

CLASS 420, ALLOYS OR METALLIC COMPOSITIONS

SECTION I - CLASS DEFINITION

STATEMENT OF CLASS SUBJECT MATTER

This is the generic class for alloys containing metal or metallic compositions which contain a continuous phase of metal and methods of making same not provided elsewhere. This class will also take "elemental" metal, per se.

RULES OF PATENT PLACEMENT

Patents have been placed in this class employing the so called "genus-species" rule. Following this rule as between a generic subclass and its indents a species unprovided for in any indented subclass is specifically classified in the generic subclass. Thus a patent containing claims to both a provided for and an unprovided for species is placed as an original in the generic subclass as the first appearing subclass and cross-referenced to the indented subclass for the provided for species.

The primary basis of classification in this class is the elemental composition of the alloy, or metallic composition without regard to the method of incorporation, or the state of the element in the product. As to impurities, a substance which is recited as optionally present as an impurity, e.g., "up to a certain percent", or "not over a certain percent" has been disregarded for purposes of classification. Thus, when searching for an alloy, or metallic composition containing a very small quantity of an ingredient consideration should be given to the possibility that the ingredient might have been disclosed as being an impurity and classified as if it were not present. If, however, an element is claimed as an impurity but is recited as being positively present in at least some minimum amount this element is considered to be a positive constituent of the product and classified accordingly. In subclasses 8+ hereunder some subclasses contain limitations as to the percentages of an element present. When an alloy falls exactly on the recited percentage whether or not the alloy is included depends on the wording of the subclass limitation. If the subclass recites "X percent or more" than exactly X percent is included, if the subclass recited "more than X percent" then exactly X percent is excluded. As examples compare subclass 34, "9 percent or more chromium containing" with subclass 94 "over 10 percent nickel containing". An alloy containing exactly 9 percent chromium is included under subclass 34 whereas an alloy containing exactly 10 percent nickel is excluded from subclass 94.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

CHEMICAL COMPOUND AND COMPOSITION CLASSES (NONMETALLURGICAL).

In general, a composition called an alloy and containing metal is *prima facie* proper for this class (420) unless other disclosure positively reveals it to be properly classified elsewhere. A disclosure that nonmetallic particles are bonded by metal will be taken to denote a continuous phase of metal proper for Class 420 absent specific disclosure to the contrary. Cases of doubt as to whether a continuous phase of metal exists will be resolved in favor of placement in Class 420. A so called alloy which contains no metal is excluded from Class 420 and classified as a composition based upon its use or function. See References to Other Classes, below for classes specifically related to Nonmetallurgical Chemical Compound and Composition Classes.

The rules for determining Class placement of the Original Reference (OR) for claimed chemical compositions are set forth in the Class Definition of Class 252 in the section LINES WITH OTHER CLASSES AND WITHIN THIS CLASS, subsection COMPOSITION CLASS SUPERIORITY, which includes a hierarchical ORDER OF SUPERIORITY FOR COMPOSITION CLASSES.

METALLURGICAL AND METALLIC STOCK CLASSES

Class 420 provides for alloys, or metallic compositions which are intended to be of generally uniform character thought. While perfect uniformity is very difficult to achieve, this class (420) will take products which are not completely uniform where the intent is to produce a practically uniform product and any nonuniformity is accidental, or incidental and is not desired, or intended to give the product advantageous properties. Where a nonuniform product is desired, or intended, e.g., differing composition, or properties in different portions, etc., the product is considered to be stock and classified as appropriate in Classes 148, or 428 as discussed below.

This order of superiority among various metal, alloy, and metal stock areas and methods of manufacture involving them is as follows.

1. Class 419, Powder Metallurgy Processes.

2. Class 148, Metal Treatment, subclasses 22+, compositions for treatment of solid metal.

3. Class 75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 300, 301, and 303+, gaseous, liquid, or solid treating compositions for liquid metal or charges, and subclass 302, welding rod defined by composition.

4. Class 75, subclasses 228+, consolidated metal powder compositions and subclasses 255+, loose metal particulate mixtures.

5. Class 420, Alloys or Metallic Compositions, claimed as products.

6. Class 148, subclasses 95-122, 194-287, and 500-714, in the schedule order, providing for certain processes of treating solid or semi-solid metal by modifying or maintaining the internal physical structure (i.e., microstructure) or chemical properties of metal, processes of reactive coating of metal or processes of chemical-heat removing (e.g., flame-cutting, etc.) or burning of metal. However, if metal casting, fusion bonding, machining, or working is involved, there is a requirement of significant heat treatment as described in the Class 148 definition.

7. Class 148, subclasses 33+ barrier layer stock material and subclasses 400+, stock.

8. Class 75, subclasses 331+, processes of making solid particulate alloys directly from liquid metal and subclasses 343+, processes of producing or purifying alloys in powder form.

9. Class 75, subclasses 10.1+ and 10.67, processes of making alloys by electrothermic, electromagnetic, or electrostatic processes.

10. Class 420, Alloys or Metallic Compositions, processes of manufacture.

11. Class 75, subclasses 330+, processes of making metal and processes of treating liquid metals and liquid alloys and consolidating metalliferous material.

12. Class 204, Chemistry: Electrical and Wave Energy, processes.

13. Class 164, Metal Founding, subclasses 1+, processes.

14. Class 266, Metallurgical Apparatus, subclasses 44+, processes of operating metallurgical apparatus.

This list is not complete and may be added to as the proper relationship of other areas is determined.

See References to Other Classes, below for classes specifically related to Metallurgical And Metallic Stock Classes.

ARTICLE CLASSES.

The former rule known as the alloy "rule" has been abolished. Patents claiming an article by name only without any positive structural limitation and reciting the alloy, or metallic composition of which the article is made are properly classifiable in this class (420). This is true whether, or not the alloy, or metallic composition is claimed, per se, or whether it has specific properties making it particularly suitable for such article. There are, however, some article areas which have not yet as of 1981 been brought into conformance with this line. For these exceptions note is made to the list in the class definition of Class 106, Composition: Coating or Plastic, under (1) Note, section (b).

See References to Other Classes, below for classes specifically related to Article Classes.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 303+ for solid treating compositions for liquid metal or a charge for producing metal or treating liquid metal. The compositions in subclasses 303+ do not encompass alloys or metallic compositions, per se, even if used as treating agents. Another ingredient utilized in producing or refining or metal must be present with the alloy or metallic composition to be acceptable to these composition subclasses. An alloy or metallic composition made by consolidating base metal particles or a mixture of metal and nonmetal particles is proper for Class 75, subclasses 303+ or subclasses 228+ unless (a) all the components are melted or dissolved or (b) a part of the components are melted and the mass is treated as a

fluent liquid (e.g., stirring, pouring, etc.) in which instances the product is proper for Class 420. Cases of doubt will be resolved in favor of placement in Class 75, subclasses 303+ or subclasses 228+. Class 75, subclasses 303+ or subclasses 255+ provide for compositions containing loose metal particles not elsewhere provide for. Class 420 provides for a free metal or a single alloy or metallic composition in particulate form. However, a blend of free metal particles or alloy or metallic composition particles with other particles whether another free metal, another alloy or metallic composition, or a nonmetal is proper for Class 75, subclasses 303+ or subclasses 255+. Class 420 also provides for patents claiming an article by name only without any positive structural limitation and reciting the metal or alloy metallic composition of which the article is made. Processes of making solid particulate alloys or metallic compositions directly from liquid metal will be found in Class 75, subclasses 331+ and processes of producing alloys or metallic composition in powder form will be found in Class 75, subclasses 343+. In the instances in which the above mentioned processes are claimed and a process of making an alloy is claimed in generalized terms the patent will go as an original to Class 75 and a cross reference will be placed in Class 420. Processes of making an alloy by electrothermic, electromagnetic, or electrostatic steps will be found in Class 75, subclasses 10.1+ or subclass 10.67. In the instances in which the electrothermic, electromagnetic, or electrostatic steps are claimed and a process of making an alloy is claimed in generalized terms the patent will go as an original to Class 75 and a cross reference will be placed in Class 420. In the instances in which the electrothermic, electromagnetic or electrostatic steps are claimed and an alloy or metallic composition is claimed as a product the patent will go as an original to Class 420 and a cross reference will be placed in Class 75. The line between Class 75 and Class 420 is necessarily a difficult one since the metals produced by the processes of Class 75 are often impure and the Class 420 alloys are sometimes made from ores. Therefore, the following lines will be observed. A process of making an alloy of desired compositions for an end use will be classified in Class 420 even if made by reducing compounds or ore. A method of reduction or smelting to yield metal without intent to

obtain a particular alloy or metallic composition will be classified in Class 75, even if it is recognized that the product is impure. Furthermore, methods of melting, refining, or purifying an existing alloy will be placed in Class 75. (Metallurgical and Metallic Stock Classes.)

- 106, Compositions: Coating or Plastic, for plastic compositions containing metal, or alloy fillers, or pigments and subclass 290 for pigment compositions containing metal alloy powders. This class (420) however, provides for an alloy, or metallic composition, per se, in powdered form even though claimed as a pigment. Under compositions containing a free metal. (Chemical Compound And Composition Classes-Non-metallurgical)
- 148, Metal Treatment, appropriate subclasses for processes of treating solid or semi-solid metal to modify or maintain the internal physical structure (i.e., microstructure) or chemical properties of metal. If metal casting, fusion bonding, machining, or working is involved, there is a requirement of significant heat treatment as defined in the Class 148 definition. Note that Class 420 is superior and thus when both Class 420 claims to an alloy, or metallic composition, per se, and Class 148 process claims are present in the same patent, the original is placed in Class 420 with cross-reference in Class 148. Class 148, subclass 24, is the location for a mixture of a powdered alloy or metallic composition with particles of a flux. Class 148, subclasses 400+, is the location for elemental metal, alloy or metallic compositions which (a) are the product of a process of Class 148, e.g., significantly heat treated, age hardened, etc., (b) are claimed in terms of specific magnetic properties, (c) are amorphous, (d) possess the property of shape memory, (e) are the product of a significant Class 164, Metal Founding step, e.g., chill cast, directionally solidified, etc., or (f) are the product of the dispersion of particulate matter in molten metal, which, particulate matter retains its identity in the final product, e.g., dispersion strengthened, etc. Class 420 provides for an alloy or metallic composition in which the claims include a recitation of physical, or chemical properties such as noncorrosiveness, hardness, of ductility which are inherent properties of the composition. Since Class 420 is superior, a patent containing both types of alloy or metallic composition claims is classified originally in

- Class 420 and cross-referenced to Class 148, subclasses 400+. Please note, in general no cross-references based on disclosures have been made from Class 148, subclasses 400+, stock, to Class 420 except from Class 148, subclasses 402, 403, and 404. Thus, for a complete search of possible unclaimed disclosure of alloys by composition, consideration should be given to expanding the search to the appropriate areas of Class 148, subclasses 300+ for magnetic stock material which is claimed as resulting from a Class 148 treatment or for stock material claimed in terms of a specified magnetic property, (e.g., coercive force, etc.). Class 420, however, provides for alloys or metallic compositions defined only as "magnetic", "magnetized", or "permanent magnet" material even though disclosed as resulting from a Class 148 treatment as well as alloys, or magnetic compositions claimed, per se, which are inherently magnetic. (Metallurgical and Metallic Stock Classes.)
- 164, Metal Founding, for a method of casting molten metal including the step of alloying while teaming (pouring), or in the mold. Otherwise a combined method of preparing an alloy followed by casting thereof is proper for Class 420. (Metallurgical and Metallic Stock Classes.)
- 204, Chemistry: Electrical Wave Energy, subclass 293 for electrodes for electrolytic devices claimed by name only and defined by the alloy, or metallic compositions of which they are made. (Article Class)
- 205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, especially subclasses 334+ for electrolytic synthesis of an alloy or metallic composition. If, however, the alloy or metallic composition is also claimed as such, the patent is placed originally in Class 420 and cross-referenced to Class 205. (Chemical Compound And Composition Classes-Nonmetallurgical)
- 252, Compositions, subclass 1 for miscellaneous compositions not having a utility provided for elsewhere in the composition classification; subclass 62.3 for barrier layer device compositions. This class (420) however, provides for an alloy, or metallic composition, per se, which is a barrier layer composition; subclasses 62.51+ for magnetic compositions. This class (420), however, provides for an alloy, or metallic composition, per se, which is inherently magnetic, or is defined in terms of its magnetic properties. (Chemical Compound And Composition Classes-Nonmetallurgical)
- 266, Metallurgical Apparatus, for apparatus useful in preparing a Class 420 alloy. For related apparatus classified elsewhere see the search notes to Class 266. (Metallurgical and Metallic Stock Classes.)
- 423, Chemistry of Inorganic Compounds, for methods of storage of hydrogen by combination with an alloy no matter by what mechanical, whether chemical reaction, or sorbtion, and whether or not a stiochrometric compound is formed. This class (420) provides for an alloy, or metallic composition, per se, disclosed, or claimed as useful for binding hydrogen for purposes of storage no matter whether by chemical reaction, or sorbtion. (Chemical Compound And Composition Classes-Nonmetallurgical)
- 428, Stock Material or Miscellaneous Articles, for structurally defined stock material or blanks made wholly, or partially of metal. Consult the Class 428 definition for a detailed description of the structure proper for that class. Particularly pertinent subclasses are: subclasses 544+, for stock which is all metal, or contains adjacent metals. Subclass 545 for metallic stock which contains a continuous phase of metal interengaged with a continuous phase of nonmetal. Subclass 615 for composite metal stock having plural, adjacent spatially distinct metal components e.g., layers, welded joint, etc. For this and indented subclasses there must be a sharp gradation between the plural components. Where there is a gradual gradation of properties, e.g., differentially heat treated etc., see Class 148, subclasses 400+. (Metallurgical and Metallic Stock Classes.)
- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, for an alloy, or metallic composition claimed, or solely disclosed as useful in a method of that class (430), particularly subclasses 85+ for alloys useful for use as photoconductors in electric photography, e.g., xerography, etc. (Chemical Compound And Composition Classes-Nonmetallurgical)
- 501, Compositions: Ceramic, for so called alloys which contain no metal and which have the properties, e.g., hard refractory, etc., associated with ceramic compositions. (Chemical Compound And Composition Classes-Nonmetallurgical)

- 506, Combinatorial Chemistry Technology: Method, Library, Apparatus, for a library (e.g., chemical, biological, etc.) or a process of creating said library.
- 523, and 524 Synthetic Resin or Natural Rubbers, for compositions containing a metal, alloy, or metallic composition as a pigment, or filler in a synthetic resin matrix, or continuous phase. (Chemical Compound And Composition Classes-Nonmetallurgical)
- Florentium (Promethium)
- Glucinum (Beryllium)
- Illinium (Promethium)
- Masurium (Technetium)
- Neoytterbium (Ytterbium)

SECTION IV - GLOSSARY

Asterisked * terms are employed in section C, Chemistry and Metallurgy of the International Patent Classification (IPC) and have the same meaning herein.

The following is a list of synonyms of names of metals used in this class (mostly obsolete). They are followed in parentheses by the metal names used in this class.

Synonym Name used herein

- Aldebaranium (Ytterbium)
- Austrium (Gallium (ipure))
- Cassiopeium (Lutecium)
- Celtium (Lutecium)
- Demonium (Dyprosium)
- Didymium (Mixture of neodymium and paraseodymium)
- Dwi-manganese (Rhenium)
- Eka-aluminum (Gallium)
- Eka-boron (Scandium)
- Eka-caesium (Virginium)
- Eka-Iodine (Astatine)
- Eka-manganese (Technetium)
- Eka-silicon (Germanium)
- Eka-tantalum (Protoactinium)
- Erythronium (Vanadium)

Niobium (Columbian (Note: while niobium is the internationally standard name among chemists, columbium is still widely used among metallurgists in the USA)).

Tungsten (Wolfram (Note: while wolfram is the internationally standard name among chemists, tungsten is still preferred among metallurgists in the USA)).

ALKALI METAL*

A metal of the groups Lithium, Sodium, Potassium, Rubidium, Cesium and Francium.

ALKALINE EARTH METAL*

A metal of the group Calcium, Strontium, Barium and Radium.

ALLOY

A union, possessing metallic properties of two or more metallic elements, or of nonmetallic element(s) and metallic element(s) which are not pure compounds and which are miscible with each other, at least to a certain extent when molten, to form a more, or less homogeneous liquid having a metallic matrix and which do not separate into distinct layers when solid. Such combinations when solidified from a melt may consist of mechanical mixtures, eutectics, eutectoids, solid solutions, or in part of chemical compounds one, or more of which may exist at the same time. Intermetallic compounds are considered alloys for purposes of classification.

BASE

A metal which is present in an amount of over 50 percent by weight in an alloy, or metallic composition.

LANTHANIDE*

An element of atomic number 57 to 71 inclusive.

METAL*		promethium and all elements of atomic number 84 and higher.
Element other than nonmetal (q.v.)	2	Actinide base singly or in combination: This subclass is indented under subclass 1. Alloy or metallic composition in which contains over 50 percent of a single metal of atomic number 89 to 103 inclusive, or wherein the total of all these metals taken together is over 50 percent of weight of the total alloy or metallic composition.
METALLIC COMPOSITION		
A composition which contains a continuous phase of metal and no continuous phase of nonmetal.		
NOBLE METAL*		
A metal of the group Ruthenium, Rhodium, Palladium, Osmium, Iridium, Platinum, Gold and Silver.	3	Uranium base: This subclass is indented under subclass 2. Alloy or metallic composition which contains over 50 percent uranium.
NONMETAL*		
An element of the group, Hydrogen, Boron, Carbon, Silicon, Nitrogen, Phosphorus, Oxygen, Sulfur, Selenium, Tellurium, Fluorine, Chlorine, Bromine, Iodine, Astatine, Helium, Neon, Argon, Krypton, Xenon and Radon.	4	Iron base: This subclass is indented under subclass 1. Alloy or metallic composition which contains over 50 percent iron.
PRECIOUS METAL	5	Magnesium base: Alloy or metallic composition under subclass I which contains over 50 percent magnesium.
Synonym for Noble Metal*		
RARE EARTH*	6	Nickel or cobalt base: This subclass is indented under subclass 1. Alloy or metallic composition which contains over 50 percent nickel or over 50 percent cobalt.
An element of the group Scandium, Yttrium and the Lanthanides*.		
REFRACTORY METAL*	7	Aluminum base: This subclass is indented under subclass 1. Alloy or metallic composition which contains over 50 percent aluminum.
A metal of the group Titanium, Zirconium, Hafnium, Vanadium, Niobium, Tantalum, Chromium, Molybdenum and Tungsten.		
TRANSITION METAL*	8	Ferrous (i.e., iron base): This subclass is indented under the class definition. Alloy or metallic composition containing over 50 percent of iron.
An element of atomic number 21-30, 39-48 or 57-80.		

SUBCLASSES

- 1 Radioactive:**
This subclass is indented under the class definition. Alloys or metallic composition which is claimed as being radioactive, containing an isotope of an element of which is radioactive or containing an element of which all known isotopes are radioactive.
- (1) Note. The elements of which all known isotopes are radioactive are technetium,
- (1) Note. This and indented subclasses will take so called feralloys e.g., ferrosilicon, etc., where the percentage of iron is not specified. Where there are indented subclasses hereunder which provide for different percentages of alloying ingredient e.g., chromium, the patent is classified in the subclass providing for the largest percentage of alloying ingredient in the absence of recitations that a smaller percentage is present.

- 9 1.7 percent or more carbon containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains 1.7 percent or more carbon.
- (1) Note. This and indented subclasses contain patents drawn to graphitic steel.
- 10 Six percent or more total group IV, V, or VII transition metals containing:**
This subclass is indented under subclass 9. Alloys or metallic composition which additionally contains 6 percent or more total content of titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum, or tungsten, singly or in combination.
- (1) Note. Many patents in this and indented subclasses are so called "hard facing" alloys, which contain a high concentration of hard carbide precipitates.
- 11 Eight percent or more chromium containing:**
This subclass is indented under subclass 10. Alloy or metallic composition which additionally contains 8 percent or more of chromium.
- 12 Molybdenum, tungsten or vanadium containing:**
This subclass is indented under subclass 11. Alloy or metallic composition which additionally contains one or more of molybdenum, tungsten or vanadium.
- 13 2.7 percent or more carbon equivalent containing:**
This subclass is indented under subclass 9. Alloy or metallic composition in which the total of the carbon content plus one third the silicon content plus one sixth the phosphorus content is 2.7 percent or more, i.e., cast iron.
- (1) Note. The recitation "cast iron" shall be taken as indicating a carbon equivalent of 2.7 percent or more in the absence of a specific disclosure to the contrary.
- 14 Boron containing:**
This subclass is indented under subclass 13. Alloy or metallic composition which additionally contains boron.
- 15 Chromium containing:**
This subclass is indented under subclass 13. Alloy or metallic composition ... which additionally contains chromium.
- 16 Nickel containing:**
This subclass is indented under subclass 15. Alloy or metallic composition which additionally contains nickel.
- 17 Molybdenum:**
This subclass is indented under subclass 16. Alloy or metallic composition additionally contains molybdenum.
- 18 Process of adding magnesium:**
This subclass is indented under subclass 13. Processes of preparing an alloy or metallic composition wherein magnesium is added to the alloy or metallic composition.
- (1) Note. The magnesium is usually added to cause carbon in the molten alloy to precipitate in spherical form, thus increasing the strength and ductility of the solid alloy, i.e., production of so called "nodular iron" or "spherulitic cast iron" etc.
- 19 Adding magnesium as a liquid, vapor or as a solid agent entrained by a gas (e.g., fluidized):**
This subclass is indented under subclass 18. Process of adding magnesium to an alloy or metallic composition where the magnesium is added in molten form as a liquid, is vaporized and added to the alloy metallic composition in the gaseous state or wherein a solid agent containing magnesium is entrained in a gas and added to the alloy or metallic composition while so entrained.
- (1) Note. The recitation that a solid magnesium additive is added in a "fluidized" state renders a patent appropriate for this subclass.
- 20 Flowing molten iron alloy onto solid magnesium containing agent, or adding solid mag-**

nesium containing agent to molten stream of iron alloy:

This subclass is indented under subclass 18. Process wherein a molten stream of iron alloy is poured onto a solid magnesium containing agent, e.g., in the bottom of a vessel, or wherein a solid magnesium containing agent is added to a molten stream of iron alloy, e.g., by continuously adding particles of agent to the molten stream.

SEE OR SEARCH CLASS:

- 164, Metal Founding, appropriate subclasses for similar processes wherein the solid magnesium containing agent is placed in a mold, followed by pouring molten iron, or wherein the molten iron is recited as being treated by a solid magnesium containing agent while being poured into a mold.
- 21 Mechanically plunging magnesium containing agent below surface of iron alloy melt:**
This subclass is indented under subclass 18. Processes wherein the magnesium containing agent is mechanically forced below the surface of the iron alloy melt, e.g., by employing a plunging bell.
- 22 Separate addition of plural agents, at least one containing magnesium:**
This subclass is indented under subclass 18. Process wherein plural agents of different compositions are separately added to an alloy or metallic compositions under subclass 13, at least one of the agents containing magnesium.
- (1) Note. The additions of plural agents may be separated by physical location or separated by time.
- 23 Magnesium containing agent is coated, impregnated or compacted (e.g., briquetted, coated particles):**
This subclass is indented under subclass 18. Processes wherein the magnesium is contained in an agent which is coated, impregnated or compacted e.g., briquettes.
- 24 Magnesium present in agent only as a compound with a nonmetal:**
This subclass is indented under subclass 18. Process wherein the magnesium is added to the iron alloy only as a compound with a nonmetal
- and the additive contains no metallic magnesium or alloy thereof.
- (1) Note. To be classified in this subclass, there must be a positive disclosure that the magnesium compound decomposes or reacts to yield metallic magnesium in the iron alloy. In the absence of such disclosure a patent is classified elsewhere under subclasses 13+ as appropriate.
- 25 In agent also containing silicon, rare earth or alkaline earth metal:**
This subclass is indented under subclass 18. Processes wherein magnesium in the iron alloy in an agent which additionally contain at least one of silicon, scandium, yttrium, a lanthanide metal, calcium, strontium or barium.
- 26 Copper containing:**
This subclass is indented under subclass 13. Alloy or metallic composition which additionally contains copper.
- 27 Nickel or molybdenum:**
This subclass is indented under subclass 13. Alloy or metallic composition which additionally contains at least one of nickel or molybdenum.
- 28 Over .1 percent aluminum containing:**
This subclass is indented under subclass 13. Alloy or metallic composition which additionally contains more than 0.1 percent of aluminum.
- 29 Processes:**
This subclass is indented under subclass 13. Processes of manufacturing an alloy or metallic composition .
- 30 Adding rare earth or alkaline earth metal:**
This subclass is indented under subclass 29. Process which includes a step of adding one or more of scandium, yttrium, a lanthanide metal, calcium, strontium or barium to the alloy or metallic composition.
- 31 Adding sulfur, selenium or tellurium:**
This subclass is indented under subclass 29. Process which includes a step of adding one or more of sulfur, selenium or tellurium to the alloy or metallic composition.

- 32 Adding vanadium, titanium, niobium or zirconium:**
This subclass is indented under subclass 29. Process which includes a step of adding one or more of vanadium, titanium, niobium or zirconium to the alloy or metallic composition.
- 33 Adding silicon:**
This subclass is indented under subclass 29. Process which includes a step of adding silicon to the alloy or metallic composition.
- 34 Nine percent or more chromium containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains 9 percent or more of chromium.
- (1) Note. Many of the alloys classified in this and indented subclasses are called "stainless steel" because the presence of 9 percent or more chromium makes an iron base alloy relatively resistant to corrosion. The recitation that a ferrous alloy is a "stainless steel" will *prima facie* be taken as meaning that the alloy is properly classified in this or indented subclass in absence of a specific indication that the alloy does not contain 9 percent or more chromium.
- 35 Noble metal containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains one or more of silver, gold, ruthenium, rhodium, palladium, osmium, iridium or platinum.
- 36 Cobalt containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains cobalt.
- 37 Molybdenum or tungsten containing:**
This subclass is indented under subclass 36. Alloy or metallic composition which additionally contains at least one of molybdenum or tungsten.
- 38 Nickel containing:**
This subclass is indented under subclass 37. Alloy or metallic composition which additionally contains nickel.
- 39 Copper containing:**
This subclass is indented under subclass 37. Alloy or metallic composition which additionally contains copper.
- 40 Rare earth containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains at least one of scandium, yttrium or a lanthanide metal.
- 41 Lead, bismuth, antimony, calcium, selenium or tellurium containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains at least one of lead, bismuth, antimony, calcium or tellurium.
- (1) Note. These materials are commonly added in small amounts to improve the machinability of the alloy.
- 42 Over 0.05 percent sulfur, over 0.04 percent phosphorus or sulfur or phosphorus added in any amount to promote machinability:**
This subclass is indented under subclass 34. Alloys or metallic composition which contains one or more of more than 0.05 percent sulfur or more than 0.04 percent phosphorus or which contain any amount of sulfur or phosphorus which is positively stated to be present to promote machinability of this alloy or metallic composition.
- 43 Eight percent or more nickel containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains 8 percent or more of nickel.
- (1) Note. This amount of nickel usually renders the alloy austenitic.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
56, for austenitic stainless steel which contains less than 8 percent nickel but which contains manganese instead to bring the total of the two elements to over 8 percent.

- 44 Over 2 percent manganese containing:**
This subclass is indented under subclass 43. Alloy or metallic composition which additionally contains more than 2 percent of manganese.
- 45 Copper containing:**
This subclass is indented under subclass 44. Alloy or metallic composition which additionally contains copper.
- 46 Molybdenum or tungsten containing:**
This subclass is indented under subclass 44. Alloy or metallic composition which additionally contains one or more of molybdenum or tungsten.
- 47 Group IV or V transition metal containing:**
This subclass is indented under subclass 46. Alloy or metallic composition which additionally contains one or more of titanium, zirconium, hafnium, vanadium, niobium or tantalum.
- 48 Group IV or v transition metal containing:**
This subclass is indented under subclass 44. Alloy or metallic composition which additionally contains one or more of titanium, zirconium, hafnium, vanadium, niobium or tantalum.
- 49 Copper containing:**
This subclass is indented under subclass 43. Alloy or metallic composition which additionally contains copper.
- 50 Over 1.5 percent silicon containing:**
This subclass is indented under subclass 43. Alloy or metallic composition which additionally contains more than 1.5 percent silicon.
- 51 Group IV or V transition metal containing:**
This subclass is indented under subclass 50. Alloy or metallic composition which additionally contains one or more of titanium, zirconium, hafnium, vanadium, niobium or tantalum.
- 52 Molybdenum containing:**
This subclass is indented under subclass 43. Alloy or metallic composition which additionally contains molybdenum.
- 53 Group IV or V transition metal containing:**
This subclass is indented under subclass 52. Alloy or metallic composition which additionally contains one or more of titanium, zirconium, hafnium, vanadium, niobium or tantaium.
- 54 Group IV or V transition metal containing:**
This subclass is indented under subclass 43. Alloy or metallic composition which additionally contains one or more titanium, zirconium, hafnium, vanadium, niobium or tantalum.
- 55 Over 0.1 percent carbon containing:**
This subclass is indented under subclass 43. Alloy or metallic composition which additionally contains more than 0.1 percent of carbon.
- 56 Eight percent or more total nickel plus manganese containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains a total quantity of nickel plus manganese of 8 percent or more.
- (1) Note. When the alloy contains 8 percent or more manganese, nickel may be completely absent.
- (2) Note. This amount of nickel plus manganese usually renders the alloy austenitic.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
43, for authentic stainless steel which contains 8 percent or more nickel.
- 57 Molybdenum or tungsten containing:**
This subclass is indented under subclass 56. Alloy or metallic composition which additionally contains one or more of molybdenum or tungsten.
- 58 Copper containing:**
This subclass is indented under subclass 56. Alloy or metallic composition which additionally contains copper.
- 59 Over 0.20 percent nitrogen containing:**
This subclass is indented under subclass 56. Alloy or metallic composition which additionally contains more than 0.20 percent nitrogen.

- 60 Copper containing:**
This subclass is indented under subclass 34. Alloy on metallic composition which additionally contains copper.
- 61 Molybdenum or tungsten containing:**
This subclass is indented under subclass 60. Alloy or metallic composition which additionally contains one or more of molybdenum or tungsten.
- 62 Over 0.1 percent aluminium containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains more than 0.1 percent aluminum.
- 63 Molybdenum or tungsten containing:**
This subclass is indented under subclass 62. Alloy or metallic compositions which additionally contains more of molybdenum or tungsten.
- 64 Boron containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains boron.
- 65 0.25 percent or more nitrogen containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains 0.25 percent or more nitrogen.
- 66 Group IV or V transition metal containing:**
This subclass is indented under subclass 65. Alloy or metallic composition which additionally contains one or more of titanium, zirconium, hafnium, vanadium, niobium or tantalum.
- 67 Molybdenum or tungsten containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains one or more of molybdenum or tungsten.
- 68 Titanium, zirconium, or hafnium containing:**
This subclass is indented under subclass 67. Alloy or metallic composition which additionally contains one or more of titanium, zirconium or hafnium..
- 69 Vanadium, niobium or tantalum containing:**
This subclass is indented under subclass 67. Alloy or metallic composition which additionally contains one or more of vanadium, niobium and tantalum.
- 70 Group IV or V transition metal containing:**
This subclass is indented under subclass 34. Alloy or metallic composition which additionally contains one or more of titanium, zirconium, hafnium, vanadium, niobium or tantalum.
- 71 Processes:**
This subclass is indented under subclass 34. Processes of producing alloys or metallic composition .
- (1) Note. While this subclass provides for processes of producing alloys under subclass 34 not specifically provided in the indents above, e.g., ferrochrome, it is also employed as a collecting point for cross-references to processes of general utility in preparing a wide range of alloys classified in different subclasses under subclass 34.
- 72 Eight percent or more manganese containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains 8 percent or more of manganese.
- (1) Note. The alloys classified in this and indented subclass are often referred to as "authentic manganese steel" or "Hadfield steel". These recitations shall be considered *prima facie* sufficient for classification hereunder in the absence of an indication that the alloy does not contain 8 percent or more manganese.
- 73 Nickel containing:**
This subclass is indented under subclass 72. Alloy or metallic composition which additionally contains nickel.
- 74 Chromium containing:**
This subclass is indented under subclass 72. Alloy or metallic composition which additionally contains chromium.

- 75 Titanium containing:**
This subclass is indented under subclass 72. Alloy or metallic composition which additionally contains chromium.
- 76 Copper containing:**
This subclass is indented under subclass 72. Alloy or metallic composition which additionally contains copper.
- 77 Four percent or more aluminium containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains 4 percent or more aluminium.
- 78 Over 2 percent silicon containing:**
This subclass is indented under subclass 77. Alloy or metallic composition which additionally contains more than 2 percent silicon.
- 79 Chromium containing:**
This subclass is indented under subclass 77. Alloy or metallic composition which additionally contains chromium.
- 80 Nickel or cobalt containing:**
This subclass is indented under subclass 78. Alloy or metallic composition which additionally contains at least one of nickel or cobalt.
- 81 Zirconium, vanadium or titanium containing alloy or metallic composition:**
This subclass is indented under subclass 77. Alloy or metallic composition which additionally contains one or more of zirconium, vanadium or titanium.
- 82 Noble metal containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains one or more of silver, gold, ruthenium, rhodium, palladium, osmium, iridium or platinum.
- 83 Rare earth metal containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains one or more of scandium, yttrium or a lanthanide metal.
- 84 Lead, bismuth, selenium, tellurium or calcium containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains one or more of lead, bismuth, selenium, tellurium or calcium.
- (1) Note. These elements are usually added to ferrous alloys in small amounts to improve the machinability of the alloy.
- 85 Processes:**
This subclass is indented under subclass 84. Processes of incorporating one or more additional element under subclass 84 into a ferrous alloy.
- 86 Adding lead:**
This subclass is indented under subclass 85. Processes wherein the added elements under subclass 84 includes lead.
- 87 Over 0.05 percent sulfur, over 0.04 percent phosphorus, or sulfur or phosphorus added in any amount to promote machinability:**
This subclass is indented under subclass 8. Alloy or metallic composition which contains one or more of more than 0.05 percent sulfur or more than 0.04 percent phosphorus or which contain any amount of sulfur or phosphorus which is positively stated to be present to promote machinability of this alloy or metallic composition.
- 88 Processes of making or treating alloy containing over 0.04 percent phosphorus:**
This subclass is indented under subclass 87. Processes wherein an alloy containing over 0.04 Percent phosphorus is made or treated.
- 89 Copper containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains copper.
- 90 Chromium containing:**
This subclass is indented under subclass 89. Alloy or metallic composition which additionally contains chromium.

- 91 Nickel containing:**
This subclass is indented under subclass 90. Alloy or metallic composition which additionally contains nickel.
- 92 Nickel containing:**
This subclass is indented under subclass 89. Alloy or metallic composition which additionally contains nickel.
- 93 Vanadium, zirconium, titanium or molybdenum containing:**
This subclass is indented under subclass 89. Alloy or metallic composition which additionally contains one or more vanadium, zirconium, titanium or molybdenum.
- 94 Over 10 percent nickel containing:**
This subclass is indented under subclass 89. Alloy or metallic composition which additionally contains more than 10 percent nickel.
- (1) Note. Many of the alloys in this and indented subclasses are called "maraging" steels, which can be age hardened to very high levels of strength.
- 95 Cobalt containing:**
This subclass is indented under subclass 94. Alloy or metallic composition which additionally contains cobalt.
- 96 Molybdenum containing:**
This subclass is indented under subclass 94. Alloy or metallic composition which additionally contains molybdenum.
- 97 Chromium containing:**
This subclass is indented under subclass 94. Alloy or metallic composition which additionally contains chromium.
- 98 Over 1 percent silicon containing:**
This subclass is indented under subclass 94. Alloy or metallic composition which additionally contains more than 1 percent.
- 99 One percent or more carbon containing, but less than 1.7 percent:**
This subclass is indented under subclass 8. Alloy or metallic composition containing 1 percent or more carbon.
- (1) Note. Due to schedule superiority, alloys containing 1.7 percent or more carbon are classified above in subclasses 9+. Patents classified in subclasses 9+ above are not cross-referenced to this or indented subclasses unless there is a positive disclosure of an alloy containing less than 1.7 percent carbon.
- 100 Chromium containing:**
This subclass is indented under subclass 99. Alloy or metallic composition which additionally contains chromium.
- (1) Note. Many patents in this and indented subclasses are drawn to alloys which are sufficiently heat resistant to be used to cut metal at relatively high speed, i.e., "high speed" steel.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
104+, for so called "high speed" steel alloys containing less than 1 percent carbon.
- 101 Molybdenum containing:**
This subclass is indented under subclass 100. Alloy or metallic composition which additionally contains molybdenum.
- 102 Cobalt containing:**
This subclass is indented under subclass 102. Alloy or metallic composition which additionally contains cobalt.
- 103 Over 0.1 percent aluminum containing, but less than 4 percent:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains more than 0.1 percent aluminum.
- (1) Note. Due to schedule superiority, alloys containing 4 percent or more aluminum are classified above in subclasses 77+. Patents classified in subclasses 77+ above are not cross referenced to this subclass unless there is a positive disclosure of an alloy containing less than 4 percent aluminum.

- 104 Chromium containing, but less than 9 percent:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains chromium.
- (1) Note. Due to schedule superiority, alloys containing 9 percent or more chromium are classified above in subclasses 34+. Patents classified in subclasses 34+ above are not cross-referenced to this or indented subclasses unless there is a positive disclosure of an alloy containing less than 9 percent chromium.
- 105 Molybdenum containing:**
This subclass is indented under subclass 104. Alloy or metallic composition which additionally contains molybdenum.
- 106 Boron or beryllium containing:**
This subclass is indented under subclass 105. Alloy or metallic composition which additionally contains one or more of boron or beryllium.
- 107 Cobalt containing:**
This subclass is indented under subclass 105. Alloy or metallic composition which additionally contains cobalt.
- 108 Nickel containing:**
This subclass is indented under subclass 105. Alloy or metallic composition which additionally contains nickel.
- 109 Vanadium, titanium or zirconium containing:**
This subclass is indented under subclass 108. Alloy or metallic composition which additionally contains one or more of vanadium, titanium or zirconium.
- 110 Titanium, zirconium or niobium containing:**
This subclass is indented under subclass 105. Alloy or metallic composition which additionally contains one or more of titanium, zirconium or niobium.
- 111 Vanadium containing:**
This subclass is indented under subclass 104. Alloy or metallic composition which additionally contains nickel.
- 112 Nickel containing:**
This subclass is indented under subclass 104. Alloy or metallic composition which additionally contains nickel.
- 113 Tungsten containing:**
This subclass is indented under subclass 112. Alloy or metallic composition which additionally contains tungsten.
- 114 Tungsten containing:**
This subclass is indented under subclass 104. Alloy or metallic composition which additionally contains tungsten.
- 115 Processes:**
This subclass is indented under subclass 104. Processes of preparing an alloy or metallic composition .
- (1) Note. While this subclass provides for processes of producing alloys under subclass 104 not specifically provided for in the indents above it is also employed as a collecting point for cross-references to processes of general utility in preparing a wide range of alloys classified in different subclasses under subclass 104.
- 116 Including reducing a chromium compound:**
This subclass is indented under subclass 115. Process wherein metallic chromium is introduced into the product by reducing a chromium compound.
- 117 Two percent or more silicon containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains 2 percent or more silicon.
- 118 Titanium, molybdenum, tungsten or vanadium containing:**
This subclass is indented under subclass 117. Alloy or metallic composition which additionally contains one or more of titanium, molybdenum, tungsten or vanadium.

- 119 Nickel containing, but 10 percent or less:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally containing nickel.
- (1) Note. Due to schedule superiority, alloys containing more than 10 percent nickel are classified above in subclasses 94+. Patents classified in subclasses 94+ above are not cross-referenced to this subclass unless there is a positive disclosure of any alloy containing 10 percent or less nickel.
- 120 1.5 percent or more manganese containing, but less than 8 percent:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains 1.5 percent or more manganese.
- (1) Note. Due to schedule superiority, alloys containing 8 percent or more manganese are classified above in subclasses 72+. Patents classified in subclasses 72+ above are not cross-referenced to this subclass unless there is a positive disclosure of an alloy containing less than 8 percent manganese.
- 121 Boron containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains boron.
- 122 Tungsten containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains boron.
- 123 Molybdenum containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains molybdenum.
- 124 Vanadium tantalum or titanium containing:**
This subclass is indented under subclass 123. Alloy or metallic composition which additionally contains one or more of vanadium, tantalum, or titanium.
- 125 Zirconium containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains zirconium.
- 126 Titanium containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains titanium.
- 127 Vanadium, tantalum or niobium containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains one or more of vanadium, tantalum or niobium.
- 128 Nitrogen containing:**
This subclass is indented under subclass 8. Alloy or metallic composition which additionally contains nitrogen.
- 129 Processes:**
This subclass is indented under subclass 8. Processes of preparing an alloy or metallic composition .
- (1) Note. While this subclass provides for processes of producing alloys under subclass 8 not specifically provided for in the indents above it is also employed as a collecting point for cross-references to processes of general utility in preparing a wide range of alloys classified in different subclasses under subclass 8.
- 400 ALKALI METAL BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition s which contains over 50 percent of weight of a single metal selected from Lithium, Sodium, Potassium, Rubidium, or Cesium.
- 401 Beryllium base:**
This subclass is indented under the class definition. Alloy, or metallic composition s containing over 50 percent of beryllium by weight.
- 402 Magnesium base:**
This subclass is indented under the class definition. Alloy, or metallic composition containing over 50 percent magnesium by weight.

- 403 Silver containing:**
This subclass is indented under subclass 402. Alloy, or metallic composition which additionally contains silver.
- 404 Manganese containing:**
This subclass is indented under subclass 403. Alloy, or metallic composition which additionally contains manganese.
- 405 Lanthanide containing:**
This subclass is indented under subclass 402. Alloy, or metallic composition which additionally contains at least one of the metals lanthanum through lutetium, i.e., atomic numbers 57 through 71.
- 406 Zirconium containing:**
This subclass is indented under subclass 405. Alloy, or metallic composition additionally containing zirconium.
- 407 Aluminum containing:**
This subclass is indented under subclass 402. Alloy, or metallic composition which additionally contains aluminum.
- 408 Zinc containing:**
This subclass is indented under subclass 407. Alloy, or metallic composition which additionally contains zinc.
- 409 Manganese containing:**
This subclass is indented under subclass 408. Alloy, or metallic composition which additionally contains manganese.
- 410 Manganese containing:**
This subclass is indented under subclass 407. Alloy, or metallic composition which additionally contains manganese.
- 411 Zinc containing:**
This subclass is indented under subclass 402. Alloy, or metallic composition which additionally contains zinc.
- 412 Manganese containing:**
This subclass is indented under subclass 411. Alloy, or metallic composition which additionally contains manganese.
- 413 Manganese containing:**
This subclass is indented under subclass 402. Alloy, or metallic composition which additionally contains manganese.
- 414 Zirconium containing:**
This subclass is indented under subclass 402. Alloy, or metallic composition which additionally contains zirconium.
- 415 Alkaline earth metal base:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of calcium, over 50 percent of strontium, or over 50 percent of barium.
- 416 Rare earth metal base singly or in combination:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent by weight of a single metal selected from scandium, yttrium, or lanthanum, through lutetium (i.e., atomic numbers 57 through 71), or wherein the total of all these metals taken together is over 50 percent by weight of the total alloy, or metallic composition.
- (1) Note. Because the rare earths often occur together naturally and are not easily separated, they are often used as crude, or partially purified mixtures which have their own names e.g., misch metal, didymium, etc.
- 417 Titanium base:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of titanium by weight.
- 418 Aluminum containing:**
This subclass is indented under subclass 417. Alloy, or metallic composition which additionally contains aluminum.
- 419 Tin containing:**
This subclass is indented under subclass 418. Alloy, or metallic composition which additionally contains tin.

- 420 Vanadium containing:**
This subclass is indented under subclass 418. Alloy, or metallic composition which additionally contains vanadium.
- 421 Chromium or molybdenum containing:**
This subclass is indented under subclass 417. Alloy, or metallic composition which additionally contains at least one of the metals chromium, or molybdenum.
- 422 ZIRCONIUM OR HAFNIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of zirconium or over 50 percent of hafnium.
- 423 Copper containing:**
This subclass is indented under subclass 422. Alloy, or metallic composition which additionally contains copper.
- 424 VANADIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition containing over 50 percent of vanadium.
- 425 NIOBIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition containing over 50 percent of niobium.
- 426 Titanium, zirconium or hafnium containing:**
This subclass is indented under subclass 425. Alloy, or metallic composition which additionally contains at least one of the metals titanium, zirconium, or hafnium.
- 427 TANTALUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of tantalum.
- 428 CHROMIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of chromium.
- 429 MOLYBDENUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of molybdenum.
- 430 TUNGSTEN BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of tungsten.
- 431 Carbon, boron or nitrogen containing:**
This subclass is indented under subclass 430. Alloy, or metallic composition which additionally contains at least one of the elements, carbon, boron, or nitrogen.
- SEE OR SEARCH CLASS:**
75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 230+ and 244 for particulate metal carbide (236+) boride, or nitride (244) bonded with a metal (commonly cobalt), e.g., the so called "sintered carbides", etc. See the class definition of this class for the distinction between the alloys and metallic compositions of this class and the consolidated metal powder composition for Class 75.
423, Chemistry of Inorganic Compounds, subclass 409, for a pure, stoichiometric tungsten nitride, subclass 440, for a pure, stoichiometric tungsten carbide, subclass 297, for a pure, stoichiometric tungsten boride.
- 432 Rhenium or noble metal containing:**
This subclass is indented under subclass 430. Alloy, or metallic composition which additionally contains at least one of the metals, rhenium, ruthenium, palladium, osmium, iridium, platinum, silver, or gold.
- 433 RHENIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition containing over 50 percent of rhenium.
- 434 MANGANESE BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of manganese.

- 435 **COBALT BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of cobalt.
- 436 **Chromium containing:**
This subclass is indented under subclass 435. Alloy, or metallic composition which additionally contains chromium.
- 437 **Aluminum containing:**
This subclass is indented under subclass 436. Alloy, or metallic composition which additionally contains aluminum.
- 438 **Titanium containing:**
This subclass is indented under subclass 437. Alloy, or metallic composition which additionally contains titanium.
- 439 **Titanium containing:**
This subclass is indented under subclass 436. Alloy, or metallic composition which contains titanium.
- 440 **Iron containing:**
This subclass is indented under subclass 436. Alloy, or metallic composition which additionally contains iron.
- 441 **NICKEL BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of nickel.
- 442 **Chromium containing:**
This subclass is indented under subclass 441. Alloy, or metallic composition which additionally contains chromium.
- (1) Note. This and indented subclasses contain many patents to so called "superalloys" which retain considerable strength at high temperatures and which are therefor particularly useful as components in gas turbine engines.
- 443 **Rare earth, magnesium or alkaline earth metal containing:**
This subclass is indented under subclass 442. Alloy, or metallic composition which additionally contains at least one metal selected from scandium yttrium, lanthanum through lutetium
- (i.e., atomic numbers 57-71), magnesium, calcium, strontium, or barium.
- 444 **Noble metal containing:**
This subclass is indented under subclass 442. Alloy, or metallic composition which additionally contains at least one of the metals ruthenium, rhodium, palladium, osmium, iridium, platinum, gold, or silver.
- 445 **Aluminum containing:**
This subclass is indented under subclass 442. Alloy, or metallic composition which additionally contains aluminum.
- 446 **Titanium containing:**
This subclass is indented under subclass 445. Alloy, or metallic composition which additionally contains titanium.
- 447 **Tantalum, niobium, vanadium or hafnium containing:**
This subclass is indented under subclass 446. Alloy which additionally contains at least one, or the metals tantalum, niobium, vanadium, or hafnium.
- 448 **Molybdenum or tungsten containing:**
This subclass is indented under subclass 447. Alloy, or metallic composition which additionally contains at least one of the metals molybdenum, or tungsten.
- 449 **Zirconium or boron containing:**
This subclass is indented under subclass 446. Alloy, or metallic composition which additionally contains at least one of the elements zirconium, or boron.
- 450 **Molybdenum or tungsten containing:**
This subclass is indented under subclass 446. Alloy, or metallic composition additionally containing at least one of the metals molybdenum, or tungsten.
- 451 **Titanium containing:**
This subclass is indented under subclass 442. Alloy, or metallic composition which additionally contains titanium.

- 452 Iron or manganese containing:**
This subclass is indented under subclass 442. Alloy, or metallic composition which additionally contains at least one of the metals iron, or manganese.
- 453 Molybdenum or tungsten containing:**
This subclass is indented under subclass 452. Alloy, or metallic composition which additionally contains at least one of the metals molybdenum, or tungsten.
- 454 Cobalt containing:**
This subclass is indented under subclass 453. Alloy, or metallic composition which additionally contains cobalt.
- 455 Rare earth containing:**
This subclass is indented under subclass 441. Alloy, or metallic composition which additionally contains at least one of the metals scandium, yttrium, or lanthanum through lutetium (i.e., atomic numbers 57 through 71).
- 456 Noble metal containing:**
This subclass is indented under subclass 441. Alloy, or metallic composition which additionally contains at least one of the metals, ruthenium, rhodium, palladium, osmium, iridium, platinum, silver, or gold.
- 457 Copper containing:**
This subclass is indented under subclass 441. Alloy, or metallic composition which additionally contains copper.
- 458 Iron containing:**
This subclass is indented under subclass 457. Alloy, or metallic composition which additionally contains iron.
- 459 Iron or manganese containing:**
This subclass is indented under subclass 441. Alloy, or metallic composition which additionally contains at least one of the metals iron, or manganese.
- 460 Aluminum containing:**
This subclass is indented under subclass 441. Alloy, or metallic composition which additionally contains aluminum.
- 461 OSMIUM OR IRIDIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of osmium, or over 50 percent iridium by weight.
- 462 RUTHENIUM OR RHODIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of ruthenium or over 50 percent of rhodium by weight.
- 463 PALLADIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition containing over 50 percent of palladium by weight.
- 464 Copper containing:**
This subclass is indented under subclass 463. Alloy, or metallic composition which additionally contains copper.
- 465 Platinum containing:**
This subclass is indented under subclass 463. Alloy, or metallic composition which additionally contains platinum.
- 466 PLATINUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of platinum by weight.
- 467 Rhodium containing:**
This subclass is indented under subclass 466. Alloy, or metallic composition which additionally contains rhodium.
- 468 Nickel containing:**
This subclass is indented under subclass 466. Alloy, or metallic composition which additionally contains nickel.
- 469 COPPER BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of copper by weight.
- 470 Tin containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains tin.

- 471 Aluminum containing:**
This subclass is indented under subclass 470. Alloy, or metallic composition which additionally contains aluminum.
- 472 Phosphorus containing:**
This subclass is indented under subclass 470. Alloy, or metallic composition which additionally contains phosphorus.
- 473 Iron, manganese or nickel containing:**
This subclass is indented under subclass 470. Alloy, or metallic composition which additionally contains at least one of the metals iron, manganese, or nickel.
- 474 Lead containing:**
This subclass is indented under subclass 470. Alloy, or metallic composition which additionally contains lead.
- 475 Zinc containing:**
This subclass is indented under subclass 474. Alloy, or metallic composition which additionally contains zinc.
- 476 Zinc containing:**
This subclass is indented under subclass 470. Alloy, or metallic composition which additionally contains zinc.
- 477 Zinc containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains zinc.
- 478 Aluminum containing:**
This subclass is indented under subclass 477. Alloy, or metallic composition which additionally contains aluminum.
- 479 Nickel containing:**
This subclass is indented under subclass 478. Alloy, or metallic composition which additionally contains nickel.
- 480 Manganese containing:**
This subclass is indented under subclass 478. Alloy, or metallic composition which additionally contains manganese.
- 481 Nickel containing:**
This subclass is indented under subclass 477. Alloy, or metallic composition which additionally contains nickel.
- 482 Manganese containing:**
This subclass is indented under subclass 477. Alloy, or metallic composition which additionally contains manganese.
- 483 Noble metal containing:**
This subclass is indented under subclass 477. Alloy, or metallic composition which additionally contains at least one of the metals ruthenium, rhodium, palladium, osmium, iridium, platinum, silver, or gold.
- 484 Refractory metal containing:**
This subclass is indented under subclass 477. Alloy, or metallic composition which additionally contains at least one of the metals titanium, vanadium, rhromium, zirconium, niobium, molybdenum, hafnium, tantalum, or tungsten.
- 485 Nickel containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains nickel.
- 486 Aluminum containing:**
This subclass is indented under subclass 485. Alloy, or metallic composition which additionally contains aluminum.
- 487 Iron or manganese containing:**
This subclass is indented under subclass 485. Alloy, or metallic composition which additionally contains at least one of the metals iron, or manganese.
- 488 Refractory metal containing:**
This subclass is indented under subclass 485. Alloy, or metallic composition which additionally contains at least one of the metals titanium, vanadium, chromium, zirconium, niobium, molybdenum, hafnium, tantalum, or tungsten.
- 489 Aluminum, gallium, indium or thallium containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains at least one of the metals aluminum, gallium, indium, or thallium.

- 490 Silicon containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains silicon.
- 491 Lead containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains lead.
- 492 Titanium, zirconium or hafnium containing:**
This subclass is indented under subclass 469. Alloys, or metallic composition which additionally contains at least one of the metals titanium, zirconium, or hafnium.
- 493 Manganese containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains manganese.
- 494 Beryllium, magnesium or alkaline earth metal containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains at least one of the metals beryllium, magnesium, calcium, strontium, or barium.
- 495 Other refractory metal containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains at least one of the metals vanadium, chromium, niobium, molybdenum, tantalum, or tungsten.
- 496 Iron or cobalt containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains at least one of the metals iron, or cobalt.
- 497 Noble metal containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition additionally containing at least one of the metals ruthenium, rhodium, palladium, osmium, iridium, platinum, silver, or gold.
- 498 Cadmium or mercury containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains at least one of the metals cadmium, or mercury.
- 499 Phosphorus, arsenic, antimony or bismuth containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains at least one of the elements phosphorus, arsenic, antimony, or bismuth.
- 500 Sulfur, selenium or tellurium containing:**
This subclass is indented under subclass 469. Alloy, or metallic composition which additionally contains at least one of the elements sulfur, selenium, or tellurium.
- 501 SILVER BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of silver by weight.
- 502 Copper containing:**
This subclass is indented under subclass 501. Alloy, or metallic composition which additionally contains copper.
- 503 Other noble metal containing:**
This subclass is indented under subclass 502. Alloy, or metallic composition which additionally contains at least one of the metals ruthenium, rhodium, palladium, osmium, iridium, platinum, or gold.
- 504 Zinc or cadmium containing:**
This subclass is indented under subclass 502. Alloy, or metallic composition which additionally contains at least one of the metals zinc, or cadmium.
- 505 Other noble metal containing:**
This subclass is indented under subclass 501. Alloy, or metallic composition which additionally contains at least one of the metals ruthenium, rhodium, palladium, osmium, iridium, platinum, or gold.
- 506 Zinc or cadmium containing:**
This subclass is indented under subclass 501. Alloy which additionally contains at least one of the metals zinc, or cadmium.

- 507 GOLD BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of gold by weight.
- 508 Palladium containing:**
This subclass is indented under subclass 507. Alloy, or metallic composition which additionally contains palladium.
- 509 Platinum containing:**
This subclass is indented under subclass 508. Alloy, or metallic composition which additionally contains platinum.
- 510 Platinum containing:**
This subclass is indented under subclass 507. Alloy, or metallic composition which additionally contains platinum.
- 511 Silver containing:**
This subclass is indented under subclass 507. Alloy, or metallic composition which additionally contains silver.
- 512 Iron, cobalt or nickel containing:**
This subclass is indented under subclass 507. Alloy, or metallic composition which additionally contains at least one of the metals iron, cobalt, or nickel.
- 513 ZINC BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of zinc.
- 514 Aluminum containing:**
This subclass is indented under subclass 513. Alloy, or metallic composition which additionally contains aluminum.
- 515 Copper containing:**
This subclass is indented under subclass 514. Alloy, or metallic composition which additionally contains copper.
- 516 Magnesium containing:**
This subclass is indented under subclass 515. Alloy, or metallic composition which additionally contains magnesium.
- 517 Tin containing:**
This subclass is indented under subclass 515. Alloy, or metallic composition which additionally contains tin.
- 518 Manganese, iron, cobalt or nickel containing:**
This subclass is indented under subclass 515. Alloy, or metallic composition which additionally contains at least one of the metals manganese, iron, cobalt, or nickel.
- 519 Magnesium containing:**
This subclass is indented under subclass 514. Alloy, or metallic composition which additionally contains magnesium.
- 520 Manganese, iron, cobalt or nickel containing:**
This subclass is indented under subclass 514. Alloy, or metallic composition which additionally contains at least one of the metals manganese, iron, cobalt, or nickel.
- 521 Copper containing:**
This subclass is indented under subclass 513. Alloy, or metallic composition which additionally contains copper.
- 522 Manganese, iron, cobalt or nickel containing:**
This subclass is indented under subclass 521. Alloy, or metallic composition which additionally contains at least one of the metals manganese, iron, cobalt, or nickel.
- 523 Cadmium containing:**
This subclass is indented under subclass 513. Alloy, or metallic composition which additionally contains cadmium.
- 524 Tin containing:**
This subclass is indented under subclass 513. Alloy, or metallic composition which additionally contains tin.
- 525 CADMIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition containing over 50 percent of cadmium by weight.

- 526 MERCURY BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of mercury by weight.
- 527 Silver containing:**
This subclass is indented under subclass 526. Alloy, or metallic composition which additionally contains silver.
- 528 ALUMINUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of aluminum by weight.
- 529 Copper containing:**
This subclass is indented under subclass 528. Alloy, or metallic composition which additionally contains copper.
- 530 Tin containing:**
This subclass is indented under subclass 529. Alloy, or metallic composition which additionally contains tin.
- 531 Zinc containing:**
This subclass is indented under subclass 529. Alloy, or metallic composition which additionally contains zinc.
- 532 Magnesium containing:**
This subclass is indented under subclass 531. Alloy, or metallic composition which additionally contains magnesium.
- 533 Magnesium containing:**
This subclass is indented under subclass 529. Alloy, or metallic composition which additionally contains magnesium.
- 534 Silicon containing:**
This subclass is indented under subclass 533. Alloy, or metallic composition which additionally contains silicon.
- 535 Titanium, zirconium, hafnium, vanadium, niobium, or tantalum containing:**
This subclass is indented under subclass 534. Alloy, or metallic composition which additionally contains at least one of the metals titanium, zirconium, hafnium, vanadium, niobium, or tantalum.
- 536 Cadmium, lead or bismuth containing:**
This subclass is indented under subclass 534. Alloy, or metallic composition which additionally contains at least one of the metals cadmium, lead, or bismuth.
- 537 Silicon containing:**
This subclass is indented under subclass 529. Alloy, or metallic composition which additionally contains silicon.
- 538 Iron, cobalt or nickel containing:**
This subclass is indented under subclass 529. Alloy, or metallic composition which additionally contains at least one of the metals iron, cobalt, or nickel.
- 539 Silver containing:**
This subclass is indented under subclass 529. Alloy, or metallic composition which additionally contains silver.
- 540 Zinc containing:**
This subclass is indented under subclass 528. Alloy, or metallic composition which additionally contains zinc.
- 541 Magnesium containing:**
This subclass is indented under subclass 540. Alloy, or metallic composition which additionally contains magnesium.
- 542 Magnesium containing:**
This subclass is indented under subclass 528. Alloy, or metallic composition which additionally contains magnesium.
- 543 Titanium, zirconium, hafnium, vanadium, niobium or tantalum containing:**
This subclass is indented under subclass 542. Alloy, or metallic composition which additionally contains at least one of the metals titanium, zirconium, hafnium, vanadium, niobium, or tantalum.
- 544 Silicon containing:**
This subclass is indented under subclass 543. Alloy, or metallic composition which additionally contains silicon.

- 545 Chromium containing:**
This subclass is indented under subclass 543. Alloy, or metallic composition which additionally contains chromium.
- 546 Silicon containing:**
This subclass is indented under subclass 542. Alloy, or metallic composition which additionally contains silicon.
- 547 Iron, cobalt or nickel containing:**
This subclass is indented under subclass 542. Alloy, or metallic composition which contains at least one of the metals iron, cobalt, or nickel.
- 548 Silicon containing:**
This subclass is indented under subclass 528. Alloys, or metallic composition which additionally contains silicon.
- 549 Alkali or alkaline earth metal containing:**
This subclass is indented under subclass 548. Alloy, or metallic composition which contains at least one of the metals lithium, sodium, potassium, rubidium, cesium, calcium, barium, or strontium.
- 550 Iron, cobalt or nickel containing:**
This subclass is indented under subclass 528. Alloy, or metallic composition which additionally contains at least one of the metals iron, cobalt, or nickel.
- 551 Titanium, zirconium, hafnium, vanadium, niobium, or tantalum containing:**
This subclass is indented under subclass 550. Alloy, or metallic composition which additionally contains at least one of the metals titanium, zirconium, hafnium, vanadium, niobium, or tantalum.
- 552 Titanium, zirconium, hafnium, vanadium, niobium or tantalum containing:**
This subclass is indented under subclass 528. Alloy, or metallic composition which additionally contains at least one of the metals, titanium, zirconium, hafnium, vanadium, niobium, or tantalum.
- 553 Manganese containing:**
This subclass is indented under subclass 552. Alloy, or metallic composition which additionally contains manganese.
- 554 Cadmium, lead or bismuth containing:**
This subclass is indented under subclass 528. Alloy, or metallic composition which additionally contains at least one of the metals cadmium, lead, or bismuth.
- 555 GALLIUM, INDIUM OR THALLIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains either over 50 percent of gallium, over 50 percent of indium, or over 50 percent of thallium by weight.
- 556 GERMANIUM BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of germanium by weight.
- 557 TIN BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of tin by weight.
- 558 Lead containing:**
This subclass is indented under subclass 557. Alloy, or metallic composition which additionally contains lead.
- 559 Antimony or bismuth containing:**
This subclass is indented under subclass 558. Alloy, or metallic composition which additionally contains at least one of the metals antimony, or bismuth.
- 560 Copper containing:**
This subclass is indented under subclass 557. Alloy, or metallic composition which additionally contains copper.
- 561 Antimony or bismuth containing:**
This subclass is indented under subclass 560. Alloy, or metallic composition which additionally contains at least one of the metals antimony or bismuth.
- 562 Antimony or bismuth containing:**
This subclass is indented under subclass 557. Alloy, or metallic composition which contains at least one of the metals antimony, or bismuth.

- 563 LEAD BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition containing over 50 percent of lead by weight.
- 564 Alkali, alkaline earth metal or magnesium containing:**
This subclass is indented under subclass 563. Alloy, or metallic composition which additionally contains at least one of the metals, lithium, sodium, potassium, rubidium, cesium, magnesium, calcium, strontium, or barium.
- 565 Tin containing:**
This subclass is indented under subclass 564. Alloy, or metallic composition which additionally contains tin.
- 566 Silver containing:**
This subclass is indented under subclass 563. Alloy, or metallic composition which additionally contains silver.
- 567 Arsenic containing:**
This subclass is indented under subclass 563. Alloy, or metallic composition which additionally contains arsenic.
- 568 Tin containing:**
This subclass is indented under subclass 567. Alloy, or metallic composition which additionally contains tin.
- 569 Antimony containing:**
This subclass is indented under subclass 568. Alloy, or metallic composition which additionally contains antimony.
- 570 Tin containing:**
This subclass is indented under subclass 563. Alloy, or metallic composition which additionally contains tin.
- 571 Antimony containing:**
This subclass is indented under subclass 570. Alloy, or metallic composition which additionally contains antimony.
- 572 Antimony containing:**
This subclass is indented under subclass 563. Alloy, or metallic composition which additionally contains antimony.
- 573 Copper containing:**
This subclass is indented under subclass 563. Alloys, or metallic composition which additionally contains copper.
- 574 Zinc containing:**
This subclass is indented under subclass 563. Alloy, or metallic composition which additionally contains zinc.
- 575 Cadmium containing:**
This subclass is indented under subclass 563. Alloy, or metallic composition which additionally contains cadmium.
- 576 ANTIMONY BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of antimony by weight.
- 577 BISMUTH BASE:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of bismuth by weight.
- 578 SILICON BASE ALLOY CONTAINING METAL:**
This subclass is indented under the class definition. Alloy which is so named in the patent which contains over 50 percent of silicon by weight and which further contains at least one element which is a metal under the definition of this class.
- (1) Note. This subclass contains, e.g., ferro-silicon containing over 50 percent silicon by weight, etc.
- 579 ARSENIC BASE OR SELENIUM OR TELLURIUM BASE ALLOY CONTAINING METAL:**
This subclass is indented under the class definition. Alloy, or metallic composition containing over 50 percent arsenic by weight, or an alloy under the class definition which is so named in the patent, which contains over 50 percent selenium, or 50 percent tellurium by weight and which further contains at least one element which is a metal under the definition of this class.

- SEE OR SEARCH CLASS:
430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 85+ for a selenium base alloy claimed, or solely disclosed as having utility as an image forming medium in electrical photography, e.g., xerography.
- 580 CONTAINING OVER 50 PERCENT METAL BUT NO BASE METAL:**
This subclass is indented under the class definition. Alloy, or metallic composition which contains over 50 percent of total metal by weight but wherein each individual metal is present in an amount of not over 50 percent by weight.
- 581 Iron containing:**
This subclass is indented under subclass 580. Alloy, or metallic composition which contains iron in an amount which does not exceed 50 percent by weight.
- 582 Copper containing:**
This subclass is indented under subclass 581. Alloy, or metallic composition which additionally contains copper.
- 583 Chromium containing:**
This subclass is indented under subclass 581. Alloy, or metallic composition which additionally contains chromium.
- 584.1 Nickel containing:**
This subclass is indented under subclass 583. Alloy, or metallic composition which additionally contains nickel.
- 585 Cobalt containing:**
This subclass is indented under subclass 584. Alloy, or metallic composition which additionally contains cobalt.
- 586 Titanium or zirconium containing:**
This subclass is indented under subclass 585. Alloy, or metallic composition which additionally contains at least one of the metals titanium, or zirconium.
- 586.1 Molybdenum containing:**
This subclass is indented under subclass 584.1. Alloy, or metallic composition which additionally contains molybdenum.
- 587 Copper containing:**
This subclass is indented under subclass 580. Alloy, or metallic composition containing copper in an amount which does not exceed 50 percent by weight.
- 588 Chromium containing:**
This subclass is indented under subclass 580. Alloy, or metallic composition which contains chromium in an amount which does not exceed 50 percent by weight.
- 589 Tin containing:**
This subclass is indented under subclass 580. Alloy, or metallic composition which contains tin in an amount which does not exceed 50 percent by weight.
- 590 PROCESS:**
This subclass is indented under the class definition. Processes of preparing alloys, or metallic compositions which are not claimed with sufficient particularity to be placed in any subclass above, e.g., no base metal is recited either individually, or as a particular group, e.g., refractory metals, etc.
- (1) Note. This subclass is the collecting point for processes which are of general utility in preparing a wide variety of alloys. Processes which prepare a specific alloy are placed therewith and are cross referenced here only if disclosed as having general utility.
- 591 Miscellaneous:**
This subclass is indented under the class definition. Alloys or metallic composition not provided for in any subclass above.
- (1) Note. Specific subject matter found in this subclass includes e.g., alloys based on boron containing metal and alloys containing less than 50 percent of total metals, but at least some metal.

CROSS-REFERENCE ART COLLECTIONS

900 HYDROGEN STORAGE:

Cross-reference art collection of alloys, or metallic compositions which are capable of taking up and releasing hydrogen for purposes of storage of hydrogen.

- (1) Note. This class takes alloys, metallic compositions which take up hydrogen for storage no matter what the mechanism. Often the patent states that metal hydride is formed, but this is not always clear. This class thus takes hydrogen storage alloys in preference to Class 252, subclass 184 and Class 502, subclasses 400+ whether, or not the storage is stated to be by chemical reaction, or sorbtion.

SEE OR SEARCH CLASS:

- 423, Chemistry of Inorganic Compounds, subclasses 644+ for metal hydrides, or hydrided alloys whether stoichiometric or not, or for methods of hydrogen storage and release by chemical reaction, or sorbtion.

901 SUPERCONDUCTIVE:

Cross-reference art collection of alloys, or metallic compositions which exhibit the property of practically no resistance to the flow of electric current.

- (1) Note. At this time (1981) this property has only been observed at very low temperatures of about 22° K, or below.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclass 599 for a method of making an electrical device which includes a superconductor.
- 174, Electricity: Conductors and Insulators, subclasses 126.1+ for electrical conductor structure which includes a superconductor.
- 252, Compositions, subclass 500 for electrically conductive compositions which may be superconductors.
- 335, Electricity: Magnetically Operated Switches Magnets, and Electromagnets, subclass 216 for magnets or electromagnets of the superconductive type.

- 427, Coating Processes, subclasses 62+ for processes of producing a superconductive electrical product by coating.
- 428, Stock Material or Miscellaneous Articles, subclass 930 for metallic stock material which is superconductive.

902 SUPERPLASTIC:

Cross-reference art collection of alloys, or metallic compositions which exhibit property of being capable of great deformations of over 100 percent without "necking down", or rupturing.

- (1) Note. In some cases the alloy must be heated to exhibit this property.
- (2) Note. In most cases superplastic alloys are described as such in the patents found herein.

903 SEMICONDUCTIVE:

Cross-reference art collection alloys, or metallic composition whose resistivity at room temperature is in the range of 10^{-2} to 10^{-9} ohm-cm (which is between the range of metallic conductors and insulators).

- (1) Note. These compositions are usually employed in barrier layer devices, e.g., transistors, etc.

SEE OR SEARCH CLASS:

- 252, Compositions, subclass 62.3 for barrier layer device compositions which are not merely alloys, or metallic compositions.

END