boiler passageways.

- (1) Note. Tube plate structure is quite different and distinct from tube sheet structure. A tube plate has traverse passageways therethrough and generally serves as end joint structure for a heat exchanger made up of a large plurality of associated tubes.

**890.039 Sheet joined to sheet:**

This subclass is indented under subclass 890.03. Process wherein the heat exchanger device or boiler made comprises a plurality of

broad generally flat members joined directly together.

**890.04 With inserted tubes:**

This subclass is indented under subclass 890.039. Process wherein the heat exchanger device or boiler made comprises a plurality of broad generally flat members joined directly together having a plurality of elongated hollow generally cylindrical members extending there-through.

**890.041 Utilizing bond inhibiting material:**

This subclass is indented under subclass 890.039. Process wherein the heat exchanger or boiler is selectively bonded together making use of coating composition or applied substance which prevents or minimizes bonding in particular interface areas.

- (1) Note. The above method is one type of "roll bonding".

**890.042 With subsequent fluid expansion:**

This subclass is indented under subclass 890.041. Process herein the selectively bonded heat exchanger or boiler is pneumatically or hydraulically inflated.

**890.043 Tube joint and tube plate structure:**

This subclass is indented under subclass 890.03. Process wherein the heat exchanger or boiler is made by joining elongated hollow generally cylindrical members to one another or to associated heat exchanger members.

- (1) Note. Tube sheet structure is quite different and distinct from tube plate structure. A tube sheet has longitudinal passageway therein, whereas a tube plate has traverse passageways therethrough.

**890.044 Including conduit expansion or inflation:**

This subclass is indented under subclass 890.043. Process wherein the tube joint or tube plate structure is plastically deformed to increase its size or volume.

- (1) Note. Generally, the expansion or inflation is done to perfect the joint structure integrity or to prepare the structure for its particular use.

**890.045 Tube with heat transfer means:**

This subclass is indented under subclass 890.03. Process wherein the heat exchanger or boiler has an elongated hollow generally cylindrical member having features especially adapted for transferring thermal energy.

**890.046 Finned tube:**

This subclass is indented under subclass 890.045. Process wherein the heat transfer means include at least one protuberance.

**890.047 Common fin traverses plurality of tubes:**

This subclass is indented under subclass 890.046. Process wherein at least one fin extends across and is attached to or associated with more than one of the tubes.

**890.048 Helically finned:**

This subclass is indented under subclass 890.046. Process wherein the heat exchanger or boiler has an elongated hollow generally cylindrical structure having spiral protuberances thereon for facilitating heat transfer.

**890.049 Internally finned:**

Process under 890.046 wherein the protuberance is located on the inside surface of the tube.

**890.05 Made from unitary workpiece, i.e., no assembly:**

This subclass is indented under subclass 890.046. Process wherein the finned tube is manufactured from a single preform member or bonded monolithic structure.

**890.051 Boiler making:**

This subclass is indented under subclass 890.03. Process wherein the article made is especially useful for (1) generating steam or (2) heating water in a closed system for distribution of thermal energy.

- (1) Note. Hot water heaters which are not closed systems are excluded from this subclass.

**SEE OR SEARCH CLASS:**

122, Liquid Heaters and Vaporizers, for a closed or pressurized apparatus to heat liquid or make steam.

**890.052 Header or manifold making:**

This subclass is indented under subclass 890.03. Process wherein the article made includes a conduit or chamber for distributing fluid from a series of smaller conduits.

**890.053 Tube making or reforming:**

This subclass is indented under subclass 890.03. Process wherein (1) the article made comprises an elongated hollow generally cylindrical member or (2) such an existing cylindrical member is reshaped.

**890.054 With metallurgical bonding:**

This subclass is indented under subclass 890.03. Process wherein the article made is manufactured employing metal soldering, brazing or welding.

**890.06 Accumulator making:**

This subclass is indented under subclass 592. Process for manufacturing a gas and water device which (1) acts upon a contained fluid to allow the fluid to be discharged rapidly thereby yielding high pneumatic or hydraulic power or (2) enables a uniform steam boiler output to meet an irregular steam demand.

- (1) Note. Prior to the establishment of this subclass (890.06), this subject matter was indented under "Gas and Water Device Making" (old 29/157+). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.

**890.07 Condenser, evaporator or vaporizer making:**

This subclass is indented under subclass 592. Process for manufacturing a gas and water device especially useful for changing matter in its vaporous or gaseous phase to a liquid phase or in its liquid phase to a vaporous or gaseous phase.

- (1) Note. This subclass excludes making driers, per se, since the phase change involved is only incidental to the drying use.
- (2) Note. Prior to the establishment of this subclass (890.07), this subject matter was indented under "Gas and Water

Device Making” (old 29/157+). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

592.1+, for a method of making an electrical device.

SEE OR SEARCH CLASS:

122, Liquid Heaters and Vaporizers, for a closed or pressurized apparatus to heat liquid or make steam.

126, Stoves and Furnaces, for a water heater or steam generator of an open or unpressurized type, or may be a closed or pressurized type if it is part of the stove or furnace structure, subclass 350.2 for a fluid fuel burner other than a top-accessible liquid heating vessel vaporizer or humidifier or subclasses 381.1 and 382.1 for an open-top liquid heating vessel that may include a lid having a condenser for steam from the vessel.

**890.08 Muffler, manifold or exhaust pipe making:**

This subclass is indented under subclass 592. Process for manufacturing a gas and water device which is (1) useful for deadening the noise produced by escaping gas or vapor, (2) a duct through which spent gas leaves an engine or gas turbine or (3) a branch duct arrangement which connects valve parts of a multicylinder internal combustion engine to a carburetor or to an exhaust gas handling system.

- (1) Note. Prior to the establishment of this subclass (890.08), this subject matter was indented under “Gas and Water Device Making” (old 29/157+). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.

SEE OR SEARCH CLASS:

138, Pipes and Tubular Conduits, for a tubular member for transmitting gas, generally.

**890.09 Fluidic or fluid actuated device making:**

This subclass is indented under subclass 592. Process for manufacturing a gas and water article which (1) operates by the interaction of streams of fluids or (2) employs fluid dynamic phenomena to perform control, processing or actuation functions.

- (1) Note. Automatic transmission making and brake system making are not included in this subclass.
- (2) Note. Fluidic power device making is not included in this subclass.
- (3) Note. Fluidic devices are themselves classified in Class 137, subclasses 803+.
- (4) Note. Prior to the establishment of this subclass (890.09), this subject matter was indented under “Gas and Water Device Making” (old 29/157+). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

888+, for process of making a fluidic power device.

**890.1 Fluid Pattern dispersing device making, e.g., ink jet:**

This subclass is indented under subclass 592. Process for manufacturing a gas and water article which is especially useful for projecting, depositing, ejecting, or emitting fluid for producing s:graphic, printing, or other information characters.

- (1) Note. Prior to the establishment of this subclass (890.1), this subject matter was indented under “Gas and Water Device Making” (old 29/157+). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.

**890.11 Tapping device making:**

This subclass is indented under subclass 592. Process for manufacturing a gas and water article which is especially useful for gaining entry or access into a fluid system at a location

which was not previously an entry or access point.

- (1) Note. Prior to the establishment of this subclass (890.11), this subject matter was indented under "Gas and Water Device Making" (old 29/157+). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.

#### **890.12 Valve or choke making:**

This subclass is indented under subclass 592. Process for manufacturing a gas and water device which is especially useful for regulating or controlling the flow of fluids in a piping system or in machinery.

- (1) Note. Installing a preformed valve or valve assembly, per se, into a fluid system, per se, is not herein or hereunder unless some significant shaping or manufacturing occurs such as valve seat forming or assembling valve subcomponents.
- (2) Note. Prior to the establishment of these subclasses (890.12+), this subject matter was indented under "Gas and Water Device Making" (old 29/157+). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.

#### **890.121 Repairing, converting, servicing or salvaging:**

This subclass is indented under subclass 890.12. Process wherein an existing valve or choke is (1) restored or otherwise put in a more functional, stable or improved working condition; (2) mechanically modified or altered to produce an article of substantially different capacity, size, function or type of operation; or (3) treated to recover a portion of the whole thereof which would otherwise constitute discarded material or using such material in a process of mechanical manufacturing.

- (1) Note. See the definition of "repair" in Class 29 Glossary in the Class Definition.
- (2) Note. Making a replacement part, per se, is not found in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 401.1, for a process of converting. Also see the search notes thereunder.
- 402.01+, for a process of repairing. Also see the search notes thereunder.
- 403.1+, for a process including scrap recovery or utilization. Also see the search notes thereunder.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 15.17 for a process having a particular mounting or repairing feature for a valve or valve member, or subclasses 15.18-15.26 for a process of assembling, disassembling, or repairing a valve or valve member.

#### **890.122 Valve seat forming:**

This subclass is indented under subclass 890.12. Process including the step of permanently deforming, shaping or making the annular or circular ring upon which the valve head rests when the valve is in a closed position.

#### **890.123 Valve stem or tire valve making:**

This subclass is indented under subclass 890.12. Process including the step of manufacturing (1) connector structure by means of which a disk or plug is moved thereby opening or closing the valve or (2) an elongated valve for use on pneumatic tires.

#### **890.124 With assembly, disassembly or composite article making:**

This subclass is indented under subclass 890.12. Process wherein the valve or choke which is manufactured is (1) composed of a plurality of interrelated attached components or subcombination elements, some of which are associated or disassociated from the other components or elements during the manufacturing or (2) a unitary structure composed of at least two different materials or compositions with each material or composition retaining its identity.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 15.17 for a process having a particular mounting or repairing feature for a valve or valve member, or subclasses 15.18-

15.26 for a process of assembling, disassembling, or repairing a valve or valve member.

**890.125 Joining plural semi-circular components:**

This subclass is indented under subclass 890.124. Process wherein the valve or choke is manufactured from at least two arcuate members or elements assembled together.

**890.126 With material shaping or cutting:**

This subclass is indented under subclass 890.124. Process wherein the valve or choke is manufactured (1) utilizing a deforming, casting or molding operation or (2) employing a machining, drilling or severing step.

- (1) Note. A coating step, per se, is not a material shaping for the purpose of this subclass.

**890.127 Including molding or casting:**

This subclass is indented under subclass 890.126. Process wherein the material shaping operation includes shaping a liquid or plastic substance into a fixed shape utilizing a forming surface or mold.

**890.128 Including machining or drilling:**

This subclass is indented under subclass 890.126. Process wherein the material shaping operation includes the use of a cutter to remove excess material to produce the desired shaped valve or component thereof.

- (1) Note. The cutter herein is generally a milling, drilling, grinding, broaching or planing tool.

**890.129 Including metallurgical bonding:**

This subclass is indented under subclass 890.126. Process including a metal soldering, welding or brazing step.

**890.13 Including metal deforming:**

This subclass is indented under subclass 890.126. Process including metal shaping employing forces which exceed the elastic limit of the metal, which forces plastically shape the metal without any substantial removal of material.

- (1) Note. See the definition of “deforming” in the Class 29 Glossary in the Class Definition.

**890.131 Including metallurgical bonding:**

This subclass is indented under subclass 890.124. Process wherein the valve or choke is manufactured employing metal soldering, brazing, or welding.

**890.132 Including metal shaping and diverse operation:**

This subclass is indented under subclass 890.12. Process wherein the valve or choke is manufactured by the combined steps of (1) permanently altering the form, configuration, or contour of the workpiece or stock, with or without removal of material, together with (2) an unlike or different manufacturing step, which second step is distinct from the first step although the second step may also constitute another metal shaping operation.

**890.14 Gas and water specific plumbing component making:**

This subclass is indented under subclass 592. Process for manufacturing an article especially adapted for use with gaseous phase matter or with aqueous material, which article is utilized generally by a skilled plumber in the practice of his trade.

- (1) Note. Original placement in this subclass or the indented subclasses requires more than the process of assembling two or more self-sustaining parts, per se.
- (2) Note. Prior to the establishment of this subclass (890.14+), this subject matter was indented under “Gas and Water Device Making” (old 29/157+). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.

SEE OR SEARCH THIS CLASS, SUBCLASS:

428+, for a process including assembling two or more self-sustaining parts. See the definition of “assembly” in Class 29 Glossary in the Class Definition.

## SEE OR SEARCH CLASS:

- 15, Brushing, Scrubbing, and General Cleaning, for utilization of gas or water in that class operation.
- 138, Pipes and Tubular Conduits, for means to transmit gas or water.

**890.141 Plumbing fixture making:**

This subclass is indented under subclass 890.14. Process wherein the manufactured article is a fixed or attached gas and water utility device which is to be installed into a fluid system.

## SEE OR SEARCH CLASS:

- 4, Baths, Closets, Sinks, and Spittoons, for a plumbing fixture, generally

**890.142 Nozzle making:**

This subclass is indented under subclass 890.14. Process wherein the manufactured article is an especially adapted tubelike device, generally streamlined, for accelerating, directing, and dispersing a fluid, whose pressure decreases as it leaves the device.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 890.01, for a method of making a rocket or jet device.

**890.143 Sprayer:**

This subclass is indented under subclass 890.142. Process wherein the manufactured nozzle is especially useful for dispersing or projecting the fluid so as to form a spray.

**890.144 Flexible conduit or fitting therefor:**

This subclass is indented under subclass 890.14. Process wherein the manufactured article is (1) a pliant or nonrigid tube or pipe or (2) an accessory part or component especially adapted for use with (1).

**890.145 Flue connector device making:**

Process under 890.14 wherein the manufactured article forms at least part of an enclosed passageway or channel for conveying flame, hot gases, or smoke to a chimney or to the ambient atmosphere.

**890.146 Trap making:**

This subclass is indented under subclass 890.14. Process wherein the manufactured article is especially useful in a fluid system for preventing the passage of sewer gas or noxious effluent gas while allowing other material and fluid to proceed therethrough.

- (1) Note. A trap generally consists of a bend or partitioned chamber in which the liquid forms a seal to prevent passage of the undesired gas.

**890.147 Return connector device making:**

This subclass is indented under subclass 890.14. Process wherein the manufactured article forms at least part of an enclosed passageway or channel for conveying gas or water back to its starting point or previous location.

**890.148 T-shaped fitting making:**

This subclass is indented under subclass 890.14. Process wherein the manufactured article is an accessory, part, or component especially adapted for use in a fluid system, which part or component has a form or configuration similar to the 20th letter of the English alphabet.

**890.149 Elbow or L-shaped fitting making:**

This subclass is indented under subclass 890.14. Process wherein the manufactured article is an accessory part or component especially adapted for use in a fluid system, which part or component has a form or configuration similar to the bent joint in the human arm or to the 12th letter of the English alphabet.

**890.15 Ferrule making or reforming:**

This subclass is indented under subclass 890.14. Process wherein the manufactured article has a structure similar to a band, ring, cap, collar, or a short tube or bushing.

**891 Agricultural device making:**

This subclass is indented under subclass 592. Process for manufacturing apparatus utilized in the cultivation of the soil producing crops.

**891.1 Traction apparatus, e.g., for tractor:**

This subclass is indented under subclass 891. Process for manufacturing devices related to the motivation of agricultural machinery (e.g.,

crawler type tractor, etc.) with respect to ground contact.

**SEE OR SEARCH CLASS:**

180, Motor Vehicles, subclasses 9+ for track driven motor vehicle structure and subclass 16 for traction wheel attachments.

**891.2 Harvester guard:**

This subclass is indented under subclass 891. Process for manufacturing a protection device for the user of a crop cutting device.

**SEE OR SEARCH CLASS:**

56, Harvesters, subclasses 307+ for guard finger and bar structure for cutter members.

**892 Pulley making:**

This subclass is indented under subclass 592. Process of manufacturing a wheel for transmitting power by means of a band or belt type member passing over its rim.

**SEE OR SEARCH CLASS:**

474, Endless Belt Power Transmission Systems or Components, subclasses 152+ for positive drive pulley structure and subclasses 166+ for friction drive pulleys or guide roll structure.

**892.1 Assembly:**

This subclass is indented under subclass 892. Process wherein the pulley is manufactured from a plurality of permanently associated parts.

**892.11 With shaping:**

This subclass is indented under subclass 892.1. Process including a step of altering form, configuration, or contour of a pulley component.

**892.2 Disc splitting to form pulley rim groove:**

This subclass is indented under subclass 892. Process wherein a circular metal blank is rotated and caused by a tool to divide at its periphery into at least one band or belt receiving channel which is incorporated into a pulley rim.

**SEE OR SEARCH CLASS:**

72, Metal Deforming, subclass 82 for metal deforming by use of rotating

shape imparting tool during work spinning by work holder.

**892.3 Groove forming in sheet metal pulley rim:**

This subclass is indented under subclass 892. Process wherein a thin metal blank is shaped into at least one band or belt receiving channels which is incorporated into a pulley rim.

**SEE OR SEARCH CLASS:**

474, Endless Belt Power Transmission Systems or Components, subclasses 166+ for pulleys with single or plural rim groove structure.

**893 Gear making:**

This subclass is indented under subclass 592. Process of manufacturing a wheel having segmented force transmitting portions thereon such as teeth extending about its periphery.

(1) Note. Processes herein classified may include steps of removing, disassembling, and repairing as part of the gear making process.

**893.1 Assembling of gear into force transmitting device:**

This subclass is indented under subclass 893. Process including the joining of at least one gear into a unit for conveying driving energy or power.

**SEE OR SEARCH CLASS:**

74, Machine Element or Mechanism, subclasses 412+ for directly cooperating gears.

**893.2 Gear mounting:**

This subclass is indented under subclass 893. Process wherein at least one gear is joined or assembled with elements such as an axle, thus forming a gear component assembly.

**893.3 Gear shaping:**

This subclass is indented under subclass 893. Process including mechanically permanently altering the form, configuration, dimensions, proportions or contour of a part or stock either with or without the removal of material to form a gear.

**893.31 Worm gear:**

This subclass is indented under subclass 893.3. Process for the shaping of a gear of the kind having a thread type element which revolves and intermeshes with the driven elements of a rack or wheel device.

## SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 425+ and 458 for worm type gear structure.

**893.32 Roll forming:**

This subclass is indented under subclass 893.3. Process wherein the shaping of the gear includes deforming the gear stock by means of a shaped forming tool which comes in rolling contact with the gear stock during its deformation thereof.

## SEE OR SEARCH CLASS:

72, Metal Deforming, subclasses 102+ for deforming during relative rotation between work and tool using a noncylindrical rotating tool.

**893.33 Punching or stamping:**

This subclass is indented under subclass 893.3. Process wherein the shaping of the gear includes the use of a cutting tool to sever the desired shape from the confines of relatively thin gear stock.

**893.34 Die-press shaping:**

This subclass is indented under subclass 893.3. Process wherein the shaping of the gear includes deforming the gear stock by means of a shaped forming tool or die which substantially imparts its shape to the gear stock as the tool or die applies its deformation force thereto.

## SEE OR SEARCH CLASS:

72, Metal Deforming, subclasses 343+ for deforming with use of closed-die and coacting work forcer (e.g., push-drawing).

**893.35 Gear tooth cutting:**

This subclass is indented under subclass 893.3. Process wherein the shaping of the gear includes removing material from a gear blank utilizing an operating tool, i.e., to cut teeth in

its periphery by removal of material between said teeth.

## SEE OR SEARCH CLASS:

409, Gear Cutting, Milling, or Planing, subclasses 1 through 62 for gear cutting as defined thereunder.

**893.36 Gear blank making:**

This subclass is indented under subclass 893.3. Process wherein stock for material forming a gear is shaped or treated.

**893.37 With specific gear material:**

This subclass is indented under subclass 893.3. Process utilizing particular or special materials both metallic and nonmetallic.

**894 Wheel making:**

This subclass is indented under subclass 592. Process for manufacturing a device having a generally circular, relatively narrow peripheral surface, i.e., a rim, framing an inner surface element, i.e., a connected hub, capable of turning on its central axis.

## SEE OR SEARCH CLASS:

16, Miscellaneous Hardware, subclass 45 for caster wheel structure and subclass 117 for hand wheel type structure.  
74, Machine Element or Mechanism, subclass 572.21 for flywheel structure.  
310, Electrical Generator or Motor Structure, subclass 261.1 for rotor structure.

**894.01 Railway or trolley wheel making:**

This subclass is indented under subclass 894. Process wherein the device is especially adapted for use on rail transportation vehicles or streetcars.

## SEE OR SEARCH CLASS:

72, Metal Deforming, for making a wheel by deforming a metal workpiece.

**894.011 Multiple part or composite:**

This subclass is indented under subclass 894.01. Process wherein the device is made of a plurality of distinct or assembled components.

**894.012 With axle or hub:**

This subclass is indented under subclass 894.011. Process wherein the device includes (a) a center portion or (b) a supporting shaft or member upon which the device revolves.

**894.1 Steering wheel:**

This subclass is indented under subclass 894. Process wherein the wheel made is of the type which is generally manually rotated about its axis to control by means of linkages the direction of movement of a vehicle such as an automobile.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 372+ for a hand wheel.
- 264, Plastic and Nonmetallic Article Shaping or Treating Processes, for molding or shaping processes within the class definition which may include molding and uniting.

**894.2 Material winding, e.g., reel, spool:**

This subclass is indented under subclass 894. Process for manufacturing a device having a core which receives material to be wound thereon.

SEE OR SEARCH CLASS:

- 242, Winding, Tensioning, or Guiding, directed to particular material winding structure such as a reel, bobbin, spool, etc.

**894.3 Land wheel:**

This subclass is indented under subclass 894. Process wherein the wheel made is of the type that is generally mounted on a vehicle or other apparatus so that it supports the vehicle or apparatus against the force of earth's gravity while contacting the earth's surface.

SEE OR SEARCH CLASS:

- 301, Land Vehicles: Wheels and Axles, for a land wheel, per se.

**894.31 Assembling tire to wheel body:**

This subclass is indented under subclass 894.3. Process wherein a wheel surrounding element, i.e., a tire, which may be replaceable is attached to a portion, i.e., the rim, of a wheel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 894.37, for a process of making a nonresilient tire.

**894.32 Disc type wheel:**

This subclass is indented under subclass 894.3. Process wherein the central portion of the wheel is in the form of a generally thin solid circular element, i.e., a disc which supports the rim for turning about the wheel axis upon its hub.

SEE OR SEARCH CLASS:

- 301, Land Vehicles: Wheels and Axles, directed to disc type wheel structure.

**894.321 Assembling wheel disc to rim and hub:**

This subclass is indented under subclass 894.32. Process including joining the disc to both the rim and hub portions of the wheel.

**894.322 Assembling wheel disc to rim:**

This subclass is indented under subclass 894.32. Process including joining the rim portion to the disc portion of the wheel.

**894.323 With disc shaping:**

This subclass is indented under subclass 894.322. Process including a step of altering form, configuration, or contour of the wheel disc.

**894.324 Integral rim and disc making:**

This subclass is indented under subclass 894.32. Process wherein the disc and rim portion are formed out of a unitary blank.

**894.325 Disc shaping:**

This subclass is indented under subclass 894.32. Process comprising of altering the form, configuration, or contour of the wheel disc.

**894.33 Tensioned spoke type wheel making:**

This subclass is indented under subclass 894.3. Process wherein the wheel has individual elements, i.e., spokes which radiate from the center of the wheel and support the rim portion thereof, the elements supporting the rim being in a mechanical state of tension.

- (1) Note. Determining spoke tension and adjusting such accordingly (i.e., wheel truing) is considered wheel making as defined in this subclass.

SEE OR SEARCH CLASS:

301, Land Vehicles: Wheels and Axles, directed to tensioned spoke type wheel structure.

**894.331 Tensioning all spokes simultaneously:**

This subclass is indented under subclass 894.33. Process wherein elongation stress is applied at one moment of time to all spokes of a wheel to place them in a state of mechanical tension.

**894.332 Tensioning spokes in series:**

This subclass is indented under subclass 894.33. Process wherein a plurality of wheel spokes, but less than all, have the tensioning stress applied to them followed by a separate step of tensioning a further plurality of spokes.

**894.333 Tensioning spokes individually:**

This subclass is indented under subclass 894.33. Process wherein each wheel spoke has the tensioning stress applied to it in a separate operation.

**894.34 Compression, e.g., nontension, spoke type wheel making:**

This subclass is indented under subclass 894.3. Process wherein the wheel has individual elements, i.e., spokes radiating from the center of the wheel which support the rim portion thereof, the elements supporting the rim being subjected to no axial force prior to the supporting of any weight by the wheel.

SEE OR SEARCH CLASS:

301, Land Vehicles: Wheels and Axles, directed to nontensioned spoke type wheel structure.

**894.341 Joining spokes to rim and hub:**

This subclass is indented under subclass 894.34. Process including attaching the spokes to both the rim and hub portion of the wheel.

SEE OR SEARCH CLASS:

301, Land Vehicles: Wheels and Axles, subclasses 67 through 85 for spoke connections to felly (rim) and hub.

**894.342 Joining spokes to rim:**

This subclass is indented under subclass 894.34. Process including attaching the spokes to the rim portion of the wheel.

**894.343 Joining spokes to hub:**

This subclass is indented under subclass 894.34. Process including attaching the spokes to the hub portion of the wheel.

**894.344 Making plural spokes from a single blank:**

This subclass is indented under subclass 894.34. Process wherein a plurality of spokes are manufactured from a unitary workpiece.

SEE OR SEARCH CLASS:

301, Land Vehicles: Wheels and Axles, subclass 66 for integrally connected spoke type wheels.

**894.345 Individual spoke making:**

This subclass is indented under subclass 894.34. Process wherein a spoke member is fabricated from stock material.

SEE OR SEARCH CLASS:

301, Land Vehicles: Wheels and Axles, subclass 104 for spoke structure.

**894.35 Rim making:**

This subclass is indented under subclass 894.3. Process for manufacturing the outer peripheral portion of a wheel which is joined to a hub or central portion thereof such as by spokes or a disc element.

SEE OR SEARCH CLASS:

301, Land Vehicles: Wheels and Axles, subclass 95.101 for felly or rim structure.

**894.351 With assembling:**

This subclass is indented under subclass 894.35. Process wherein the rim is manufactured from a plurality of permanently associated parts.

**894.352 Demountable rim making:**

This subclass is indented under subclass 894.351. Process wherein the manufactured rim includes a special feature to facilitate the attaching or detaching of an element such as a tire upon the rim.

## SEE OR SEARCH CLASS:

301, Land Vehicles: Wheels and Axles, subclasses 10.1+ for demountable rim structure.

**894.353 Die-press shaping:**

This subclass is indented under subclass 894.35. Process wherein stock material is deformed by means of a forming tool which substantially imparts its shape to the material as deformation force is applied thereto to form the rim.

**894.354 Roller forming:**

This subclass is indented under subclass 894.35. Process wherein the rim is manufactured from stock material deformed by means of a forming tool which comes in rolling contact with such material.

**894.36 Hub making:**

This subclass is indented under subclass 894.3. Process for manufacturing the central portion of a wheel especially a structure which may be joined at the wheel center with other wheel elements, e.g., spokes, and is used for mounting the wheel for rotation during use.

- (1) Note. A process of repairing a hub is included herein as well as method of demounting a hub from associated elements.

## SEE OR SEARCH CLASS:

301, Land Vehicles: Wheel and Axles, subclasses 105.1+ for hub structure.

**894.361 With assembling:**

This subclass is indented under subclass 894.36. Process wherein the hub is manufactured from a plurality of permanently associated parts.

**894.362 Hub shaping:**

This subclass is indented under subclass 894.36. Process wherein the hub is manufactured of stock material altered in form, configuration, or contour.

**894.37 Tire making:**

This subclass is indented under subclass 894.3. Process for manufacturing a wheel surrounding element joined thereto, usually by means of the wheel rim, said element generally comprising the land contacting surface.

- (1) Note. Excluded from this subclass are the resilient tire molding processes, per se, as defined in Class 156 and the corresponding apparatus, Class 425.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

894.31, for process of assembling tire to wheel body.

## SEE OR SEARCH CLASS:

301, Land Vehicles: Wheels and Axles, subclasses 39.1+ for emergency tire structure and 86+ for nonresilient tire structure.

**894.38 Wheel trim making, e.g., wheel cover, hub-cap:**

This subclass is indented under subclass 894.3. Process for manufacturing a device secured to and rotating with a wheel which device ornaments or protects the wheel.

**894.381 With means for retaining trim member on wheel:**

This subclass is indented under subclass 894.38. Process including a component for securing, generally removably, a trim member to a wheel.

**895 Roller making:**

This subclass is indented under subclass 592. Process for manufacturing a device having a generally cylindrical work contacting surface which surface revolves about the longitudinal axis thereof with rolling motion relative to the surface of the work.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

898.068, for process of manufacturing a cylindrical rolling component for use in a anti-friction bearing.

SEE OR SEARCH CLASS:

72, Metal Deforming, subclass 236 for a disclosure of roller reconditioning or lubricating.

76, Metal Tools and Implements, Making, subclass 107.1 for a process of making a die roll.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, for method of making rolls by lamination.

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclass 73 for the electroforming of a roll, ring, or hollow body; subclasses 131+ for the electrolytic coating of an internal surface (e.g., inside of a cylinder, etc.); and subclass 151 for the electrolytic coating of a predominantly single metal or alloy cylinder, roll, or hollow article.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, for molding and shaping of plastic materials within the class definition.

409, Gear Cutting, Milling, or Planing, subclass 305 for a machine for planing a groove in the curved surface of a roll to provide a scored surface, e.g., for forming the surface of a grinding roll, a crushing roll, etc.

427, Coating Processes, subclasses 230+, for a process of coating the interior of a hollow article, including a roll, by other than immersion.

451, Abrading, subclasses 49+ for a process of grinding a roll, roller, shaft, ball, or piston.

492, Roll or Roller, for a roller of general utility not elsewhere provided for; see the notes thereunder.

#### **895.1 Repairing or servicing:**

This subclass is indented under subclass 895. Process comprising the restoring of an existing roller to a more functional, stable, or improved working condition.

(1) Note. See the definition of "repair" in the Class 29 Glossary in the Class Definition.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

402.01+, for particular repair operations which may be utilized in repair of a roller. Also see the search notes thereunder.

#### **895.2 Assembling preformed components:**

This subclass is indented under subclass 895. Process for joining or juxtaposing in a permanent relationship the previously manufactured elements of a roller.

SEE OR SEARCH CLASS:

492, Roll or Roller, for a roll not elsewhere provided for, and see the notes thereunder.

#### **895.21 Work contacting surface element assembled to core:**

This subclass is indented under subclass 895.2. Process wherein a previously formed work contacting surface is assembled to an interior centrally portioned support element.

SEE OR SEARCH CLASS:

492, Roll or Roller, for a roll not elsewhere provided for, and see the notes thereunder.

#### **895.211 Work contacting surface wound about core:**

This subclass is indented under subclass 895.21. Process wherein the previously formed work contacting surface is in the form of an elongated strip-like element which is caused to sinuously encircle the interior centrally positioned support element.

#### **895.212 With prestressing of component by heat differential, e.g., shrink fit:**

This subclass is indented under subclass 895.21. Process including the use of temperature variation to change a dimension of a part relative to another part to facilitate the joining of the parts by a subsequent temperature variation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

447, for general processes of assembly or joining during mechanical manufacture with prestressing of part by heat differential.

**895.213 Work contacting surface having annular axial sections:**

This subclass is indented under subclass 895.21. Process wherein the work contacting surface includes at least two abutting annular elements axially of another along the axis of rotation of the roll.

SEE OR SEARCH CLASS:

492, Roll or Roller, subclasses 40+ for a roll, not elsewhere provided for, having axially stacked annular members.

**895.22 Work contacting surface element assembled to end support members:**

This subclass is indented under subclass 895.2. Process wherein the opposing end portions of a cylindrical work contacting surface element are assembled to end engaging holding or driving members.

**895.23 Includes securing removable cover on roller:**

This subclass is indented under subclass 895.2. Process including the step of placing and holding a sheet, strip, or tube element in position on a roller body element.

SEE OR SEARCH CLASS:

492, Roll or Roller, subclasses 22+ for a roll, not elsewhere provided for, having means to hold the edge of a sheet, strip, or tube element thereon.

**895.3 Fabricating and shaping roller work contacting surface element:**

This subclass is indented under subclass 895. Process including the steps of manufacturing the body of or configuring the roller work contacting surface element.

(1) Note. This subclass includes treating the surface of a roller work contacting surface element to change its surface characteristic or shape (i.e., roughening or crowning).

SEE OR SEARCH CLASS:

492, Roll or Roller, for a roll not elsewhere provided for, and see the notes thereunder.

**895.31 Toothed roller:**

This subclass is indented under subclass 895.3. Process for forming, applying, and securing metallic teeth to the surface of cylindrical bodies.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

23.1, for machines and tools for forming, applying, and securing metallic teeth to the surface of cylindrical bodies.

**895.32 With coating or casting about a core:**

This subclass is indented under subclass 895.3. Process wherein the work contacting surface element is formed by covering the surface of an interior support element with a relatively thin layer of material applied, for example, projecting a liquid material against said surface or by molding a fluent material against said surface which material hardness to form said layer.

(1) Note. In some instance, the formed work contacting surface element is formed on a mandrel from which it may be removed and mounted on another interior support element for use.

SEE OR SEARCH CLASS:

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, for molding and shaping within the class definition.

**895.33 One-piece roller making:**

This subclass is indented under subclass 895. Process wherein the roller is made of one piece such as by molding or casting.

(1) Note. A blank may be shaped by forming steps such as drawing, coining, and swaging into the final roller configuration.

**896.1 Dental appliance making:**

This subclass is indented under subclass 592. Process for manufacturing a device pertaining to or for the teeth such as a denture, a bridge, a crown, or an artificial tooth.

**SEE OR SEARCH CLASS:**

433, Dentistry, subclasses 215+ for a method or material for testing, treating, restoring, or removing natural teeth.

**896.11 Orthodontic device making:**

This subclass is indented under subclass 896.1. Process wherein the device is especially adapted for correcting abnormally aligned or positioned teeth.

**896.2 Sound device making:**

This subclass is indented under subclass 592. Process for manufacturing a device especially adapted for producing, recording, amplifying, modifying, or otherwise altering a vibratory disturbance in a fluid or solid, which disturbance is capable of being detected by the organs of hearing.

**896.21 Hearing aid component making:**

This subclass is indented under subclass 896.2. Process wherein the manufactured device is especially adapted to be worn in order to compensate for poor hearing.

**SEE OR SEARCH CLASS:**

600, Surgery, subclass 25 for a process of surgically implanting a vibratory hearing aid. Also see the search note thereunder.

**896.22 Musical instrument or tuning fork making:**

This subclass is indented under subclass 896.2. Process wherein the manufactured device is especially adapted (a) for producing sounds or tones possessing rhythm, melody, and harmony or (b) for producing a sound of fixed pitch useful as a reference, as in adjusting a musical instrument.

**SEE OR SEARCH CLASS:**

84, Music, subclasses 1+ for a musical instrument, per se, and subclasses 454+ for a turning device, per se.

**896.23 Including diaphragm or support therefor:**

This subclass is indented under subclass 896.2. Process wherein the manufactured device (a) includes a thin disk whose vibrations convert electric signals to sound waves or sound waves to electric signals or (b) bears the weight of or holds in position such a disk.

**SEE OR SEARCH CLASS:**

181, Acoustics, especially subclasses 148+ for a diaphragm and enclosure and subclasses 157+ for a diaphragm, per se, and/or mounting or suspension means therefor.

**896.24 Phonograph component making:**

This subclass is indented under subclass 896.2. Process wherein the manufactured device is a machine for reproducing sound from a record disk or a part of such a machine.

**SEE OR SEARCH CLASS:**

369, Dynamic Information Storage or Retrieval, subclasses 99+ for specific detail of information handling portion of system.

**896.3 Watch or clock making:**

This subclass is indented under subclass 592. Process for manufacturing (a) a device especially adapted for measuring or indicating time such as by means of a numbered dial and moving hands or pointers or (b) a part of such a device.

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

228, for means to apply or remove a flat spiral spring to or from a watch or clock.

**SEE OR SEARCH CLASS:**

368, Horology: Time Measuring Systems or Devices, subclasses 62+ for a chronological device, per se.

**896.31 Having arbor, pinion, or balance:**

This subclass is indented under subclass 896.3. Process wherein the manufactured device or part includes (a) a spindle of a wheel, (b) a small cogwheel engaged by a larger cogwheel or a rack, or (c) a wheel adapted for attaining equilibrium.

- (1) Note. Included herein is a blank to be made into an arbor, pinion, or balance.

SEE OR SEARCH CLASS:

- 368, Horology: Time Measuring Systems or Devices, especially subclasses 127+ for a balance wheel-type escapement and subclass 322 for arbor and pinion details.

**896.32 Having indicia, face, or dial:**

This subclass is indented under subclass 896.3. Process wherein the manufactured device or part includes(a) identifying marks for indicating the time or (b) the front marked side indicating the time.

- (1) Note. Included herein is a blank to be made into an indicia, face, or dial.

SEE OR SEARCH CLASS:

- 368, Horology: Time Measuring Systems or Devices, especially subclasses 232+ for dial details, per se.

**896.33 Having case, cover, or back:**

This subclass is indented under subclass 896.3. Process wherein the manufactured device or part includes(a) a container or receptacle or (b) a wrapper or protector.

- (1) Note. Included herein is a blank to be made into a case, cover, or back.

SEE OR SEARCH CLASS:

- 72, Metal Deforming, subclasses 343+ for disclosure of push-drawing or deep-drawing, subclasses 412+ for a tool couple embodying a nonplanar tool face, and cross-reference art collection 703 for knurling.
- 368, Horology: Time Measuring Systems or Devices, especially subclasses 276+ for a case.

**896.34 Having crown, stem, or pendent:**

This subclass is indented under subclass 896.3. Process wherein the manufactured device or part includes(a) a small projecting shaft by which a watch or clock is set or wound; (b) an expanded button or knob for use on (a); or (c) a dangling, suspended, or projecting member.

- (1) Note. Included herein is a blank to be made into a crown, stem, or pendent.

SEE OR SEARCH CLASS:

- 72, Metal Deforming, subclasses 343+ for disclosure of push-drawing or deep-drawing, subclasses 412+ for a tool couple embodying a nonplanar tool face, and cross-reference art collection 703 for knurling.
- 368, Horology: Time Measuring Systems or Devices, especially subclasses 301+ for cases with pendent details and subclasses 319+ for crown or stem details.

**896.4 Jewelry or locket making:**

This subclass is indented under subclass 592. Process for manufacturing a device or component especially adapted for adornment purposes such as an ornament made of precious or decorative material or set with gems or gem imitations.

- (1) Note. A method of making a jewelry box or a case for containing jewelry is included herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 10, for gem or jewel setting.

SEE OR SEARCH CLASS:

- 163, Needle and Pin Making, subclasses 1+ for making a needle, generally.

**896.41 Human adornment device making:**

This subclass is indented under subclass 896.4. Process wherein the manufactured device or component is especially adapted to decorate or lend beauty to a person who wears the device or component.

**896.411 Bracelet making:**

This subclass is indented under subclass 896.41. Process wherein the manufactured device or component is for encircling the human wrist, arm, ankle, or leg.

**896.412 Finger ring making:**

This subclass is indented under subclass 896.41. Process wherein the manufactured device or component is for encircling one of the five digits on the human hand or foot.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

8, for forming or sizing a finger ring.

**896.42 Latch, clasp, or fastener component making:**

This subclass is indented under subclass 896.4. Process wherein the manufactured device or component is especially adapted for securing or holding together a jewelry or locket device.

**896.43 Ornamental stock making:**

This subclass is indented under subclass 896.4. Process wherein the manufactured device or component is raw material or a blank especially adapted for producing an ornament therefrom.

**896.5 Knob or knob shank making:**

This subclass is indented under subclass 592. Process for manufacturing a device or component having (a) a rounded protuberance offset from a surface or extremity or (b) a tang or stem for mounting (a).

(1) Note. A knob is generally useful for opening or operating purposes.

SEE OR SEARCH CLASS:

292, Closure Fasteners, subclass 347 for a closure knob, generally.

**896.6 Multiperforated metal article making:**

This subclass is indented under subclass 592. Process for making multiple perforations in a metallic sheet, tube, etc.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

6.1+, for a process or apparatus for making apertures in sheet material and thereafter deforming the apertured portion of the sheet to form an expanded metal article.

SEE OR SEARCH CLASS:

83, Cutting, subclasses 13+ for a process of cutting, generally.  
205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclass 75 for an electrolytic method of making a perforated article.  
428, Stock Material or Miscellaneous Articles, subclass 592 for metallic stock material which is helical or has a helical component and subclass 596 for such material which has apertures or cuts.

**896.61 Coil wound wall screen:**

This subclass is indented under subclass 896.6. Process for making a perforated filtering device which includes a spiral element for performing the filtering.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

905, for a cross-reference art collection of methods for making a coil wound wall screen.

SEE OR SEARCH CLASS:

166, Wells, subclass 231 for a spiral well screen.  
210, Liquid Purification or Separation, subclass 497.1 for a helically wound filter.  
242, Winding, Tensioning, or Guiding, subclasses 430+ for making a composite hollow object by an operation of that class.

**896.62 Filter:**

This subclass is indented under subclass 896.6. Process of making a perforated article which will be used to separate particles from material flowing through the article.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

902, for a cross-reference art collection including a method for making a filter.

## SEE OR SEARCH CLASS:

210, Liquid Purification or Separation, subclass 498 for a filter having a perforated or grooved plate.

**896.7 Turnbuckle making:**

This subclass is indented under subclass 592. Process for (a) manufacturing a coupling device used for tightening a rod or cable or (b) assembling a tensioning member to such a device.

**896.8 Spring-head clip making:**

This subclass is indented under subclass 592. Process for manufacturing a clasp or fastener especially adapted for use on railway rolling stock such as a carriage spring head or a spring clip.

## SEE OR SEARCH CLASS:

24, Buckles, Buttons, Clasps, etc., subclasses 455+ for a clip, per se, generally.  
105, Railway Rolling Stock, subclasses 157.1+ for a railway truck including a spring-head clip.

**896.9 Spring making:**

This subclass is indented under subclass 592. Process for manufacturing an elastic device or component that regains its original shape after being compressed or extended.

- (1) Note. A spring made (a) by metal working without an assembly or diverse manufacturing step or (b) including any tempering or hardening step is generally not found as an original patent in Class 29.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

896.8, for a process of making a spring-head clip peculiar to railway usage.

## SEE OR SEARCH CLASS:

72, Metal Deforming, for bending, generally, a metal workpiece; especially subclass 66 for coiling by a workguide member orbiting about the longitudinal centerline of a formed coil and subclasses 135+ for making a helical coil by deflecting.

140, Wireworking, for working wire stock by operations other than provided for in the metal deforming class, especially subclass 89 for spring setting and subclass 103 for the loop forming of a coil spring.

148, Metal Treatment, for modifying or maintaining metal microstructure (i.e., tempering, hardening, solution heat treating, etc.) with or without assembly or diverse operations.

267, Spring Devices, for a spring, per se.

428, Stock Material or Miscellaneous Articles, subclass 592 for metallic stock material which is helical.

**896.91 For vehicle or clutch:**

This subclass is indented under subclass 896.9. Process wherein the elastic device is especially adapted for use in (a) a device or conveyance for carrying passengers, freight, goods, or equipment or (b) a device for engaging and disengaging two working parts of a shaft or of a shaft and a driving mechanism.

**896.92 For human comfort:**

This subclass is indented under subclass 896.9. Process wherein the elastic device is especially adapted for providing physical ease or well being to mankind.

- (1) Note. Generally these devices are for use in cushions, chairs, beds, furniture, or sofas.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

896.93, for a method of making a shock or vibration absorber, per se.

**896.93 Resilient shock or vibration absorber utility:**

This subclass is indented under subclass 896.9. Process wherein the elastic device is especially adapted for damping or dissipating mechanical impact, collision, wave fluctuation, or periodic quivering.

**897 Structural member making:**

This subclass is indented under subclass 592. Process of manufacturing an element utilized in supporting relationship with other elements as components of an entity such as a building or vehicle.

- (1) Note. Prior to the issuance of the classification order establishing this subclass (897), this subject matter was indented under "Braces and Brackets" (old 29/150) and "Columns and Girders" (old 29/155). Other subclasses under Class 29, subclasses 592+ have not been screened for this subject matter.

## SEE OR SEARCH CLASS:

- 72, Metal Deforming, for apparatus or process for the mechanical treatment of metal work.

**897.1 Restoring existing member, e.g., reinforcing, repairing:**

This subclass is indented under subclass 897. Process wherein an element is returned or improved to a more functional or stable working condition.

## SEE OR SEARCH CLASS:

- 228, Metal Fusion Bonding, for joining the meeting faces of engaged metal work parts.

**897.15 Grille making:**

This subclass is indented under subclass 897. Process wherein the manufactured structural member is a grating or screen.

- (1) Note. A grille is generally used to protectively cover or shield an opening for fluid or a communication receiver, transmitter, or amplifier.

**897.2 Vehicular structural member making:**

This subclass is indented under subclass 897. Process for manufacturing a structural member which is integral with a transporting device, e.g., an automobile, airplane, or ship.

## SEE OR SEARCH CLASS:

- 105, Railway Rolling Stock, for structural element of wheeled cars bodies, etc., of such vehicles.  
280, Land Vehicles, for structural elements of wheeled and other type of such vehicles.  
296, Land Vehicles: Bodies and Tops, for body and top structural elements of such vehicles.

**897.3 Static structure, e.g., a building component:**

This subclass is indented under subclass 897. Process of manufacturing elements utilized in immovable ground attached shelter and other utility type construction, e.g., masts, light, and telephone poles.

## SEE OR SEARCH CLASS:

- 52, Static Structures (e.g., Buildings), for building and other structural elements.

**897.31 Openwork, e.g., a truss, joist, frame, lattice-type or box beam:**

This subclass is indented under subclass 897.3. Process for manufacturing a structural element area having passages or openings wherein the openings are formed by plural members held at spaced intervals or by perforating sheet-like members.

## SEE OR SEARCH CLASS:

- 52, Static Structures (e.g., Buildings), subclasses 633+ for openwork structures including truss, screen, frame, etc.

**897.312 Frame component:**

This subclass is indented under subclass 897.31. Process for manufacturing a constituent part of an openwork structure for enclosing or supporting something such as a window, door, etc.

**897.32 Panel:**

This subclass is indented under subclass 897.3. Process for manufacturing (1) a pair of opposed facings or sheet-like members retained by internal supporting structure or (2) a thin sheet-like member forming a surface or part of a larger surface.

## SEE OR SEARCH CLASS:

- 52, Static Structures (e.g., Buildings), subclasses 474+ for facer and subclasses 782.1+ for composite prefabricated panel.

**897.33 Columnar member:**

This subclass is indented under subclass 897.3. Process of manufacturing a member used for supporting compressional loads while in a sub-

stantially vertical orientation, e.g., column, pole, post, etc.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

897.35, for process of manufacturing a beam or girder.

SEE OR SEARCH CLASS:

- 52, Static Structures (e.g., Buildings), subclasses 633 through 697 for open-work structures and subclasses 831-857 for elongated rigid structure.
- 174, Electricity: Conductors and Insulators, subclass 45 for towers, poles, or posts.
- 362, Illumination, subclass 431 for pole or post type support.

**897.34 Metal reinforcement member for nonmetallic, e.g., concrete, structural element:**

This subclass is indented under subclass 897.3. Process for manufacturing an element of a metallic nature, e.g., iron, steel, etc., which is incorporated for strengthening purposes within a substantially nonmetallic element such as a cast concrete column.

SEE OR SEARCH CLASS:

- 52, Static Structures (e.g., Buildings), subclasses 600 through 602 for opaque stone-like module with elongated reinforcing and subclasses 851-857 for elongated rigid structure often used to reinforce concrete.

**897.35 Beam or girder:**

This subclass is indented under subclass 897.3. Process of manufacturing an elongated rigid member whose longitudinal dimension is much greater than its width and depth and is utilized as a principle horizontal support member in building.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

897.33, for method of manufacturing a column.

SEE OR SEARCH CLASS:

- 52, Static Structures (e.g., Buildings), subclasses 831 through 849 for an elongated rigid structure.

**898 Process for making bearing or component thereof:**

This subclass is indented under subclass 592. Process for manufacturing a machine part or a component thereof, which part is designed for general use, where one member continuously bears the weight of another and wherein there is either linear motion (a crosshead), rotary motion (of a shaft or axle), or oscillating movement (a lever between the two members).

- (1) Note. The subclasses hereunder include (a) methods of mounting and demounting bearings where such methods are especially utilized to connect or disconnect a specified bearing to supporting structure, (b) methods of lubricating bearing, (c) methods of sealing bearings, (d) methods of surface treating bearing elements, and (e) pre-usage processes (i.e., freeing, preloading, adjusting and aligning bearing, or bearing elements).

SEE OR SEARCH CLASS:

- 72, Metal Deforming, subclasses 343+ for a process or apparatus for deforming metal by use of a closed die and coacting work forcer, including making a ball or a race.
- 384, Bearings, for a bearing, generally, especially subclasses 276+ for a sleeve or lining, per se.
- 419, Powder Metallurgy Processes, subclass 28 for a process of making a miscellaneous article from comminuted metal in which a bond is obtained by heat with or without pressure and including significant subsequent shaping of the blank.

**898.01 Repairing:**

This subclass is indented under subclass 898. Process wherein an existing bearing or component thereof is restored to a more functional, stable, or improved working condition.

- (1) Note. See the definition of repair in Class 29, definitions paragraph III, Terms of Definitions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

402.01+, for particular repair operations which may be utilized in repair of a bearing.

**898.02 Fluid bearing:**

This subclass is indented under subclass 898. Process of manufacturing a bearing wherein liquid or gas under pressure is used to support a component in whole or in part during relative movement of the manufactured bearing.

- (1) Note. Fluid (i.e., liquid, or gas) support and lubrication both involve interposing a fluid between relatively moving members. In general, the difference between them is that lubrication merely minimizes contact between the members whereas fluid support eliminates it altogether via a thicker layer of fluid. Almost all gas, hydrodynamic, or hydrostatic bearings involve fluid support.

SEE OR SEARCH CLASS:

384, Bearings, subclass 12 for linear fluid bearings and subclass 100 for rotary fluid bearings.

**898.03 Linear Bearing:**

This subclass is indented under subclass 898. Process of manufacturing a bearing wherein a bearing surface supports a member which has sliding or line movement in a straight direction relative to it.

SEE OR SEARCH CLASS:

384, Bearings, subclasses 7+ for specified linear type bearing devices.

403, Joints and Connections, subclasses 52+ for two or more members connected together by a joint which includes a guide or slide.

**898.04 Rotary bearing:**

This subclass is indented under subclass 898. Process of manufacturing a bearing wherein the relative motion between the bearing and supported members includes a rotary component.

- (1) Note. This subclass includes a bearing arrangement wherein the relative motion between the supported and bearing

members may be a result of flexure of a portion of the bearing (i.e., a resilient rotary oscillating movement).

**898.041 Thrust bearing:**

This subclass is indented under subclass 898. Process of manufacturing a bearing designed for loads imposed in the direction of the axis of rotation.

SEE OR SEARCH CLASS:

384, Bearings, for various types and structural features of thrust bearings.

**898.042 Plain bearing:**

This subclass is indented under subclass 898.04. Process of manufacturing a bearing wherein a bearing surface supports a member which has sliding or line contact relative to it.

- (1) Note. The term plain is used to distinguish from the so-called anti-friction type bearing which employs balls or rollers.

**898.043 Self-adjusting or self-aligning, including ball and socket type, bearing and component making:**

This subclass is indented under subclass 898.042. Process for manufacturing a bearing wherein relatively sliding surfaces in a support structure for the bearing permit continuous self-movement of the position of the bearing thereby correcting a misalignment of related components of the bearing included herein are bearings wherein one component has a spheroid portion, i.e., a ball, which is received in a recess of another component, i.e., a socket, and there relative sliding movement between the two components.

- (1) Note. The term "ball" is broadly used to refer to a bearing component which includes a spherically shaped bearing portion but does not refer necessarily to a "ball" in the sense of an entire spheroid surface. The ball in many instances is a truncated "ball", i.e., cut off (more or less) at opposite ends thereof.

**898.044 Deforming socket to secure ball:**

This subclass is indented under subclass 898.043. Process of altering the shape of the ball receiving socket to facilitate the retention therein of the ball.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

243.5+, for overedge assembling apparatus.  
441.1, for a method of assembling a sphere within a socket including deforming while retaining clearance for motion between the assembled parts.  
725, for apparatus for assembling a roller or ball bearing by deformation.

SEE OR SEARCH CLASS:

72, Metal Deforming, subclasses 362+ for deforming processes.  
384, Bearings, subclass 207 for sheet metal socket structure and subclass 208 for ball and socket assembly structure.

**898.045 Die-press shaping:**

This subclass is indented under subclass 898.044. Process wherein the step of deforming the socket is done by means of a shaped forming tool or die which substantially imparts its shape to the socket as the tool or die applies its deformation force thereto.

SEE OR SEARCH CLASS:

72, Metal Deforming, subclasses 343+ for deforming by use of closed die and coacting work forcer.

**898.046 Having liner:**

This subclass is indented under subclass 898.045. Process including the step of providing a structural element between the ball and socket components which element provides a sliding surface for at least one of said components.

(1) Note. The liner element is distinct from a mere coating layer on either of the ball and socket components.

**898.047 Having liner:**

This subclass is indented under subclass 898.043. Process including the step of providing a structural element between the ball and socket components, which element provides a

sliding surface, for at least one of said components.

(1) Note. The liner element is distinct from a mere coating layer on either of the ball and socket components.

**898.048 Socket making:**

This subclass is indented under subclass 898.043. Process including the step of manufacturing the socket component.

SEE OR SEARCH CLASS:

384, Bearings, subclass 207 for sheet metal socket.

**898.049 By molding or casting:**

This subclass is indented under subclass 898.048. Process wherein the socket component is made by shaping substantially flowable and settable material about the ball component.

SEE OR SEARCH CLASS:

164, Metal Founding, subclasses 47+ for shaping liquid metal against a forming surface.  
264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 239+ for mechanical shaping or molding to form or reform shaped article.

**898.05 Nonmetallic socket:**

This subclass is indented under subclass 898.048. Process wherein material other than metal is utilized to form the socket component.

**898.051 By assembling:**

This subclass is indented under subclass 898.048. Process wherein the socket is manufactured from a plurality of permanently associated parts.

SEE OR SEARCH CLASS:

384, Bearings, subclass 208 for assembly structure of ball and socket type bearing.

**898.052 Ball making:**

This subclass is indented under subclass 898.043. Process including the step of manufacturing the ball component.

(1) Note. The term "ball" is broadly used to refer to a bearing component which

includes a spherically shaped bearing portion, but does not refer necessarily to "ball" which in many instances is a truncated ball, i.e., cut off (more or less) at opposite ends thereof.

**SEE OR SEARCH CLASS:**

384, Bearings, subclass 211 for structure or assembly of ball of "ball and socket" type bearing.

**898.053 With metallurgical bonding:**

This subclass is indented under subclass 898.052. Process wherein the step of making the ball component includes joining separate elements together by metal fusion techniques such as welding, soldering, or brazing.

**SEE OR SEARCH CLASS:**

384, Bearings, subclass 212 for structure for assembly of sectional type ball of ball and socket type bearing.

**898.054 Sleeve or bushing making:**

This subclass is indented under subclass 898.042. Process including the manufacture of a usually removable cylindrical lining for an opening which lining supports an element either rotary, oscillating, or nonrotary which has sliding or line contact relative to it.

- (1) Note. The lining may include cylindrical shaped segments.

**SEE OR SEARCH CLASS:**

384, Bearings, subclasses 276+ for plain type bearing structure with specified sleeve or liner.

**898.055 Nonmetallic:**

This subclass is indented under subclass 898.054. Process wherein material other than metal is utilized in the manufacture of the sleeve or bushing which material provides functional sleeve characteristics such as flexibility.

- (1) Note. The inclusion of a metallic backing or lining member as a component of such bearings does not effect their non-metallic designation since the dominant functional characteristics of such bearings result from the nonmetallic components thereof.

**SEE OR SEARCH CLASS:**

384, Bearings, subclasses 297+ for a plain bearing with specified nonmetal sleeve or liner.

**898.056 Strip or blank material shaping:**

This subclass is indented under subclass 898.054. Process including the step of shaping an elongated substantially narrow workpiece, i.e., a strip or a bendable predimensioned sheet blank into a sleeve or bushing type bearing element.

**SEE OR SEARCH CLASS:**

72, Metal Deforming, subclasses 362+ for appropriate metal deforming processes.

**898.057 Die-press shaping:**

This subclass is indented under subclass 898.056. Process wherein the means for manufacturing or altering the shape of the sleeve or bushing includes a movable member to forcibly press strip or blank material into a shaped cavity to such an extent that the work has impressed therein a shape in substantial conformance with at least a portion of said shaped cavity.

**898.058 Having inner lining layer:**

This subclass is indented under subclass 898.057. Process including the step of forming an adhering layer of material on the inner bearing surface of the sleeve or bushing.

**898.059 Having liner:**

This subclass is indented under subclass 898.054. Process including the step of providing an element on the inner cylindrical surface of the sleeve or bushing which slidably supports a movable element thereon.

**SEE OR SEARCH CLASS:**

384, Bearings, subclass 282 for a plain bearing with specified sleeve or liner having a bearing surface insert.

**898.06 Anti-friction bearing or component thereof:**

This subclass is indented under subclass 898.04. Process wherein the relative motion between the weight bearing and the supported member includes a rotary component and the

friction between the members is in the nature of rolling friction, as in a ball or roller bearing.

- (1) Note. The components of anti-friction bearings include races, cages, and rolling friction members, i.e., rollers or balls, which terms are used uniformly in this and the indented subclasses as defined hereafter:

**RACE**

A structural member including the contact surface or raceway for rolling friction members such as rollers or balls.

**CAGE**

Members for mechanically spacing the rolling function members such as balls or rollers in their contact with the raceway.

**ROLLING FRICTION MEMBERS**

Those members, commonly balls or rollers, which provide that the friction between the relatively movable anti-friction bearing members is of the rolling type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 724, for roller or ball bearing type anti-friction bearing assembling or disassembling means.

SEE OR SEARCH CLASS:

- 205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclass 73 for a process of making a roll, a ring, or a hollow body by electroforming.
- 384, Bearings, subclasses 445+ for anti-friction bearing assemblies and components.

**898.061 Assembling of race, cage and rolling anti-friction members:**

This subclass is indented under subclass 898.06. Process including the assembly of anti-friction bearing components, specifically, races, cages, and rollers or balls.

- (1) Note. See "assembly" in Glossary in the Class Definition.

SEE OR SEARCH CLASS:

- 384, Bearings, subclasses 510, 511, and 537 for specified means facilitating assembly of a ball bearing; subclasses 559+, 584, and 585 for roller bearing assembling means; and subclasses 600 and 617 for thrust bearing type assembling means.

**898.062 Assembling of race and rolling anti-friction members:**

This subclass is indented under subclass 898.06. Process wherein the assembled elements include races and either rollers or balls.

- (1) Note. See search notes to subclass 898.061 regarding means facilitating assembly, etc.

**898.063 With race making:**

This subclass is indented under subclass 898.062. Process including the step of manufacturing the race.

**898.064 Assembling of cage and rolling anti-friction members:**

This subclass is indented under subclass 898.06. Process wherein the assembled elements include a cage and either a roller or a ball.

- (1) Note. See search notes to subclass 898.061 regarding means facilitating assembly, etc.

**898.065 With cage making:**

This subclass is indented under subclass 898.064. Process including the step of manufacturing the cage.

**898.066 Race making:**

This subclass is indented under subclass 898.06. Process for manufacturing a race.

- (1) Note. See defined terms under subclass 898.06 for definition of a race.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 898.063, for race making included with steps of assembling the race, ball, or roller members.









**904 LAMINATED METAL ARTICLE MAKING:**

This subclass is indented under the class definition. Cross-reference art collection relating to a method of manufacturing metal ware having united superposed layers.

**SEE OR SEARCH CLASS:**

- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 60+ for a method of surface bonding under the class definition.
- 228, Metal Fusion Bonding, subclasses 101+ for a method of metallurgically bonding.
- 413, Sheet Metal Container Making, subclasses 1+ for a method of fabricating a sheet metal receptacle or an element thereof.
- 427, Coating Processes, subclasses 402+ for a method of applying superposed diverse coating or coating a coated base.

**SEE OR SEARCH CLASS:**

- 376, Induced Nuclear Reactions: Processes, Systems, and Elements, for a nuclear device or an element thereof.
- 419, Powder Metallurgy Processes, for a method including a powder metallurgy step.
- 427, Coating Processes, subclasses 5+ for a method of coating a radioactive base or applying a radioactive coating. Fish Tail Shore was named for its natural shape. Over the ages, sand deposits have built up from both sides of the point creating a natural harbor. This campsite is located on the north side of the reservoir.

END

**905 MAKING COIL WOUND WALL SCREEN:**

This subclass is indented under the class definition. Cross-reference art collection of documents relating to a method of manufacturing a filtering device which includes spiral elements for performing the filtering.

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

- 896.61, for a method of fabricating a coil wound wall screen of multiperforated metal.

**SEE OR SEARCH CLASS:**

- 140, Wireworking, subclasses 71+ for a method of making an article from wire.

**906 NUCLEAR DEVICE MAKING:**

This subclass is indented under the class definition. Cross-reference art collection of documents relating to a method of manufacturing an article which releases energy by atomic fission or fusion or by radioactive decay.