CLASS 65, GLASS MANUFACTURING

SECTION I - CLASS DEFINITION

This class provides for (1) processes and/or apparatus for making stock or articles of those ceramic masses, which generally include a "glass former" or an oxide which approaches glass forming properties, in their composition and which are formed by fusion of raw materials (generally mixtures, most of which are of an earthy nature - as distinguished from metallic, organic, etc., - silicon, silica, and slag are included) at ordinary high furnace temperatures, by working (molding, shaping, etc.) of the mass after being melted or changed to a plastic or softened state by heating; and (2) processes and/or apparatus for treating stock or articles made by (1) above unless otherwise provided for as shown in Lines With Other Classes and Within This Class and References to Other Classes, below.

The use of hazardous or toxic waste to make a glass material a useful product is provided for herein, however, vitrification of hazardous waste for purposes of containment is excluded, see References to Other Classes below.

Included within the scope of the class definition are:

(1) Glass fiber or filament and mineral wool making.

(2) Manufacturing processes and/or apparatus including a step of, or means for adhesively bonding glass directly to another part by welding with or without use of an intermediate ceramic or vitreous material.

(3) Manufacturing processes and/or apparatus including a step of, or means for forming a glass article from molten or softened glass.

(4) Processes and/or apparatus including a step of, or means for treating glass while in a molten or solid state.

(5) Processes and/or apparatus including a step of, or means for treating a glass preform to change a physical or chemical property thereof.

(6) Processes and/or apparatus for repairing or cleaning glass working or treating apparatus.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

Search notes relating to (a) processes and apparatus and (b) products will be identified appropriately.

LINES WITH CLASS 23, CLASS 117, AND CLASS 438

Although silicon and silicon dioxide are arbitrarily considered to be glass materials for Class 65, a process of growing these polycrystalline materials is proper for Class 23, even though a rod is used as a bait, unless the shape formed is not a result of crystallization or deposition on the rod. If crystallization is combined with specific glassworking and/or treating of silicon or silicon dioxide, the process is proper for Class 65, but see Class 438 for semiconductor device manufacture. Processes of growing single-crystal of all types of materials, including silicon or silicon dioxide, are proper for Class 117. The proper placement of the original of a patent claiming a Class 23 and/or Class 117 species of crystallization and a Class 65 species, or having multiple disclosure with only generic claims, is Class 117 first, then Class 23, then Class 65.

LINES WITH CLASS 422, CLASS 23, AND CLASS 148

See Class 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 245.1+ for apparatus directed to crystallizing a material within the class definition of Class 23. Although silicon and silicon dioxide are arbitrarily considered to be glass for Class 65, a process of, or apparatus for, growing crystals of these materials is placed in Class 23 (for a process exception, see (5) Note in Class 148, subclasses 1.5+) even though a rod is used as a bait unless the shape formed is not a result of crystallization or deposition on the rod. A combination of crystallization and specific glassworking and/or treating silicon or silicon dioxide is placed in Class 65. A patent claiming a Class 23 species of crystallization and a Class 65 species or having a multiple disclosure with generic claims only is classified in Class 23.

LINES WITH CLASS 438 AND CLASS 437

Class 438, Semiconductor Device Manufacturing: Process, for the combination of Class 437 unit coating operation or Class 437 unit etching operation with glass melting, shaping or forming, joining, or heat treating. Moreover, Class 438 also takes the heat treating, per se, of Class 438 semiconductor material if for purposes of modifying the electrical properties thereof. Additionally, various classes take mounting or packaging operations

of semiconductor devices when glass melting, glass shaping, glass forming, or glass heat treating is combined with any coating, adhesive bonding, metal casting, metal working/deforming, metal fusion bonding, or other chemical or mechanical manufacturing operation. See notes therein for a detailed explanation of the relevant lines.

SECTION III - SUBCLASS REFERENCES TO THE CURRENT CLASS

SEE OR SEARCH THIS CLASS, SUBCLASS:

19, for the term "slag."
21, for references to Class 241
23, 31, 36, 37, 42, 376+, for references to Class 156
24, for the term "parting layer."
30.1, 31, 50, 60.1, for references to Class 427
33.1+, for references to Class 106
36, 430+, 443+, for references to Class 29
60.1, for the term "coating."
60.1+, for references to Class 8
61, for references to Class 451
111, for references to Class 250
112, 133, 174, for references to Class 83
114, for the term "temper."
117, for the term "anneal."
134.1+, for the term "fining."
134.1+, for the term "homogenize."
134.1+, for the term "purify."
134.1+, 178, for references to Class 366
154, for the term "slinger."
166, for references to Class 408
168, for references to Class 134
305, for the term "press molding."
352, for the term "bait."
376, for the term "fiber."
376, for the term "filament."

SECTION IV - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

23, Chemistry: Physical Processes, subclasses 295+ for processes directed to crystallizing an inorganic compound or non-metallic element. (See Lines With Other Classes and Within This Class, above.)
28, Textiles: Manufacturing, appropriate subclasses, for processes and/or apparatus involving mechanical interengaging of fibers or strands not otherwise provided for not combined with a glass working or treating operation. (Processes and apparatus)
29, Metal Working, subclasses 400.1+ and 33+ for a process or apparatus, respectively, directed to glass working or treating combined with a metal working operation or means.
52, Static Structures (e.g., Buildings), for static building structure and related elements having a glass component, e.g., a pane, particularly subclasses 171.3+, 204.52, 204.591+, 306+, 761+, and 788+. (Products)
53, Package Making, particularly subclasses 403+, 79+, and 266.1+ for methods or apparatus, respectively for filling and/or evacuating glass receptacles and sealing same by a glass working operation. See the references to Class 65 in the notes to the definition of subclasses 403+ of Class 53; and subclasses 111+ and 428+ for a process of, or apparatus for sealing-off, per se, of a filled glass container by a glass working operation under conditions which protect or affect the contents of the container except where the glass working operation inherently results in protecting or affecting the contents in which case the process and apparatus are classified in Class 65.
57, Textiles: Spinning, Twisting, and Twining, appropriate subclasses, for processes and/or apparatus for spinning, twisting or twining of glass fibers or filaments not combined with a glass working or treating operation. (Processes and apparatus)
66, Textiles: Knitting, subclass 202 for a knitted glass textile fabric or article. (Products)
79, Button Making, subclass 2, for a process of and/or apparatus for making buttons or parts thereof, and assembling the same except such as are formed of plastic material (e.g., glass) which are formed in molds or are molded upon a shank. (Processes and apparatus)
117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, for processes and non-coating apparatus for growing therein-defined single-crystal of all types of materials, including inorganic or organic, including silicon or silica (silicon dioxide).
139, Textiles: Weaving, subclasses 420+ for woven glass textile fabric or article. (Products)
148, Metal Treatment, particularly subclasses 240+ for processes of reactive coating of metal as defined thereunder. The combination of reactive coating of metal with a glass working or treating operation is proper for Class 65. How-

ever, the combination of a significant heat treatment to modify or maintain the internal physical property (i.e., microstructure) or chemical property of the metal with a glass working or glass heat treating operation is proper in Class 148. (Processes and apparatus)

164, Metal Founding, appropriate subclasses for processes and apparatus for metal casting. A patent disclosing working of named materials for Class 164 and Class 65 is classified in Class 164 unless the only species claimed or the only specific example is glass in which case the patent is classified in Class 65. Combined operations including metal casting and glass working and/or treating are classified in Class 164. See Class 164, subclasses 91+ for processes of casting metal on a glass preform.

198, Conveyors: Power-Driven, appropriate subclasses, for conveyors, carriers and forwarders to move glass articles from one place to another irrespective of the particular physical condition of the article, per se. The positive recitation of a glass working station in a claim, as such, does not constitute glass working means for Class 65. (Processes and apparatus)

202, Distillation: Apparatus, appropriate subclasses for apparatus for distillation of glass while in the liquid state. The inclusion of the step of melting solid glass to the liquid state does not exclude the patent from Class 202.

203, Distillation: Processes, Separatory, appropriate subclasses, for a process of distilling high melting mixtures.

204, Chemistry: Electrical and Wave Energy, appropriate subclasses for applying electrical or wave energy to molten or preformed glass to bring about a chemical change (e.g., color change, etc.) of at least one constituent of the glass; follow the general guidelines for placement of an operation involving the combination of at least one Class 204 step in sequence with a separate Class 65 step as explained in the Class 204 Class Definition in the (4) and (5) Notes.

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 687+ for electrolytic material treatment, especially subclass 769 for electrolytic treatment of solid glass, silica, quartz, or optical material.

215, Bottles and Jars, appropriate subclasses, for glass bottles, jars and receptacles. (Products)

220, Receptacles, subclasses 2.1+ for an envelope for an electric lamp or similar device, e.g., cathode-ray tubes (made wholly or partly of glass) not limited to use with any specific electric device or not limited by claimed structure to electrical use, and subclasses 377+, 602 and 662+ for a receptacle provided with a glass portion. (Products)

226, Advancing Material of Indeterminate Length, for a process of, or means for advancing material of indeterminate length; see Lines With Other Classes and Within This Class, Relationship To Material-Modifying Classes Which Include Feeding Of Indeterminate-Length Work, in the class definition of Class 226 for its line with material - modifying classes which include feeding of intermediate length work.

249, Static Molds, for female molds, per se, for shaping molten glass not combined with means to displace the glass by application of external force. (Processes and apparatus)

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, for processes of working or treating plastic materials not otherwise provided for. A patent disclosing working or treating of named materials for Class 264 and Class 65 is classified in Class 264 unless the only species claimed is glass or the only specific example relates to glass in which case the patent is classified in Class 65. A patent claiming a combined process for Class 65 and Class 264 is classified in Class 65. Class 264 takes processes directed to (1) shaping a mass of green siliceous material and subsequently firing or curing the material to set the material or (2) placing discrete siliceous particles, other than glass fibers or mineral wool, onto a mold surface which particles are heated on or subsequent to contact with the surface to fuse the particles to each other. A process directed to (1) heating a material within the scope of Class 65 to the molten state and forming a shaped preform therefrom or (2) bulk depositing glass fibers into a mold surface and thereafter fusing the fibers to each other is classified in Class 65. A combined Class 65 and 264 operation is classified in Class 65.

266, Metallurgical Apparatus, appropriate subclasses, for apparatus peculiarly adapted for the treatment of metals and metalliferous materials. (Processes and apparatus)

269, Work Holders, appropriate subclasses, for work holders. (Processes and apparatus)

294, Handling: Hand and Hoist-Line Implements, appropriate subclasses, for manual means for handling or manipulating glassware not com-

bined with glass working or treating means. (Processes and apparatus)

313, Electric Lamp and Discharge Devices, appropriate subclasses, for electric lamp and electric space discharge device structures, such as cathode-ray tubes, especially subclasses 461+ for screens and 477+ for envelopes employed in cathode-ray tubes. (Products)

351, Optics: Eye Examining, Vision Testing and Correcting, subclass 177 for methods of making ophthalmic lenses which usually involve some combination of grinding, glass manufacturing, and adhesive bonding; and subclass 178 for (methods of securing an eyeglass lens in its support, or of assembling such lenses in spectacle frames. (Processes and apparatus)

359, Optics: Systems (Including Communication) and Elements, subclass 900 for a cross reference art collection of optical methods. (Processes and apparatus)

359, Optics: Systems (Including Communication) and Elements, appropriate subclasses for glass structures having particular optical properties. (Products)

362, Illumination, appropriate subclasses, particularly subclasses 326+ and 341+ for glass reflectors and refractors, respectively. (Products)

403, Joints and Connections, subclasses 265+ for miscellaneous bonded joints which may comprise metal to metal and to glass, the metal and glass joint being disclosed as being formed by a glass working operation. (Products)

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 245.1+ for apparatus directed to crystallizing a material. (See Lines With Other Classes and Within This Class, above.)

423, Chemistry of Inorganic Compounds, for process of manufacturing inorganic compounds, per se.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, for apparatus for shaping or reshaping plastic materials or sizing and/or vulcanizing rubber preforms not otherwise provided for. The original copy of a patent disclosing named materials for Class 65 and Class 425 is classified in Class 425, unless the only species claimed is glass or the only specific example relates to glass, in which case the document is classified in Class 65. A document claiming the combination of Class 65 and Class 425 apparatus is classified in Class 65. Apparatus for shaping powdered glass with means to heat subsequently to obtain fusion bonding is classified in Class 425; however, apparatus shaping glass wool or mineral wool with subsequent fusion bonding is classified in Class 65.

428, Stock Material or Miscellaneous Articles, subclass 34 for hermetically sealed spaced glass sheets (e.g., double glazed window), subclass 38 for a light transmitting layer with a frame or border therearound (e.g., stained glass), and subclasses 426+ for a layer of quartz or glass next to a layer of another material. (Products)

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, for radiation imagery process not combined with a glass working step; and subclass 13 for a glass block having an image therein. (Processes and apparatus)

438, Semiconductor Device Manufacturing: Process, for the combination of a unit coating operation or a unit etching operation with glass melting, shaping or forming, joining, or heat treating. (See Lines With Other Classes and Within This Class, above.)

445, Electric Lamp or Space Discharge Component or Device Manufacturing appropriate subclasses, for processes of, or apparatus for the manufacture, repair or salvage of electric lamps and electric lamp space discharge devices. Combined processes and apparatus including a glass working and/or treating operation and a lamp making operation are classified in Class 445. The inclusion of the step of exhausting or providing a special atmosphere in the envelope is considered a lamp making operation for Class 445. For other lamp making operations provided for in Class 445, see the class definitions of Class 445.

501, Compositions: Ceramic, subclasses 2+ for processes of crystallizing devitrified glass-ceramic compositions; subclasses 11+ for preparing glass compositions; subclass 39 for forming pores or open cells within glass compositions; and subclasses 40, 41+, and 53+ for particular composition components. The combination of preparing, crystallizing, or pore-forming of glass compositions with specific glass working and/or treating is classified in Class 65; however, (a) a step of melting with heating to a specific temperature, or (b) the recitation of a forming step by name only (e.g., drawing, working, blowing, pressing, etc.), or (c) refining molten glass by name only is not enough to prevent placement in Class 501. A Class 501 operation combined with specific glass treating

is placed in Class 65; however, mere recitation of "treating the glass", "annealing", or "tempering" by these words only is not enough to prevent placement in Class 501.

505, Superconductor Technology: Apparatus, Material, Process, subclasses 300+ for processes of producing high temperature (T_c greater than 30 K) superconductors; particularly subclass 420 for glass working, forming, or treating operations combined with superconductor manufacture. (Processes and apparatus)

SECTION V - GLOSSARY

ANNEAL

See Subclass References to the Current Class, above, for a subclass reference to the term "anneal."

BAIT

See Subclass References to the Current Class, above, for a subclass reference to the term "bait."

BATCH

A properly proportioned mixture of raw materials to be delivered to a melting apparatus.

BATCH CHARGER

Mechanical means for introducing a batch to a melting apparatus.

BEAD

(1) A small piece of glass fused onto an electrical conductor, (2) an enlarged rounded portion on an edge of an article or stock material, (3) small discrete particles of glass.

BLOWING

Shaping or forming an undefined mass of glass in a soft state by introducing gas within a confined opening within the mass, i.e., by inflating.

BRIDGE (-WALL)

A hollow wall generally having an air space between refractory blocks from which it is formed and providing an opening or throat adjacent its bottom used in a tank furnace to separate a working end from a fining or melting zone.

CASTING

Forming a glass preform by flowing molten glass in the form of a stream into or onto molds, rolls or tables. (Teeming is synonymous to casting).

COATING

See Subclass References to the Current Class, above, for a subclass reference to the term "coating."

CORRUGATING

Shaping a layer throughout its thickness into a row of wavelike folds.

CRACKLED

Glassware having a surface which was intentionally cracked by water immersion and partially healed by reheating.

CULLET

Waste or broken glass.

DEBITEUSE

A slotted floating, refractory block through which glass issues in the formation of a glass sheet during a drawing operation.

DEPUTER

See debiteuse.

DEVITRIFY

The changing of glass in the amorphous state to crystalline state generally by holding a glass melt at a temperature which favors crystal growth.

DOGHOUSE

A boxlike wing on a glass furnace through which a batch or floaters, etc., are introduced into the furnace.

DRAWING

Forming stock, generally sheet or tube, by utilizing the

self-cohesiveness of glass in a plastic condition to effect an operation similar to a “taffy-pull”.

DRAW RING

A refractory device placed in a supply of molten glass to define an area for drawing.

DRAW SHIELD

Baffle means isolating stock being drawn from the hot atmosphere existing above a supply of molten glass.

EMBOSSING

Altering a surface configuration only of glass by raising a boss or protuberance thereon or causing surface portions to be depressed below the plane of the glass surface.

FIBER

See Subclass References to the Current Class, above, for a subclass reference to the term “fiber.”

FILAMENT

See Subclass References to the Current Class, above, for a subclass reference to the term “filament.”

FINING

See Subclass References to the Current Class, above, for a subclass reference to the term “fining.”

FIRE-POLISHING

Heating of the outer surface of hard glass to a temperature where that surface only melts and surface tension causes smoothing thereof, the heating usually being by fire or flame contact of the glass surface.

FLASHING

Applying a thin layer of opaque or colored glass to the surface of clear glass, or vice versa.

FLOATERS

Refractory blocks floating on molten glass in a tank furnace to prevent gall or scum from entering the working end.

FUSION BONDING

Welding by bringing glass, while molten or softened by heating, into intimate contact with another part with subsequent cooling to solid phase whereby uniting is effected.

GATHERER

Means used to remove discrete charges of molten glass from a supply.

GLASS

An inorganic product (a) the constituents of which generally include a “glass former” (e.g., As_2O_3, B_2O_3 GeO_2, P_2O_5, SiO_2, V_2O_5) which has an essential characteristic of creating or maintaining, singly, or in a mixture, that type of structural disorder characteristic of a glassy condition, other oxides which approach glass forming properties (e.g., $A1_2O_3$, BeO, PbO, Sb_2O_3 TiO_2, ZnO and ZrO_2) as well as oxides that are practically devoid of glass forming tendencies (e.g., BaO, CaO, K_2O, Li_2O, MgO, Na_2O and SrO), however, pure and modified silica, silicon and slag are also included; (b) formed by fusion and cooled to a rigid condition generally without crystallization; (c) having no definite melting point (whereby the mass has the characteristic of passing through a plastic state before reaching a liquid state when heated); (d) incapable in the solid state of permanent deformation; and (e) which fractures when subject to deformation tension.

GLASS TREATING

Effecting a change in a physical or chemical property of glass, generally involving specific heating followed by controlled cooling.

GLASS WORKING

Molding, shaping, severing of uniting of glass while in a plastic state.

GOB

A discrete portion of molten glass (a) delivered by a feeder or (b) gathered on a punty or blow pipe.

HOMOGENIZE

See Subclass References to the Current Class, above, for a subclass reference to the term “homogenize.”

MARVERING

Rolling a gather of glass on a flat plate whereby it is shaped and cooled.

MOIL

Surplus or waste glass which must be removed from the apparatus or a product after a glass working operation.

NECK RING

That portion of a segmented mold used to form a neck portion of a hollow article.

ORBITING

Causing movement in a regular, generally a circular or elliptical path around a fixed point.

PARISON

A partially shaped article of manufacture requiring further significant shaping to arrive at the form of a completed useful article.

PARTING LAYER

See Subclass References to the Current Class, above, for a subclass reference to the term “parting layer.”

PASTE MOLD

A mold with an inner lining of a paste (generally made from resins and linseed oil, soap, etc.) which is brushed into a hot mold and kept wet so that glass within the mold rides on a steam cushion while being formed.

PONTILE

A dipstick used to gather charges of molten glass, punty, puntil, pontee, and ponto are local variants.

PREFORM

Stock material that has been given a shape (the term preform is used interchangeably with article, product, parison and blank).

PRESS MOLDING

See Subclass References to the Current Class, above, for a subclass reference to the term “press molding.”

PURIFY

See Subclass References to the Current Class, above, for a subclass reference to the term “purify.”

PUNTY

See Pontile

RESHAPING

Changing the gross overall configuration of a glass preform by (a) confining a glass preform within a configured mold and effecting significant flow of the glass to cause it to assume the configuration of the mold or (b) distorting a glass preform by bodily moving a portion of it throughout its entire thickness relative to a second portion during which the thickness of the work piece remains substantially the same and no significant flow of the glass occurs, i.e., bending.

Changing at least one dimension of a glass preform throughout its perimeter without any appreciable change in the original configuration thereof, e.g., stretching and shrinking.

SINTERING

The coalescence of particles into one solid mass through heating, generally with melting limited to a surface layer only of each particle.

SLAG

See Subclass References to the Current Class, above, for a subclass reference to the term “slag.”

SLINGER

See Subclass References to the Current Class, above, for a subclass reference to the term “slinger.”

SMOOTHING

Removing surface irregularities or imperfections.

SOFTENED GLASS

Glass that has been heated to a temperature at which it is pliable or liquid.

SOFTENING POINT

The temperature at which a uniform fiber, 0.5 to 1.0 mm. in diameter, elongates under its own weight at a rate of 1 mm. per minute when the upper 10 cm. of its length is heated in a prescribed furnace * at the rate of approximately 5°C. per minute. (*See "A Method for Measuring The Softening Temperature of Glass", J.T. Littleton, J. Am. Ceramic Soc., 10(4), 259 (1927).

SURFACE DEFORMATION

A reshaping operation involving only the surface of the glass preform and only partially through the thickness and wherein the overall shape of the preform throughout its breadth and width is unaltered.

TEMPER

See Subclass References to the Current Class, above, for a subclass reference to the term "temper."

SUBCLASSES

17.1 PROCESSES:
This subclass is indented under the class definition. Processes of working or treating glass.

SEE OR SEARCH CLASS:
588, Hazardous or Toxic Waste Destruction or Containment, appropriate subclasses for the solidification or vitrification of waste for purposes of containment and for the treatment of slag to prevent the emission of hazardous or toxic gases.

17.2 Sol-gel or liquid phase route utilized:
This subclass is indented under subclass 17.1. Processes wherein a sol-gel route or liquid phase route procedure is used during any stage of working or treating glass.

SEE OR SEARCH CLASS:
516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, for colloid systems or agents for such systems or making or stabilizing such systems or agents, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.

17.3 With shaping of particulate material and subsequent fusing of particles:
This subclass is indented under subclass 17.1. Processes combined with a step of associating a mass of individual discrete particulate material and shaping said mass and either during or subsequent to the shaping operation, heating the material to effect fusing of the particles one to another.

(1) Note. Processes claiming depositing particulate material into a mold cavity which its intended function is not to shape the mass of particles prior to fusing them but intended to shape a molten or plastic mass formed by heating the particles are classified elsewhere. See search notes below.

(2) Note. This subclass includes, for example, patents claiming a step of shaping a mass of glass particles which are fused together in a manner to preserve the shape of the mass of glass particles combined with a subsequent glassworking or treating operation (e.g., pore forming or annealing, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
65, for processes claiming depositing particulate material into a mold cavity which its intended function is not to shape the mass of particles prior to fusing them but intended to shape a molten or plastic mass formed by heating the particles.
68+, for processes of forming an article from molten glass and see (1) Note above.
114, for glassworking apparatus combined with means to shape an article from particulate material.

SEE OR SEARCH CLASS:
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 62.2+ for laminating processes under the class definition, which includes a step of forming a lamina or laminae by bulk deposition of discrete particles to form a self-sustaining article (e.g., fiber batt, etc.).

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 43+ and 603+ for processes within the class definition for vitrification, sintering, or firing of inorganic materials, which may include shaping of clay or glass particles prior to firing to form a self-supporting article. See the class definition of Class 65, particularly References to Other Classes and the notes to Classes 264 and 425. See also subclass 6 for processes under the class definition for forming solid particulate material directly from a molten or liquid mass (other than glass) with subsequent uniting of the formed particles; and subclass 125 for processes directed to a uniting step not otherwise provided for.

17.4 Including flame or gas contact:
This subclass is indented under subclass 17.3. Processes in which the particulate material is formed in a flame or particulate or fused material is contacted by a flame or gas to effect treatment thereof.

17.5 Employing nonoxide additive:
This subclass is indented under subclass 17.3. Processes in which a nonoxide material which is generally not an ingredient of a glass composition is incorporated with the particulate material prior to fusing.

17.6 With treatment subsequent to fusing:
This subclass is indented under subclass 17.3. Processes including an additional step of treating the fused glass particles (e.g., shaping, heat treatment, coating, etc.).

(1) Note. Mere cooling of fused material is not considered proper for classification here.

(2) Note. Subsequent melting of shaped and fused particulate material is properly classified here.

19 This subclass is indented under subclass 17.1. Processes directed to working and/or treating of slag usually formed by corrosion or fluxing of refractories, or formed as a by-product in metallurgical processes.

SEE OR SEARCH THIS CLASS, SUBCLASS:
376+, for a process of forming fibers or filaments from slag.

SEE OR SEARCH CLASS:
106, Compositions: Coating or Plastic, 501, Compositions: Ceramic, subclass 28 for glass compositions having slag; subclass 767 for the use of slag as raw material in making Portland type cement; and subclasses 624, 679, 714, 782, 789 for other inorganic ingredient containing compositions including slag. For the line between Class 106 and Class 65, see the reference to Class 106 in the definitions of Class 65.

20 This subclass is indented under subclass 19. Processes which include the step of contacting molten slag with a gaseous material thereby forming voids in the slag.

(1) Note. Generally the gaseous material is formed in situ by contacting the molten slag with water.

SEE OR SEARCH THIS CLASS, SUBCLASS:
22, for processes of glass working and/or treating glass combined with the step of producing pores in situ of a glass composition to form a cellular glass product and see the search notes thereunder.

21.1 Self-supporting particle making (e.g., bead, ball, granule, etc.):
This subclass is indented under subclass 17.1. Processes for a process directed to forming individually distinct separate particulate material, particles of which are self-supporting at least in one stage of manufacture.

SEE OR SEARCH THIS CLASS, SUBCLASS:
19+, for processes in which slag is utilized as the starting material.
141, for apparatus for melt comminuting by shock cooling melt by enhancing surface contact with a cooling fluid.

142+, for particulate bead or ball making apparatus.
376+, for a process of making a fiber.

SEE OR SEARCH CLASS:
241, Solid Material Comminution or Disintegration, subclass 23 and 65+ for processes and apparatus for comminuting hard glass combined with heating and/or cooling of the glass where the temperature modification does not effect a change in a physical or chemical property of the glass (e.g., removing water of hydration, annealing).
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 222 for a tumbling type agglomerating means for particulate material; and subclasses 332+ for means rolling a discrete charge of stock to form a ball; see the search notes thereunder.

21.2 By molten glass comminuting:
This subclass is indented under subclass 21.1. Processes wherein glass in molten state is comminuted to form discrete particles and is solidified in its comminuted form.

(1) Note. To be classified in this subclass the material must be subdivided from an original liquid mass and then the subdivided particles solidified with no substantial change in shape and size.

(2) Note. Particles formed by a molten glass stream entering a liquid quenching both are not proper for this subclass since no distinct liquid particles are formed which are subsequently solidified.

SEE OR SEARCH CLASS:
264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 5+ for processes under the class definition of liquid comminuting to form discrete particles and note references to other pertinent classes listed thereunder.

21.3 Spheroidizing or rounding of solid glass particles:
This subclass is indented under subclass 21.1. Processes directed to the reshaping of solid, irregular, or nonspherical particulate glass material wherein said irregularities are diminished or the particles are caused to become more spherical or rounded in shape without loss of material therefrom and by means other than use of a mold or shaping surface therefor and in which the individual and separate identities of the particles is maintained.

(1) Note. Patents in this subclass are generally directed to those processes in which heat is employed to soften the particles so as to permit the internal cohesive forces of the particles to effect said reshaping as defined.

SEE OR SEARCH CLASS:
264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 15 for processes under the class definition of spheroidizing particulate matter.

21.4 Hollow or porous particle:
This subclass is indented under subclass 21.1. Processes including the step of forming hollow spheres or forming pores or voids in particulate material.

21.5 With mechanical shaping or subdividing:
This subclass is indented under subclass 21.1. Processes including mechanical shaping of molten glass into desired particulate form.

(1) Note. Bead shaping or rotating wire or spindle included hereunder as well as comminuting solids by ultrasonic vibration.

22 This subclass is indented under subclass 17.1. Processes combined with the step of forming pores or open cells in situ within a glass composition by a gas forming agent during or subsequent to the formation of a glass product.

SEE OR SEARCH THIS CLASS, SUBCLASS:
20, for processes of foaming slag in situ to form a cellular product.
141, for melt disintegrating or puffing means including fluid-melt contacting means.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 77+ for a process of bonding lamina including the step of forming pores in situ within a lamina.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 41+ for processes under the class definition, which include a pore forming in situ step.

501, Compositions: Ceramic, subclass 39 for processes of forming pores or open cells with a glass melt not combined with specific glass working and/or treating. The line between this class (501) and Class 65 on patents claiming the combination or pore-forming and broad glass working and/or treating is stated in the class definitions of Class 65.

521, Synthetic Resins or Natural Rubbers, subclasses 50+ for processes directed to the production of porous or cellular resinous bodies.

23 This subclass is indented under subclass 17.1. Processes which include the step of either (1) adhesively adhering a separate part or material, or (2) associating a destructible separate part or material with a glass part, then performing a glass working or treating operation, and subsequently discarding the separate part or material by either (1) stripping the part or material from the glass part, or (2) destroying the separate part or material.

SEE OR SEARCH CLASS:

29, Metal Working, subclasses 423+ for a mechanical manufacturing process including a step of utilizing transitory attached or associated separate material.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 89.11+ and 540+ for processes and apparatus for direct contact transfer of ceramic material on a substrate to another substrate combined with vitrification or firing of the ceramic material. Processes and apparatus directed to a direct transfer of ceramic material to soft glass are classified in Class 65; and see this class (156), subclass 155 for adhesive bonding including a step involving destruction of a transitory material.

24 This subclass is indented under subclass 17.1. Processes which include the step of applying to the glass or the apparatus a separate and distinct layer which functions to either (1) lubricate the glass apparatus, or (2) prevent adhesion during a glass working or treating operation of the glass to another glass or to the apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:

60.1+, for a process of coating glass with a coating material not intended to function as a parting or lubricating layer and see the Search Notes thereunder.

169, and 170, for glass working apparatus combined with means providing a parting or lubricating means, respectively.

SEE OR SEARCH CLASS:

106, Composition: Coating or Plastic, subclass 2 for coating or plastic compositions specially designed for use in the prevention of adherence of a coating material to a surface.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 289 for a process of laminating including use of a parting or release layer.

25.1 Providing a gaseous layer between glass and apparatus:

This subclass is indented under subclass 24. Processes in which the parting or lubricating layer is a gaseous fluid between the glass and the apparatus.

(1) Note. The gaseous fluid may be formed by vaporization of a liquid between the glass stock, and see the search notes thereunder.

SEE OR SEARCH THIS CLASS, SUBCLASS:

182, for apparatus including a fluid support for the glass stock, and see the search notes thereunder.

25.2 Sheet:
This subclass is indented under subclass 25.1. Processes in which the glass is in sheet form.

25.3 Formed from molten glass:
This subclass is indented under subclass 25.2. Processes which include the step of forming a glass sheet from a molten glass composition.

25.4 Reshaping:
This subclass is indented under subclass 25.2. Processes which include the step of reshaping a glass sheet.

26 This subclass is indented under subclass 24. Processes directed to applying the parting or lubricating layer on a glass working or treating apparatus by a coating operation.

(1) Note. This subclass includes applying a coating of water to apparatus to prevent sticking of the glass thereto.

27 This subclass is indented under subclass 17.1. Processes which include (1) the step of repairing of the apparatus; and/or (2) the cleaning of the apparatus; and/or (3) the step of preventing the formation of dust from a glass batch or controlling batch dust.

SEE OR SEARCH THIS CLASS, SUBCLASS:
168, for glass working or treating apparatus combined with positive apparatus cleaning means.
171+, for glass working and/or treating apparatus combined with repair, assembly or disassembly means.

SEE OR SEARCH CLASS:
134, Cleaning and Liquid Contact With Solids, appropriate subclasses, for processes and apparatus for cleaning, not otherwise provided for. See the Search Notes under the class definition.

28 This subclass is indented under subclass 17.1. Processes including the step of (1) using surplus or discarded material from a glass working or treating operation in a process of glass manufacture; or (2) mending otherwise unusable parts or material by a glass working operation for reuse; or (3) preventing spreading of checks or cracks in a glass part during the formation of the glass part.

SEE OR SEARCH THIS CLASS, SUBCLASS:
165, for apparatus with a reject catcher, deflector or holder.

SEE OR SEARCH CLASS:
29, Metal Working, subclasses 402.01+, for a process of restoring, renewing, or repairing articles for reuse; and subclasses 403.1+ for a process of scrap recovery or utilization.

29.1 With program, time, or cyclic control:
This subclass is indented under subclass 17.1. Processes including the use of a (a) clocked, (b) set of coded instructions, or (c) sequentially repeated operation during any stage of forming or treating the glass.

29.11 Electric computer or data processing system utilized:
This subclass is indented under subclass 29.1. Processes including the use of a data processor or an electrical computer during any stage of forming or treating the glass.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 81+ for data processing in a manufacturing or assembly line for quality determination.

29.12 With measuring, sensing, inspecting, indicating, or testing:
This subclass is indented under subclass 17.1. Processes including a step of visually, chemically, or physically determining or evaluating some chemical or physical property or characteristic of glass.

(1) Note. Equivalent terms include examining, diagnosing, analyzing, observing, viewing, evaluating, and monitoring.

SEE OR SEARCH THIS CLASS, SUBCLASS:
158, for apparatus used for measuring and testing combined with a signal, indicator, inspection means, register, or

recorder for glass, exclusive of fibers, filaments, waveguides, or preforms thereof.

377, for processes of measuring, controlling, analyzing, inspecting, or testing the manufacture of glass fibers, waveguides, filaments, or preforms.

483, for apparatus used for measuring, controlling, analyzing, inspecting, or testing glass fibers, waveguides, filaments, or preforms.

SEE OR SEARCH CLASS:

73, Measuring and Testing, appropriate subclasses for testing or measuring of general application; see the search notes under the class definition of Class 73.

29.13 Combustion chamber atmosphere:

This subclass is indented under subclass 29.12. Processes wherein the environment inside a combustion chamber is measured, analyzed, tested, inspected, or controlled.

(1) Note. Processes involving controlling or regulating pressure inside a furnace or combustion chamber is considered proper for classification in this subclass.

29.14 Diameter, width, or thickness of formed article:

This subclass is indented under subclass 29.12. Processes directed to measuring, analyzing, testing, inspecting, or controlling the diameter, width, or thickness of a formed article.

29.15 Fluid pressure:

This subclass is indented under subclass 29.12. Processes directed to measuring, analyzing, testing, inspecting, or controlling any associated fluid pressure during the manufacture or the treatment of glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

29.13, for processes of measuring, analyzing, testing, inspecting, or controlling fluid pressure inside of a furnace or combustion chamber.

29.16 Batch or feed material:

This subclass is indented under subclass 29.12. Processes directed to measuring, testing, analyzing, inspecting, or controlling raw material or stock feed used to form the glass (e.g., article or preform, etc.).

(1) Note. Processes involving controlling or measuring the weight of the glass forming feed material are found here.

29.17 Level or flow of molten material:

This subclass is indented under subclass 29.12. Processes directed to measuring, analyzing, testing, inspecting, or controlling the elevation, viscosity, or flow rate of the melt or molten material.

29.18 Magnetic, electromagnetic, or wave energy utilized (e.g., light, infrared, ultrasonic, etc.):

This subclass is indented under subclass 29.12. Processes combined with the use of magnetic, electromagnetic radiation, wave, sonic, or ultrasonic energy during any stage of forming or treating the glass.

(1) Note. Electromagnetic radiation includes: (a) Gamma rays; (b) X-rays; (c) Atomic particles (i.e., alpha rays, beta rays, electrons); (d) Ultraviolet rays; (e) Visible rays; (f) Infrared rays; (g) Actinic; (h) Laser; (i) Microwave; (j) Radio wave. This list is not intended to be exhaustive and is not limited to the above examples.

29.19 Temperature:

This subclass is indented under subclass 29.12. Processes directed to measuring, controlling, inspecting, analyzing, or testing a change in sensible heat during any stage of forming or treating the glass.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, appropriate subclasses for processes of determining either (a) a characteristic or a condition of glass or (b) a system utilizing heating or cooling as a significant part of the test, wherein no glass working or treating is involved.

29.21 Of molten glass:
This subclass is indented under subclass 29.19. Processes wherein the glass is in a softened or molten state.

30.1 With chemically reactive treatment of glass preform:
This subclass is indented under subclass 17.1. Processes combined with a treatment of a glass preform by a material which chemically reacts therewith.

(1) Note. This subclass includes patents claiming the step of coating a glass substrate and reacting the coating with a constituent of the glass substrate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
20, and 22, for processes including a foaming step which may involve a chemical reaction.

SEE OR SEARCH CLASS:
427, Coating Processes, subclasses 399+ for processes of coating, per se, wherein a substrate other than glass supplies at least a portion of the coating.

30.11 To enhance the ability to darken or change color in response to radiation exposure (e.g., photochromic):
This subclass is indented under subclass 30.1. Processes wherein the chemically reactive treatment is for the purpose of enhancing the photochromic property of the glass or to render the glass photochromic.

(1) Note. "Photochromic" refers to the ability of a glass to reversibly change color, darken, and fade on exposure to the presence and removal of electromagnetic radiation.

(2) Note. Included herein are processes which effect parallel alignment of crystallites of a colorant substance, but in which there is insufficient crystal formation to actually effect a coloration or darkening without the further step of exposure to electromagnetic radiation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
30.13, for processes of imparting color to glass by an ion exchange process.
33.1, for processes of devitrifying glass or vitrifying crystallized glass.

SEE OR SEARCH CLASS:
430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclass 13, for products comprising an image contained within a transparent base, which may have been partially prepared by a process classified in Class 65, Glass Manufacturing, subclass 30.11; subclass 351 for thermos:graphic processes of preparing a colored image involving applying heat to develop the image, following the imaging step; and subclasses 353+ for thermos:graphic processes of developing an image involving applying heat to develop the image during dry development thereof, following the imaging step.
501, Compositions: Ceramic, subclasses 2+ for devitrified glass-ceramic compositions and processes of making them; and subclass 13 for photochromic glass compositions and processes for their manufacture.

30.12 To hydrate the glass:
This subclass is indented under subclass 30.1. Processes which comprise the incorporation of water in the glass.

30.13 With metal ion penetrating into glass (i.e., ion exchange):
This subclass is indented under subclass 30.1. Processes including the step of exchanging selected metal ions of the outer layers of the glass for other ions.

(1) Note. The ion exchange process may be for the purpose, e.g., of imparting a color to the glass or to alter its refractive index.

30.14 To temper or strengthen the glass:
This subclass is indented under subclass 30.13. Processes wherein the ion exchange process is for the purpose of altering the temper or strength of the glass.

(1) Note. Such processes are sometimes referred to as chemical tempering.

SEE OR SEARCH THIS CLASS, SUBCLASS:
114, for tempering in a bath of liquid or solids with no specific disclosure of ion exchange occurring.

31 This subclass is indented under subclass 30. Processes in which the chemical treatment includes use of a chemical reagent to remove a portion or constituent of the glass.

SEE OR SEARCH CLASS:
216, Etching a Substrate: Processes, for etching of glass materials by either chemical etching or physical solvation wherein a glass manufacturing step is not employed.
427, Coating Processes, subclasses 299+ for processes of coating combined with a pretreatment of the base.

32.1 Operating under inert or reducing conditions:
This subclass is indented under subclass 17.1. Processes including an operation carried under controlled conditions which provide an inert or reducing area therefore to prevent oxidation or to cause chemical reduction.

SEE OR SEARCH THIS CLASS, SUBCLASS:
157, for glass working treating means including means providing special gaseous atmosphere.

SEE OR SEARCH CLASS:
148, Metal Treatment, particularly subclasses 240+ for processes of reactive coating of metal as defined thereunder. The combination of reactive coating of metal with a glass working or treating operation is proper for Class 65. However, the combination of a significant heat treatment to modify or maintain the internal physical property (i.e., microstructure) or chemical property of the metal with a glass working or glass treating operation is proper in Class 148.

32.2 With bonding or sealing:
This subclass is indented under subclass 32.1. Processes including a step of bonding glass to another material or part or sealing a glass material or part to or into another material or part.

(1) Note. Included herein are process of e.g., melt bonding two glass parts together or sealing a metal terminal in a glass bulb by heat softening the glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
17.3, for a process of sintering glass particles not performed under inert or reducing conditions.

32.3 With crystallization or photochromism or phase separation:
This subclass is indented under subclass 32.1. Processes which comprises: (a) partial or complete crystallization of a glass composition; (b) a color change occurring response to radiation impinging on glass; or (c) separation of phases of a glass composition.

32.4 With coating:
This subclass is indented under subclass 32.1. Processes comprising a coating step.

(1) Note. A glass composition may provide either the substrate or the coating composition, or both of them.

32.5 With forming glass from molten state with treatment of molten glass, or with drawing of glass in softened state:
This subclass is indented under subclass 32.1. Processes comprising shaping or treating glass which has been melted or draw glass which is in a softened but not melted state.

33.1 Devitrifying glass or vitrifying crystalline glass (e.g., starting with or forming crystalline glass, etc.):
This subclass is indented under subclass 17.1. Processes which include the step of converting glass (a) from a vitreous state to a crystalline

state, or (b) from a crystalline state to a vitreous state.

(1) Note. The intent to vitrify or to devitrify must be stipulated for classification in this and indented subclasses.

33.2 Electromagnetic radiation or resulting heat utilized (e.g., gamma rays, X-rays, atomic particles, UV, visible, IR, actinic, laser, microwave or radio wave, etc.):
This subclass is indented under subclass 33.1. Processes wherein during any stage of an operation electromagnetic radiation or resulting heat of radiation is used.

(1) Note. Electromagnetic radiation includes: (a) Gamma rays; (b) X-rays; (c) Atomic particles (i.e., alpha rays, beta rays, electrons); (d) Ultraviolet rays; (e) Visible; (f) Infrared; (g) Actinic; (h) Laser; (i) Microwave; (j) Radio wave. This list is not intended to be exhaustive and is not limited to the above examples.

33.3 Halogen containing phase (e.g., crystalline or noncrystalline, etc.):
This subclass is indented under subclass 33.1. Processes wherein the composition of the glass includes halogen material during some phase of the vitrifying or devitrifying operation.

(1) Note. The halogens are: Fluorine (F); Chlorine (Cl); Bromine (Br); Iodine (I); Astatine (At)

33.4 With coating:
This subclass is indented under subclass 33.1. Processes wherein a coating which may be vitrified or devitrified is applied to a substrate which may be vitrified or devitrified glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
33.5, for processes wherein the applied material is used to bond glass to a formed part.

33.5 With fusion bonding glass to a formed part (e.g., devitrified seals, glass to metal, etc.):
This subclass is indented under subclass 33.1. Processes directed to fusion bonding of a glass part to another part of the same or different preform by adherence or coherence at the interface of the parts, wherein at least one of the parts is self-supporting prior to the bonding operation.

(1) Note. The coherence is usually effected by heat, externally applied or by the residual heat retained by the glass part from a previous operation, which renders the adherent face of the vitrified or devitrified glass part soft, thereby permitting fusion bonding directly to the adherent face of the other part.

SEE OR SEARCH CLASS:
29, Metal Working, subclasses 428+ and 700+ for a process or apparatus, respectively, for mechanical joining of parts.
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses for processes and apparatus for adhesive securing of parts other than by glass fusion or metal fusion, see especially subclasses 89.11+ for a process of laminating comprising decal-type transfer of a lamina of ceramic material to a base with subsequent firing thereof to bond the lamina to the base, and subclasses 99+ for optically transparent glass sandwich making including a Class 156 bonding combined with a Class 65 reshaping (e.g., bending) operation. A process reciting a Class 156 bonding step and a Class 65 bonding step is classified in Class 65.
228, Metal Fusion Bonding, for bonding of glass to metal by metal solder.

33.6 Glass applied in powdered form (i.e., frit):
This subclass is indented under subclass 33.5. Processes wherein the glass used to form the bond is in the form of small particles or dust.

33.7 Alumino-silicate containing phase:
This subclass is indented under subclass 33.1. Processes wherein an inorganic aluminum-silicon material is present in the composition of the glass during some phase of the vitrifying or devitrifying operation.

33.8 Containing at least 3 percent lithium or lithium oxide (e.g., spodumene, eucryptite, petalite, etc.):
This subclass is indented under subclass 33.7. Processes wherein the aluminum-silicon material also contains at least 3 percent lithium or lithium oxide.

(1) Note. Some of the most common lithium-alumino-silicate containing materials found in this subclass are: (a) spodumene (b) eucryptite; (c) petalite. This list is not intended to be exhaustive and is not limited to the above examples.

33.9 Forming product or preform from molten glass:
This subclass is indented under subclass 33.1. Processes wherein a vitrified or devitrified glass product or preform produced is formed directly from molten glass.

34 This subclass is indented under subclass 17.1. Processes which include the step of closing an opening of a glass receptacle, which opening was used to exhaust a gas from the receptacle.

SEE OR SEARCH THIS CLASS, SUBCLASS:
270, for glassworking apparatus with glass envelope tipping off means.

SEE OR SEARCH CLASS:
53, Package Making, appropriate subclasses especially subclasses 403+, for sealing of receptacles combined with a filling step. See the reference to Class 53 in the class definitions of Class 65 for the lines between these classes and see the class definitions of Class 53 for related fields of search.

35 This subclass is indented under subclass 17.1. Processes which include the step of moving a glass preform up and down or to and fro or a combination of such motions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
178+, for means to agitate molten glass in combination with glass working or treating means.
302, for article forming means utilizing mold motion in forming.

36 This subclass is indented under subclass 17.1. Processes directed to fusion bonding of a glass part to another part of the same or different preform by adherence or coherence at the interface of the parts at least one of the parts being self-supporting prior to the bonding operation.

(1) Note. The coherence is usually effected by heat, externally applied or by the residual heat retained by the glass part from a previous operation, which renders the adherent face of the glass part soft thereby permitting fusion bonding of the glass part directly to the adherent face of the other part.

(2) Note. Processes of forming a glass part from molten glass in situ on another part are within the scope of this and indented subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102+, for a process of collapsing or sealing off of a glass preform with bonding or fusion thereof.
146, for laminating apparatus including means to feed diverse material thereto and subclasses 152+ for fusion bonding means.

SEE OR SEARCH CLASS:
29, Metal Working, subclasses 428+ and 700+, for a process or apparatus, respectively, for mechanical joining of parts.
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses, for processes and apparatus for adhesive securing of parts other than by glass fusion or metal fusion, see especially subclasses 89.11+ for a process of laminating comprising decal-type transfer of a lamina of ceramic material to a base with subsequent firing thereof to bond the lamina to the base, and subclasses 99+ for optically transparent glass sandwich making including a Class 156 bonding combined with a Class 65 reshaping (e.g., bending)

operation. A process reciting a Class 65 bonding step and a Class 156 bonding step is classified in Class 65. For other lines with Class 156, see the notes in subclasses 23, 31, 37+, and 42 in Class 65.

228, Metal Fusion Bonding, subclasses 122.1+ for bonding of glass to metal by metal solder.

438, Semiconductor Device Manufacturing: Process, particularly subclasses 107+ and 455+ for methods for joining plural semiconductor substrates. While Class 65 considers silicon and silicon dioxide glass, and hence takes the melting, shaping, or fusion bonding of the same (as well as combined operations whether preparatory or subsequent to the melting, shaping, or fusion bonding step), if the structure formed is identified as having utility for semiconductor electrical devices, placement is proper in Class 438; see the search notes therein.

445, Electric Lamp or Space Discharge Component or Device Manufacturing.

37 This subclass is indented under subclass 36. Processes directed to the formation of an optical lens by a bonding operation.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 99+ and 443+ for processes and apparatus for making optically transparent sandwiches by a laminating operation provided for in Class 156 combined with a glass bending operation.

351, Optics: Eye Examining, Vision Testing and Correcting, subclass 177 for methods of making ophthalmic lenses which usually involve some combination of grinding, glass manufacturing and adhesive bonding.

38 This subclass is indented under subclass 37. Processes which include the step of bonding at least three preformed parts to each other in the fabrication of a lens.

SEE OR SEARCH THIS CLASS, SUBCLASS:

42, for bonding of a subassembly with subsequent assembly and bonding of preformed parts only.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 182 for processes of bonding of at least two bonded subassemblies and see the "Search Notes" thereunder.

39 This subclass is indented under subclass 37. Processes which include the step of (1) shaping, during bonding, of molten glass to assume the shape of a configured glass lens part; and/or (2) reshaping during bonding of a separate preformed glass part to assume the shape of a configured glass lens part.

SEE OR SEARCH THIS CLASS, SUBCLASS:

48+, for forming of a glass part from molten glass and bonding thereof to another formed part not involving lens making, and see the "Search Notes" thereunder.

40 This subclass is indented under subclass 36. Processes which include the step of heating of the work by (1) subjecting the work to a changing electric field thereby transforming the electric energy into heat due to the resistance of the work to passage of current therethrough, or (2) passage of an electric current directly through the work which constitutes a part of an electrical circuit.

(1) Note. The electrical energy must act directly on the work and not, for example, by convection or conduction of heat from an element not constituting a part of the work.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 272+ for processes of adhesive bonding including heating by dielectric loss or by passing current through work which is capable of conducting an electrical current there-

through, and see the reference to other classes under "Search Class" in subclass 272 of Class 156 for related fields of search.

219, Electric Heating, subclasses 600+ for inductive heating, subclasses 678+ for microwave heating, and subclasses 764+ for capacitive dielectric heating.

373, Industrial Electric Heating Furnaces, subclasses 27+ for a glass furnace reciting specific electrical structure or characteristics, and for a process including manipulation of an electrical glass furnace; see the "Search Notes" thereunder; and see the class line note in Class 65, subclass 134.

41 This subclass is indented under subclass 36. Processes which include the step of (1) annealing, or (2) tempering glass.

42 This subclass is indented under subclass 36. Processes directed to fusion bonding of at least two self-supporting parts and thereafter bringing together in a separate operation an additional self-supporting part with the bonded subassembly and then bonding the additional part to the subassembly.

SEE OR SEARCH THIS CLASS, SUBCLASS:

38, for processes of bonding at least three formed parts in the fabrication of a lens.

SEE OR SEARCH CLASS:

29, Metal Working, subclass 469 for processes of joining subassemblies.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 182 for a process of bonding subassemblies. The combination of serially bonding individually handled parts together by a Class 65 operation in one stage and by a Class 156 operation in another stage is provided for in Class 65, in this subclass (42).

43 This subclass is indented under subclass 36. Processes directed to coating of the adherent face of at least one part prior to the bonding operation.

(1) Note. Processes of bonding a previously coated part with another part are included herein.

(2) Note. Melting of a self-supporting glass part to the molten state to form a glass coating on the joint interface of one of the parts is considered a coating operation for the purposes of this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

60.1+, for a process of coating glass in general combined with a glass working or treating operation and see the notes thereunder for the scope of the term "coating" and related fields of search.

SEE OR SEARCH CLASS:

148, Metal Treatment, subclasses 240+ for a process for producing a reactive coating on solid metal.

438, Semiconductor Device Manufacturing: Process, particularly subclasses 107+ and 455+ for methods for joining plural semiconductor substrates. While Class 65 considers silicon and silicon dioxide glass, and hence takes the melting, shaping or fusion bonding of the same (as well as combined operations whether preparatory or subsequent to the melting, shaping, or fusion bonding step), if the structure formed is identified as having utility for semiconductor electrical devices, placement is proper in Class 438; see the search notes therein.

44 This subclass is indented under subclass 36. Processes directed to (1) altering the surface configuration only of the work by raising bosses or protuberances thereon or causing surface portions to be depressed below the plane surface of the work, or (2) forming or shaping the work into alternate ridges and grooves in wavelike shape.

(1) Note. The embossing or corrugating may occur simultaneously with the bonding step.

(2) Note. Transitory embossing or corrugating is within the scope of this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

93, for a process of forming a sheet including the step of corrugating, embossing or surface deforming the sheet.

106, for a process of corrugating or forming depressions in a glass sheet.

151, for embedding means on a roll which may function to emboss or corrugate glass in its soft state.

SEE OR SEARCH CLASS:

101, Printing, subclasses 3.1+ for process and apparatus for embossing, per se.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses, particularly subclasses 205+ for a process of corrugating and subclasses 209 and 219+ for embossing processes combined with a laminating operation, and subclasses 342+ for corrugating processes, per se, and see and "Search Notes" under these subclasses for related searches.

45 This subclass is indented under subclass 36. Processes combined with a step of fabricating a glass part from glass while in the molten or soft state by a molding or casting operation.

(1) Note. The step of simultaneously forming the glass part and bonding the glass part to a self-supporting part is included herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:

66+, for processes for fabricating glass articles from glass while in the molten state.

139+, for apparatus for making electronic envelope header, terminals or stems including forming and fusion bonding means.

146+, for forming and fusion bonding apparatus including means to feed non-glass material thereto.

152+, for forming and fusion bonding apparatus.

SEE OR SEARCH CLASS:

164, Metal Founding, subclasses 47+ for processes of metal casting, and see the reference to this class (164) in the class definitions of Class 65 for the lines between these classes.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 110+ for means to manufacture a composite article including fluent or bulk stock shaping means and means to feed or support a preform to or on the shaping means; see the search notes thereunder.

46 This subclass is indented under subclass 45. Processes which include the step of applying gas pressure to shape the glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

66+, for a process of forming an open cavity in a glass charge by differential gas pressure in a process of forming a glass article from molten glass while on a blow pipe and subclasses 68+, for blowing glass confined in a mold cavity, and see the "Search Notes" in these subclasses for related searches.

87, for a process of utilizing differential gas pressure to reshape hollow stock combined with the step of forming the hollow stock by a drawing operation.

110, for a process of reshaping tubular stock utilizing gaseous pressure.

47 This subclass is indented under subclass 45. Processes wherein the fabricating is conducted in a mold cavity, and see (1) Note of this subclass for the scope of the term "mold cavity".

(1) Note. A recess in a part which constitutes an element of a composite product or a space between preformed elements to be joined and which receives a glass composition therein for simultaneous solidification and bonding to the part is considered a mold cavity for the purposes of this and indented subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:
68+, for processes of forming hollow glass articles in a mold cavity in general.

48 This subclass is indented under subclass 47. Processes wherein the step of bonding is conducted while the fabricated part remains in the mold cavity.

SEE OR SEARCH CLASS:
164, Metal Founding, subclasses 91+ for processes of forming composite products by casting molten metal onto a preform.
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 117+ for means bonding a preform to plastic material in a plastic material shaping cavity.

49 This subclass is indented under subclass 48. Processes in which the part to which the molten glass is bonded is metal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
59, for a process in general for bonding a glass preform to a metal preform.

50 This subclass is indented under subclass 45. Processes directed to forming a sheet from molten glass and fusion bonding a metal part to the glass prior to, during or subsequent to formation of the sheet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
49, for a process of simultaneously forming a glass part in a mold cavity and bonding it to a metal part.
59.1+, for a process of bonding glass to metal in general.
147+, for apparatus including wire feed means to form and bond glass sheet to wire, to form wire reinforced glass.
154, for metal to glass fusion bonding apparatus.

SEE OR SEARCH CLASS:
427, Coating Processes, appropriate subclasses for processes of coating a substrate with molten glass.

51 This subclass is indented under subclass 50. Processes directed to associating a metal part with molten glass and then forming a sheet from the molten glass while in contact with the metal part.

52 This subclass is indented under subclass 51. Processes which includes the step of forming an additional glass sheet from molten glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
53, for a process of forming plural sheets or sheet-like streams from a common source of melt combined with glass to glass fusion bonding.
98, for a process of simultaneously forming at least two separate and distinct glass sheets.

53 This subclass is indented under subclass 45. Processes which include the step of forming at least two separate and distinct glass sheets or sheet-like streams from a single reservoir.

(1) Note. The glass streams need not be cooled or solidified for the purposes of this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
52, for a process of forming plural glass sheets combined with bonding to a metal part.
98, for a process of simultaneously forming plural glass sheets.
195, for sheet drawing apparatus including means dividing and recombining metal in a draw chamber.

54 This subclass is indented under subclass 36. Processes combined with the step of reshaping a glass preform either (1) prior to associating the glass preform with another formed part, or (2) subsequent to bonding of the glass preform to another formed part; see the Glossary for the definition of the term “reshaping”.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102, for a process of reshaping a glass preform of general application, and see the “Search Notes” thereunder.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 196+, particularly subclasses 221+ for a combined process or reshaping and bonding by a Class 156 operation; see the reference to Class 156 in subclass 37.

55 This subclass is indented under subclass 54. Processes in which the step of reshaping of the glass part occurs prior to associating the glass part with another part.

56 This subclass is indented under subclass 36. Processes combined with the step of (1) cutting, or (2) perforating, or (3) breaking of hard or soft glass; see subclass 112 for the definitions of these terms.

SEE OR SEARCH THIS CLASS, SUBCLASS:

112, for preform treating combined with severing, perforating, or breaking.

133, for a process of severing a molten glass stream, per se.

57 This subclass is indented under subclass 36. Processes directed to producing relative rotation of a heat source and the glass part during the bonding operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

120, for a process of flame treating a glass preform which may include relative movement between the source of heat and the preform.

271, for reshaping apparatus combined with heating means that moves relative to work during a shaping operation.

58 This subclass is indented under subclass 36. Processes in which as least one of the parts provides spacing ribs or flanges so that facing portions of the parts are maintained out of contact during and subsequent to the bonding operation.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 292 for other methods for bonding laminae having opposed facing areas out of contact.

59.1 Of glass to metal part:

This subclass is indented under subclass 36. Processes in which at least one part is metal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

43, for processes directed to coating of the adherent face of at least one part prior to the bonding operation, and see the notes to the definition of that subclass.

49, for a process of forming glass in a mold cavity combined with uniting a metal piece thereto, in situ.

50+, for a process of forming and bonding a glass sheet to a metal part.

138+, for electronic envelope header, terminal or stem-making apparatus which includes bonding means.

147+, for glass-working apparatus with wire-laminating means.

154, for glass atom metal fusion bonding means.

SEE OR SEARCH CLASS:

228, Metal Fusion Bonding, subclasses 101+ for processes of fusion bonding of glass to metal which involve metal working.

59.2 Maintaining cavity in glass:

This subclass is indented under subclass 59.1. Processes in which the process performed produces an object in which the fusion bond is part of a space-enclosing cavity.

(1) Note. Typical products produced herein are cathode-ray tubes and electric lamps.

59.21 Glass applied in powdered (i.e., frit) form:

This subclass is indented under subclass 59.2. Processes which include the application of the glass in the form of a powder (i.e., a frit).

59.22 Named fusible bonding material employed:
This subclass is indented under subclass 59.2. Processes which employ an additional fusible material to adhere to both the glass and metal parts sought to be adhered.

(1) Note. The additional fusible material may comprise a glass of a composition specifically different from that of the glass sought to be adhered to the metal part or a different fusible metallic material.

59.23 With firing in vacuum, in inert atmosphere, or in pumped in gas:
This subclass is indented under subclass 59.2. Processes which the fusion step performed to adhere the glass and metal parts takes place in a vacuum, in an inert atmosphere, or in the presence of a gaseous medium at super atmospheric pressure.

59.24 Metal part outside of glass part:
This subclass is indented under subclass 59.2. Processes in which the metal part is at least in part exterior to the glass part as a result of the fusion.

(1) Note. The term "exterior" as used herein means that more of the metal part lies outside the glass than merely minor length of a filament lead-in wire of an electric lamp which remains on the outside when a glass tube forming a support for the filament has the filament wire fused to same prior to being fused into the main lamp envelope.

59.25 Metal part inserted through hole or into groove in glass part:
This subclass is indented under subclass 59.2. Processes in which the glass part, while in the solid state, has a hole through which the metal part is threaded or a groove into which the metal part is inserted so as to fix their relative positions prior to the fusion step.

59.26 Metal part forced through or into softened glass part (e.g., pinch sealing, etc.):
This subclass is indented under subclass 59.2. Processes in which the glass part is softened by heat and the metal part is forced through or into it to fix their relative positions.

(1) Note. This subclass included those processes sometimes referred to as pinch sealing in which the heat-softened glass is squeezed down around the metal part until the glass fuses with itself.

59.27 Metal part coaxial with and inside of glass part:
This subclass is indented under subclass 59.2. Processes in which the glass and metal parts are both relatively elongated, the glass part being outside of the metal part, and the two being arranged to be coaxial.

(1) Note. Such a process may produce, e.g., a cylindrical metal pipe or tube fused to a surrounding glass pipe or tube of similar shape.

59.28 Relative movement or manipulation of parts during or immediately preceding fusion:
This subclass is indented under subclass 59.2. Processes which include moving the glass and metal parts relative to each other during the actual fusion step, or during the heating immediately preceding the actual movement of fusion.

59.3 More than two parts in overlaying series (noncavity):
This subclass is indented under subclass 59.1. Processes in which the final product has more than two glass and metal parts in an overlaying series without becoming part of a space-enclosing cavity.

(1) Note. A metal sheet sandwiched between two glass sheets is an example of a product produced by such a process.

59.31 Metal part inserted through hole or into groove in glass part:
This subclass is indented under subclass 59.3. Processes in which the glass part, while in the solid state, has a hole through which the metal part is threaded or a groove into which the metal part is inserted so as to fix their relative position prior to the fusion step.

59.32 Metal part forced through or into softened glass part (e.g., pinch sealing, etc.):
This subclass is indented under subclass 59.3. Processes in which the glass part is softened by heat and the metal part is forced through or into it to fix their relative positions.

(1) Note. This subclass included those processes referred to as pinch sealing, in which the heat-softened glass is squeezed down around the metal part until the glass fuses with itself.

59.33 Relative movement or manipulation of parts during or immediately preceding fusion:
This subclass is indented under subclass 59.3. Processes which include moving the glass and metal parts relative to each other during the actual fusion step, or during the heating immediately preceding the actual movement of fusion.

59.34 Metal part outside of glass part:
This subclass is indented under subclass 59.3. Processes in which the metal part is at least in part exterior to the glass part as a result of the fusion.

(1) Note. The term "exterior to" as used herein means that more of the metal part lies outside the glass than merely the minor length of a filament lead-in wire of an electric lamp which remains on the outside when a glass tube forming a support for the filament has the filament wire fused to same prior to being fused into the main lamp envelope.

(2) Note. An example of metal parts exterior to a glass part would be the case of two metal sheets with a glass sheet sandwiched between them by fusion bonding.

59.35 Metal part coaxial with and inside of glass part:
This subclass is indented under subclass 59.3. Processes in which the glass and metal parts are both relatively elongated, the glass part being outside of the metal part and the two being arranged to be coaxial.

(1) Note. Such a process may produce, e.g., a metal or rods inserted into a closely surrounding glass tube all fusion bonded together.

59.4 Metal part outside of glass part:
This subclass is indented under subclass 59.1. Processes in which the metal part is at least in part exterior to the glass part as a result of the fusion.

(1) Note. For the definition of "exterior to", see the definition of subclass 59.24, supra.

59.5 Glass applied in powdered (i.e., frit) form:
This subclass is indented under subclass 59.1. Processes which include the application of the glass in the form of a powder, i.e., a frit.

59.6 Metal part coaxial with and inside of glass part:
This subclass is indented under subclass 59.1. Processes in which the glass and metal parts are both relatively elongated, the glass part being outside of the metal part and the two being arranged to be coaxial.

(1) Note. Such a process may produce, e.g., a metal rod inside of a closely fitting glass tube, to which it is fusion bonded.

59.7 Metal part forced through or into softened glass part (e.g., pinch sealing, etc.):
This subclass is indented under subclass 59.1. Processes in which the glass part is softened by heat and the metal part is forced through or into it to fix their relative positions.

(1) Note. This subclass includes processes referred to as pinch sealing, in which the heat-softened glass is squeezed down around the metal part until the glass fuses with itself.

60.1 With coating:
This subclass is indented under subclass 17.1. Processes combined with the step of applying a surface coating material to a glass preform (the coating material usually being an emulsion, dispersion, solution), which is clearly disclosed as leaving a residual film, layer or continuous deposit on the preform.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23, for a glassworking or treating process combined with destruction or delamination of transitory attached or associated separate material.

24+, for processes of applying a parting or lubricating layer.

30.1+, for process of applying a coating involving a chemical reaction with a glass substrate.

40, for a process of coating a part with a conductive coating for Joule effect heating of the work.

43, for a process of bonding including coating a formed part at the joint interface prior to bonding.

443+, for a process of forming a glass fiber or filament combined with a step of coating the fiber or filament during or subsequent to its formation.

SEE OR SEARCH CLASS:

8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, subclass 523 for processes of dyeing a siliceous body, and see the search notes thereunder.

106, Compositions: Coating or Plastic, appropriate subclasses for coating compositions, per se.

427, Coating Processes, appropriate subclasses for a coating process including the step of forming a substrate by a glassworking operation by name only, unless the coating is applied to the substrate while hot from the heat of formation, in which case the process is in Class 65. When a preparatory treatment for coating is disclosed as additionally changing the physical characteristics of the glass, the patent is classified in Class 65.

60.2 Plural diverse layers:
This subclass is indented under subclass 60.1. Processes which result in the glass preform having more than one coating layer, each layer comprising a different substance.

60.3 Organic coating:
This subclass is indented under subclass 60.1. Processes which result in the glass preform being covered with an organic substance.

(1) Note. To be classified herein, the organic coating must remain a part of the final product.

SEE OR SEARCH THIS CLASS, SUBCLASS:

60.52, for similar processes using an organic compound containing a metal followed by the step of converting the organic compound to a metallic oxide.

60.4 Free metal coating:
This subclass is indented under subclass 60.1. Processes which result in the preform being covered at least in part by free metal.

60.5 Oxide coating:
This subclass is indented under subclass 60.1. Processes which result in the glass preform being covered by an inorganic oxide.

60.51 From inorganic metal salt:
This subclass is indented under subclass 60.5. Processes wherein the glass preform is first coated with an inorganic metal salt, and the salt is then chemically reacted to convert it into an oxide of that metal.

60.52 From organic metal compound:
This subclass is indented under subclass 60.5. Processes wherein the glass preform is first coated with an organic metal compound, and that compound is chemically treated to convert it into an oxide of that metal.

60.53 From inorganic oxides or hydroxides:
This subclass is indented under subclass 60.5. Processes wherein the glass preform is first coated with an inorganic oxide or hydroxide compound, and that compound is chemically reacted to convert it into a metal oxide or a different metal oxide.

60.6 Free carbon containing coating:
This subclass is indented under subclass 60.1. Processes in which the glass preform is coated with a material which comprises elemental carbon.

(1) Note. The coating may comprise, e.g., charcoal particles.

60.7 Inorganic metal salt containing coating:
This subclass is indented under subclass 60.1. Processes in which the glass preform is coated with a material which comprises an inorganic metal salt.

SEE OR SEARCH THIS CLASS, SUBCLASS:
60.51, for similar processes including the further step of chemically reacting the salt to form convert it into a metal oxide coating.

60.8 Silicon containing coating:
This subclass is indented under subclass 60.1. Processes in which the glass preform is coated with a material which comprises silicon.

(1) Note. The coating may comprise, e.g., silica (SiO_2), a glass of a different composition than that of the glass preform, etc.

61 This subclass is indented under subclass 17.1. Processes combined with a step of wearing away glass by rubbing with an abrasive to smooth, polish or remove material.

SEE OR SEARCH THIS CLASS, SUBCLASS:
37+, for a process of lens-making involving both grinding and bonding.

SEE OR SEARCH CLASS:
451, Abrading, for grinding generally, particularly subclasses 41+ for a process of grinding glass or stone.

62 This subclass is indented under subclass 17.1. Processes which include (1) a perfecting step or (2) a working step or (3) a treating step other than a glass working or glass treating step.

(1) Note. Combined processes including severing of a hard or soft glass preform are classified below.

SEE OR SEARCH THIS CLASS, SUBCLASS:
112+, for glass preform treating combined with a severing or perforating; see the "Search Notes" thereunder.

63 This subclass is indented under subclass 17.1. Processes including separate and distinct steps of: (1) forming a preform from molten glass, (2) reheating the preform, and (3) reworking the reheated preform.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102+, for a process of reshaping a glass preform.
227+, for diverse glass working apparatus, especially subclass 230 for press and blow means having reheating means therebetween.
244, for plural distinct glass working apparatus having spaced preform reheating and reshaping means.

64 This subclass is indented under subclass 63. Processes comprising reworking to reshape.

65 This subclass is indented under subclass 17.1. Processes comprising (1) the step of forming a product utilizing glass in the molten or plastic state as the starting material, and (2) fire-polishing the product formed; see the Glossary for the definition of fire-polishing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
61, for a process of grinding to polish.
120, for a process of fire-polishing a glass preform by use of a flame, per se; and see the "Search Notes" thereunder.
227+, for diverse glass working apparatus including fire-polishing means.
252, for plural distinct glass working apparatus comprising fire-polishing means.

66 This subclass is indented under subclass 17.1. Processes which include a step of (1) forming a glass product or preform from a molten glass composition, and/or (2) reshaping of the preform (e.g., a parison) while still soft from its residual heat of formation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

102+, for a process of reshaping of a glass preform which requires a reheating prior to reshaping.

300+, for apparatus for blowing a glass charge not confined by mold means.

SEE OR SEARCH CLASS:

72, Metal Deforming, subclasses 253.1+ for extrusion of metal through an orifice.

67 This subclass is indented under subclass 66. Processes which include the step of (1) transforming a sheet which still retains its heat of formation into a hollow article, or (2) transforming a hollow article which still retains its heat of formation into a sheet.

68 This subclass is indented under subclass 66. Processes in which (1) the forming initially occurs in a mold cavity, and (2) the product or preform is hollow.

(1) Note. For the scope of the term "mold cavity" see (1) Note subclass 47 of this class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

261+, for a blow means with blow mold.

305+, for a press molding machine.

69 This subclass is indented under subclass 68. Processes which include the step of annealing or tempering the product.

SEE OR SEARCH THIS CLASS, SUBCLASS:

41, for a process of bonding glass which includes a step of annealing or tempering glass.

95+, for a process of forming a sheet combined with an annealing or tempering step.

104, for a process of reshaping a glass preform combined with a tempering or annealing step.

114+, for a process of tempering glass, per se.

117+, for a process of annealing glass, per se.

262, for blow molding apparatus combined with annealing or tempering means.

306, for a press molding machine combined with product treating means.

70 This subclass is indented under subclass 68. Processes which include a step of cutting, severing or perforating of a hard or soft glass product.

SEE OR SEARCH THIS CLASS, SUBCLASS:

67, for a process of severing a hollow glass product in a process of forming sheets from the hollow glass product.

105, for a process of reshaping a glass preform which include the step of preform severing or perforating.

122+, for processes of charging molten glass into a mold cavity by gravity and subsequently severing the charge and which processes do not include a glass shaping step.

71 This subclass is indented under subclass 68. Processes which include the step of spreading the molten glass within a mold by causing a rotatory movement of the molten glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

266, for blowing means with a blow mold rotary about its own axis.

302, for article forming means utilizing mold motion, e.g., centrifugal casting.

72 This subclass is indented under subclass 68. Processes which include the step of introducing a charge of molten glass into the mold cavity.

SEE OR SEARCH THIS CLASS, SUBCLASS:

122+, for a process of charging molten glass into a mold cavity not including a step of shaping the charge therein.

207+, for gob charging and shape imparting receptacle means.

73 This subclass is indented under subclass 72. Processes comprising charging by creating a reduced air pressure within the mold cavity while the mold is in contact with the upper surface of a supply.

SEE OR SEARCH THIS CLASS, SUBCLASS:

124, for a process of suction gathering molten glass from an upper surface of a glass pool into a mold cavity not including a positive shaping step.

125, for a process including suction gathering in which the suction is usually applied within a suction gatherer which functions to transfer the charge therein to a mold cavity.

210+, for gob charging and shape imparting receptacle means which include a suction gatherer movably mounted above a supply of molten glass.

74 This subclass is indented under subclass 73. Processes which include a subsequent step of inflating the charge in the cavity utilizing differential gas pressure.

75 This subclass is indented under subclass 72. Processes in which charging of the mold cavity occurs by discharging molten glass through the bottom wall of a dispenser.

SEE OR SEARCH THIS CLASS, SUBCLASS:

126+, for a process of dispensing glass by discharging downwardly through an orifice, per se; see the "Search Notes" thereunder.

221+, for shape imparting receptacle means and means for charging a gob with the receptacle means by delivery of a gob from a tank feeder.

76 This subclass is indented under subclass 72. Processes which include at least two different and distinct shaping steps.

SEE OR SEARCH THIS CLASS, SUBCLASS:

78+, for diverse glass shaping steps not including a charging step.

207+, for gob charging means combined with plural glass working apparatus especially subclasses 217+ and 224.

227+, for diverse distinct glass working apparatus.

77 This subclass is indented under subclass 68. Processes which includes a distinct and separate step of forming the product or preform; and see the Glossary for a definition of "preform".

(1) Note. Using two separate and distinct blowing pressures, or blowing at separate areas of the parison are considered plural separate and distinct glass working operations for this and indented subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

63, for a process of sequentially forming a glass product, reheating and reworking the product.

243+, for plural distinct glass working apparatus.

78 This subclass is indented under subclass 77. Processes comprising different steps of forming.

SEE OR SEARCH THIS CLASS, SUBCLASS:

227+, for diverse distinct glassworking apparatus.

79 This subclass is indented under subclass 78. Processes in which the unlike steps are pressing and blowing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

229+, for press and blow glassworking apparatus.

80 This subclass is indented under subclass 79. Processes wherein the blowing or pressing steps occur in separate and distinct lines by transferring the glass from one zone to another.

81 This subclass is indented under subclass 68. Processes in which the forming step utilizes vacuum and/or gas pressure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

263+, for apparatus for blowing a glass charge in a mold in combination with

means to reduce gas pressure exteriorly of the charge.

82 This subclass is indented under subclass 66. Processes directed to reshaping a parison in a mold cavity while still soft from its original heat of formation.

83 This subclass is indented under subclass 66. Processes directed to the dynamic cooling of the molten glass in a pool or the formed product at the portion of the glass pool at which the product forming operation occurs.

SEE OR SEARCH THIS CLASS, SUBCLASS:

111+, for a glass preform treating process which includes a step of cooling the preform.

204, for sheet drawing means combined with cooling means in the drawing chamber.

84 This subclass is indented under subclass 83. Process wherein the cooling comprises contacting the glass with a gaseous material of lower temperature than the glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

88, for a process involving injecting gas internally of a hollow cylinder during drawing thereof to prevent collapse of the hollow cylinder.

119, for a process of annealing glass involving heating or cooling the glass by direct contact with flowing gas.

85 This subclass is indented under subclass 83. Process directed to positive cooling of a glass product.

86 This subclass is indented under subclass 66. Processes for a process of drawing molten glass into hollow stock, usually glass cylinders, the shape of which being initially defined by the shape of a bait, and see the Glossary for a definition of "drawing".

SEE OR SEARCH THIS CLASS, SUBCLASS:

187+, for means for drawing a tube from a molten bath.

87 This subclass is indented under subclass 86. Processes including an additional step of shaping, severing or perforating of hard or soft glass.

(1) Note. The step of altering the shape of the hollow stock initially formed at the forming area only and while in contact with the molten glass to form a bait which functions to draw a hollow product of such shape is not considered a reshaping step as the initially drawn portion is considered transitory.

(2) Note. The step of stretching a hot tubular stock by exerting tension on the opposed ends thereof to cause separation of the stock into two parts is within the scope of this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

112+, for a process of treating a glass preform combined with severing or perforating hard or soft glass; see the "Search Notes" thereunder.

88 This subclass is indented under subclass 86. Processes in which the drawing is vertically upwardly with simultaneously injecting fluid internally of the stock.

SEE OR SEARCH THIS CLASS, SUBCLASS:

188+, for means drawing a tube vertically upward.

89 This subclass is indented under subclass 66. Processes in which a hollow product is formed by applying a film of molten glass onto a shaping surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:

184+, for a means charging a continuous film or strip to a separate and distinct forming means.

302, for an article forming means utilizing mold motion, e.g., centrifugal casting means.

90 This subclass is indented under subclass 66. Processes in which the product is sheet stock.

SEE OR SEARCH THIS CLASS, SUBCLASS:

193+, for apparatus for drawing sheet stock from a bath.

253+, for sheet or strip rolling apparatus.

258+, for sheet casting and receiving means.

91 This subclass is indented under subclass 90. Processes which include the step of applying, in a lateral direction, a force or pull to the lateral edges of a sheet during movement thereof to usually (1) maintain constant sheet width, or (2) to prevent formation of surface irregularities.

SEE OR SEARCH THIS CLASS, SUBCLASS:

199+, for a sheet drawing apparatus with width maintaining and/or lateral stretching means.

92 This subclass is indented under subclass 90. Processes which include the step of smoothing the formed sheet, generally for removal of surface irregularities.

SEE OR SEARCH THIS CLASS, SUBCLASS:

63, for a process including the steps of forming a sheet, reheating the formed sheet and then smoothing the heated sheet.

91, for a process of applying tension laterally of a sheet during formation to prevent surface irregularities.

93 This subclass is indented under subclass 90. Processes including (1) changing the gross overall configuration, or (2) embossing; see the Glossary for definitions of these terms.

SEE OR SEARCH THIS CLASS, SUBCLASS:

106, for a process of curving a glass preform which may involve corrugating or reshaping.

255, for sheet or strip rolling means combined with means to corrugate or emboss the surface.

94 This subclass is indented under subclass 93. Processes in which the reshaping or surface deformation occurs subsequent to sheet formation.

95 This subclass is indented under subclass 90. Processes combined with a step of annealing or tempering.

SEE OR SEARCH THIS CLASS, SUBCLASS:

114+, for a process of tempering; see the "Search Notes" thereunder.

117+, for a process of annealing.

194, for sheet drawing apparatus combined with an annealing or tempering means.

254, for sheet rolling means combined with annealing or tempering means.

348+, for product cooling means, e.g., tempering means, per se, especially 349+ for annealing means, per se.

96 This subclass is indented under subclass 95. Processes directed to forming the sheet at one rate of speed and thereafter conveying the formed sheet through an annealing or tempering zone at a different rate.

97 This subclass is indented under subclass 90. Processes including a severing or perforating step of hard or soft glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

112, for a process of treating a preform including severing or perforating of soft or hard glass; and the scope of the terms "severing" and "perforating"; and see the "Search Notes" thereunder.

98 This subclass is indented under subclass 90. Processes which involves formation at the same time of at least two separate and distinct glass sheets from the same or different sources.

SEE OR SEARCH THIS CLASS, SUBCLASS:

52, for a process of bonding glass to metal which includes a forming of at least two glass sheets which may be formed from the same or different source.

53, for a process of forming plural sheets from the same source and bonding the formed sheets to each other or to another formed part.

99.1 By or with pouring molten glass onto forming surface:
This subclass is indented under subclass 90. Processes directed to forming a sheet by casting or rolling molten glass onto a support; see the Glossary for a definition of "casting".

SEE OR SEARCH THIS CLASS, SUBCLASS:
89, for a process of film forming hollow stock on a surface.
253+, for sheet or strip forming by rolling means.
258+, for sheet casting means.

SEE OR SEARCH CLASS:
264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 298 for processes of casting plastic material on a liquid surface, and subclasses 299+ for processes for shaping plastic material against a forming surface.

99.2 Utilizing molten metal forming surface:
This subclass is indented under subclass 99.1. Processes in which the forming surface is composed of molten metal or alloy.

SEE OR SEARCH THIS CLASS, SUBCLASS:
182.3, through 182.5, for molten metal forming means.

99.3 Maintaining molten metal temperature:
This subclass is indented under subclass 99.2. Processes in which temperature distribution is kept in a desired state.

(1) Note. Temperature uniformity through heat exchange, circulating or induced circulating currents included herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
99.4, through 99.5+, for removing impurities from molten metal or modifying glass sheet dimension or property employing circulation.

99.4 Treating or removing impurities in molten metal or glass:
This subclass is indented under subclass 99.2. Processes in which the molten metal, or glass, or glass sheet are treated to remove, or prevent impurities, or modify glass sheet properties.

(1) Note. Includes reaction with additive removal, or prevention of gas bubbles, special atmosphere etc.

99.5 Maintaining or adjusting sheet width or thickness:
This subclass is indented under subclass 99.2. Processes in which glass sheet width, or thickness is maintained, or adjusted by application of mechanical force to the sheet, or by special glass flow restricting means in flow path.

99.6 By nonmechanical means:
This subclass is indented under subclass 99.5. Processes in which glass sheet width, or thickness is maintained, or adjusted by nonmechanical means, e.g., fluid pressure etc.

100 This subclass is indented under subclass 99. Processes including a step of simultaneously moving the support which comprises a roll or platen.

SEE OR SEARCH THIS CLASS, SUBCLASS:
193+, for sheet drawing apparatus provided with roll means located at the sheet source and in contact therewith.
257, for sheet forming by rolling apparatus which includes a reciprocating planar platen.

101 This subclass is indented under subclass 100. Processes wherein the support comprises rolls mounted to provide a pass for the glass therebetween.

102 This subclass is indented under subclass 17.1. Processes for a process of reshaping or surface deforming a glass preform which has been softened by a disclosed or claimed reheating step, and see the Glossary for a definition of "reshaping" and "surface deforming".

(1) Note. Processes of flattening curved glass preforms are provided for in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

54+, for a bonding process including a step of reshaping a glass preform prior to assembly or subsequent to bonding.

63+, for a process of sequentially forming, reheating and reworking of glass.

66+, for a process of forming a product from molten glass including a subsequent reworking operation without an intervening reheating step.

67, for a process of forming a sheet and converting the sheet to a hollow article or the process of forming a hollow article and converting it to a sheet.

269+, for reshaping apparatus combined with reheating means.

286+, for reshaping apparatus, per se.

SEE OR SEARCH CLASS:

72, Metal Deforming, subclasses 343+ and 379 for a process or apparatus for "drawing" metal sheet material.

219, Electric Heating, subclasses 602+, for metal working utilizing inductive electric heating and see the "Search Notes" thereunder.

103 This subclass is indented under subclass 102. Processes which include the step of utilizing or employing means to absorb, dissipate, distribute or shield heat.

SEE OR SEARCH THIS CLASS, SUBCLASS:

288, for preform reshaping means including a heat shield or sink.

104 This subclass is indented under subclass 102. Processes which include a step of (1) tempering, or (2) annealing, and/or (3) fire polishing.

SEE OR SEARCH THIS CLASS, SUBCLASS:

111+, for glass preform treating and see the "Search Notes" thereunder.

268, for preform reshaping apparatus combined with annealing or tempering means.

284, for fire-polishing means, and see the "Search Notes" thereunder.

105 This subclass is indented under subclass 102. Processes including severing or perforating of hard or soft glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

112, for a process of treating including severing or perforating a soft or hard glass preform and see the "Search Notes" thereunder.

166, for apparatus for perforating a glass preform; see the "Search Notes" thereunder.

174+, for a mechanical cutter, scorer, or scriber for use on a glass preform or article; see the "Search Notes" thereunder.

106 This subclass is indented under subclass 102. Processes directed to reshaping of a planar sheet by a bending or curving operation, and see the Glossary for a definition of "bending" under "reshaping".

SEE OR SEARCH THIS CLASS, SUBCLASS:

24, for a process of simultaneously reshaping a plurality of sheets separated by a parting layer.

67, for a process of forming a sheet and converting the formed sheet to a hollow product.

93+, for a process of forming a sheet from molten glass with a step of reshaping the sheet.

102, for a process of making planar sheet by flattening half-cylinders.

287+, for sheet reshaping apparatus utilizing a bending mold; see the "Search Notes" thereunder.

107 This subclass is indented under subclass 106. Processes wherein curving involves heating the glass until it droops under its own weight and conforms to the shape of the mold or form on which it rests.

108 This subclass is indented under subclass 102. Processes comprising reshaping a tubular-shaped preform in such a manner that its hollow characteristic is retained.

SEE OR SEARCH THIS CLASS, SUBCLASS:

67, for a process of forming a hollow product and converting it to a sheet.

93+, for a process of forming a sheet and reshaping the formed sheet.

276+, for means for reshaping hollow stock by or/with reheating means.

292+, for cylindrical stock reshaping means.

109 This subclass is indented under subclass 108. Processes with simultaneous relative rotation of the stock and apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:

271, for apparatus providing relative movement between a heating means and the work during glassworking.

296+, for rotary means for reshaping cylindrical stock.

110 This subclass is indented under subclass 108. Processes utilizing vacuum or gas pressure during reshaping.

SEE OR SEARCH THIS CLASS, SUBCLASS:

292+, for preform reshaping apparatus including means utilizing differential gas pressure.

111 This subclass is indented under subclass 17.1. Processes directed to treating a glass preform, and see the Glossary for definitions of "glass treating" and "preform".

SEE OR SEARCH THIS CLASS, SUBCLASS:

22, for a combined process including pore forming in situ to form a cellular glass body.

30+, for a process of treating involving a chemical reaction; see the "Search Notes" thereunder.

33.1, for a process of devitrifying or vitrifying crystalline glass.

41, for a process of bonding glass to a formed part including annealing or tempering of the glass.

60.1+, for a combined process including coating glass and see the "Search Notes" thereunder.

61, for a combined process including grinding of the glass.

69, for a process of forming a hollow product in a mold cavity from molten glass including annealing or tempering of the product.

85, for a process of forming a glass product from molten glass including positive cooling of the product.

95+, for a process of forming a sheet from molten glass including annealing or tempering of the sheet.

104, for a process of reshaping or surface deforming a glass preform including annealing or tempering of the preform.

348+, for annealing or tempering apparatus.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses for a process or apparatus of general application for contacting solids with gas or vapor.

204, Chemistry: Electrical and Wave Energy, appropriate subclasses for applying electrical or wave energy to molten or preformed glass to bring about a chemical change (e.g., color change, etc.) of at least one constituent of the glass; follow the general guidelines for placement of an operation involving the combination of at least one Class 204 step in sequence with a separate Class 65 step as explained at the beginning of the Class 204 definition under I, (4) and (5) Notes.

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 687+ for electrolytic material treatment, especially subclass 769 for electrolytic treatment of solid glass, silica, quartz, or optical material.

250, Radiant Energy, subclass 324 for methods and apparatus for corona irradiation of materials including glass, subclass 327.1 for methods and apparatus for irradiating detectors which may be of the glass type, subclass 472.1 for methods to detect radiation by non-electric detectors which include glass type.

373, Industrial Electric Heating Furnaces, subclasses 27+ for apparatus and processes directed to electric heating of glass. The line between Class 65 and 373 is stated in subclass 134 of Class 65.

432, Heating, subclasses 9+, for a process of general utility of applying heat to an article. Processes involving application of the heat to a glass substrate in a particular manner, e.g., nonuniformly, or to change a physical on chemical property of the glass are classified in Class 65.

112 This subclass is indented under subclass 111. Processes in which the treating step includes heating the glass to a temperature sufficient to render it plastic, but insufficient to produce a significant plastic flow that would cause alteration of physical shape and size, combined with a step of (1) penetrating the plastic glass to effect at least a partial separation of the glass without reshaping flow of the glass, or (2) moving one part of the plastic glass relative to the other to cause failure by tension at the point of separation, usually by stretching or (3) penetrating the plastic glass to form a closed perimeter opening extending completely through the glass, or (4) cutting or perforating of hard glass combined with glass treating.

SEE OR SEARCH THIS CLASS, SUBCLASS:

56, for a process of bonding glass to a formed part including severing, perforating or breaking of hard or soft glass.

63, for a process of sequentially forming, reheating and severing, perforating or breaking of hard or soft glass.

70, for a process of forming an article from molten glass combined with the step of severing soft or hard glass.

87, for a process of drawing and simultaneously forming hollow stock from molten glass including severing or perforating of hard or soft glass.

97, for a process of forming a sheet combined with the step of severing or perforating of the hard or soft sheet.

105, for a process of reshaping or surface deforming a glass preform combined with severing or perforating of hard or soft glass.

166, for apparatus under the class definition comprising a perforator for an article or preform.

174+, for apparatus under the class definition combined with a mechanical cutter, scorer or scriber for an article or preform.

SEE OR SEARCH CLASS:

83, Cutting, subclasses 879+ for a scoring process or apparatus, per se; see the collection of "Search Notes" thereunder for mechanically cutting, scoring or scribing hard or soft glass.

113 This subclass is indented under subclass 112. Processes in which a flame facilitates the severing or perforating.

SEE OR SEARCH THIS CLASS, SUBCLASS:

120, for a process of merely applying a flame to a glass preform, and see the "Search Notes" thereto.

269+, for flame severing apparatus.

114 This subclass is indented under subclass 111. Processes involving heating a glass preform to near the softening point under rigorous control and rapidly cooling the glass from such point to set up compressive stresses in the glass surface.

SEE OR SEARCH THIS CLASS, SUBCLASS:

111, for Search Notes relating to tempering.

348+, for tempering apparatus; see the "Search Notes" thereunder.

115 This subclass is indented under subclass 114. Processes including a step of tempering an isolated portion of an article or preform or distinct steps of tempering separate portions thereof, usually by steps unequal or different degrees of tempering restricted portions even though an end product of uniform temper is produced.

116 This subclass is indented under subclass 114. Processes in which the tempering is effected by contacting a heated preform with a liquid medium, e.g., immersing in a shower or bath.

SEE OR SEARCH CLASS:

148, Metal Treatment, subclasses 27+ for compositions for treating (e.g., quench hardening) heated solid metal.

117 This subclass is indented under subclass 111. Processes involving heating a preform or article to a suitable temperature followed by controlling the rate of cooling to prevent or to remove stresses or strains therein.

SEE OR SEARCH THIS CLASS, SUBCLASS:

111, for Search Notes relating to annealing of glass.

118 This subclass is indented under subclass 117. Processes including a simultaneous step of moving the article or preform.

119 This subclass is indented under subclass 118. Processes wherein a gaseous heat exchange medium contacts the article or preform to heat or cool the same; flame contact being included.

SEE OR SEARCH THIS CLASS, SUBCLASS:

120, for flame treating.

SEE OR SEARCH CLASS:

432, Heating, subclass 11 for a residual process of treating an article by moving it through a heating zone or through heating and cooling zones.

120 This subclass is indented under subclass 111. Processes comprising contacting a glass preform with a flame.

SEE OR SEARCH THIS CLASS, SUBCLASS:

57, for a bonding process in which one of the parts may be heated by flame contact.

65, for a process of forming a glass product combined with fire-polishing.

104, for a process of reshaping including fire-polishing.

113, for severing a glass preform by use of a flame.

284, for fire-polishing apparatus; see the "Search Notes" thereunder.

285, for apparatus to reshape a preform by use of flame pressure.

121 This subclass is indented under subclass 17.1. Processes which include the step of mixing or flowing together of distinct streams of molten glass of identical or diverse compositions.

SEE OR SEARCH THIS CLASS, SUBCLASS:

53, for a bonding process including the step of forming at least two sheet like streams from the same source and uniting such streams.

145, for glass working apparatus combined with means feeding diverse glass melts to a common forming means.

122 This subclass is indented under subclass 17.1. Processes comprising a step of depositing molten glass into a mold cavity without a significant shaping (i.e. shaping contributing to final configuration) by the mold cavity.

SEE OR SEARCH THIS CLASS, SUBCLASS:

72+, for a process of charging a mold cavity which includes a distinct step of forming hollow article in the mold cavity.

207+, for an apparatus including gob charging and shape imparting receptacle means.

123 This subclass is indented under subclass 122. Processes directed to charging the molten glass by gravity into a mold cavity and, while the molten glass communicates with both the supply of molten glass and the mold cavity, severing the molten glass from communication with supply.

SEE OR SEARCH THIS CLASS, SUBCLASS:

334, for molten glass charge cutting or scraping apparatus.

124 This subclass is indented under subclass 122. Processes comprising sucking a glass charge into a mold by removing part of the air therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

73+, for a process of charging a mold cavity by suction and forming a hollow product in the cavity.

125, for a process of suction gathering molten glass from the upper surface of a glass pool into a receptacle which is not intended to function as a mold cavity.

210+, for gob charging and shape imparting apparatus including a suction gatherer mounted above a supply.

125 This subclass is indented under subclass 17.1. Processes comprising isolating and removing a discrete portion of glass from an upper layer of a supply of molten glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

324+, for apparatus for dispensing molten glass; see the "Search Notes" thereunder.

126 This subclass is indented under subclass 17.1. Processes of delivering molten glass downwardly through an orifice of a reservoir of molten glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

75, for a process of forming a hollow product in a mold cavity combined with charging by dispensing through an orifice in a bottom wall of a feeder.

325+, for apparatus for dispensing molten glass through an orifice located below a melt level.

SEE OR SEARCH CLASS:

222, Dispensing, for processes and apparatus for dispensing material not elsewhere classified. See class definitions of Class 222 for dispensing processes and apparatus elsewhere classified.

127 This subclass is indented under subclass 126. Processes comprising treating, smoothing or shaping a gob of molten glass subsequent to discharge through the orifice but prior to delivery to a mold cavity.

SEE OR SEARCH THIS CLASS, SUBCLASS:

207, for gob charging and shape imparting receptacle means.

303, for gob shaping or treating means downstream of gob severing means.

304, for glass working or treating apparatus including gob handling means.

128 This subclass is indented under subclass 126. Processes in which the glass is heated or cooled at or adjacent the orifice.

SEE OR SEARCH THIS CLASS, SUBCLASS:

327, for molten glass dispensing apparatus having auxiliary heating or cooling means at an orifice below the melt level.

129 This subclass is indented under subclass 126. Processes which include the step of (1) regulating the rate of flow of, or (2) stopping the flow of, the molten glass through an orifice.

SEE OR SEARCH THIS CLASS, SUBCLASS:

183, for a glass working or treating apparatus which includes an extrusion die former with an upstream discharge assistant.

330+, for a molten glass dispensing apparatus including a reciprocating plunger-type discharge assistant.

130 This subclass is indented under subclass 129. Processes in which the rate of or the arrest of flow of molten glass through an orifice is affected by varying the pressure of a gas on the molten glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

329, for apparatus for applying a differential gas pressure to glass to assist its flow through an orifice below the melt level.

131 This subclass is indented under subclass 130. Processes which include the step of separating or isolating from the main body of the glass, prior to discharge through the orifice, a portion

of the glass, and discharging the separated or isolated portion of the glass through the orifice.

132 This subclass is indented under subclass 129. Processes which include the step of separating or isolating from the main body of the glass prior to discharge through the orifice of a portion of the glass and discharging the separated or isolated portion through the orifice.

133 This subclass is indented under subclass 17.1. Processes directed to cutting or dividing a stream of molten glass, usually to form a "gob".

SEE OR SEARCH THIS CLASS, SUBCLASS:
334, for charge cutting or scraping means; see the "Search Notes" thereunder.

SEE OR SEARCH CLASS:
83, Cutting, appropriate subclasses, for gob shearing apparatus, especially subclass 600 for gob shears having simple oscillating motion only with means to move cooperating cutter member and subclass 623 for gob shears having simple rectilinear reciprocating motion only with means to move cooperating cutting member.

134.1 Fining or homogenizing molten glass:
This subclass is indented under subclass 17.1. Processes directed to (a) heating molten or batch glass to a high temperature to decrease its viscosity thereby permitting occluded, entrapped, or undissolved gases formed during the chemical reaction of the batch material to rise more readily and escape from the molten glass, (b) removing undissolved batch material, or (c) making a melt uniform in physical characteristics or in composition throughout.

SEE OR SEARCH THIS CLASS, SUBCLASS:
178+, for glass working apparatus combined with an agitator for molten or soft glass.

SEE OR SEARCH CLASS:
588, Hazardous or Toxic Waste Destruction or Containment, appropriate subclasses for the solidification or vitrification of waste for purposes of containment and for the treatment of slag to prevent the emission of hazardous or toxic gases.

134.2 Subatmospheric pressure or vacuum utilized:
This subclass is indented under subclass 134.1. Processes wherein vacuum or pressure below that of the atmosphere is used during any stage of the purifying or homogenizing operation.

134.3 Melt accelerator or color modifier utilized (e.g., fining agent, etc.):
This subclass is indented under subclass 134.1. Processes wherein a material is added to softened glass or a glass charge to (a) speed up melting or (b) alter color.

134.4 Oxygen enriched or nitrogen reduced gas utilized (i.e., modified air):
This subclass is indented under subclass 134.1. Processes wherein atmospheric gas (air) has additional oxygen added or nitrogen partially or completely removed is used in fining or homogenizing the molten glass.

134.5 By injecting gas below surface of molten glass:
This subclass is indented under subclass 134.1. Processes wherein fining or homogenizing occurs when a gas is introduced below the surface of molten glass.

134.6 Exhaust or top gas treated or recycled:
This subclass is indented under subclass 134.1. Processes wherein an exhaust or top gas is reused or treated prior to releasing into the atmosphere.

SEE OR SEARCH CLASS:
95, Gas Separation: Processes, subclasses 241+ for a process of general application for separating gases by physical methods.

134.7 Rotating furnace or chamber utilized (e.g., crucible, etc.):
This subclass is indented under subclass 134.1. Processes wherein the movement of a furnace or chamber is in a circle or circular arc centered on its own axis.

134.8 By melting toxic or waste material:
Processes under 134.1 wherein undesired or toxic material is dissolved.

134.9 By eliminating gaseous inclusions (e.g., bubbles, etc.):
This subclass is indented under subclass 134.1. Processes wherein gaseous bubbles or inclusions are removed.

135.1 Glass conditioning channel section utilized:
This subclass is indented under subclass 134.1. Processes utilizing a molten glass flow restricting area wherein the purity or homogeneity of the molten glass is adjusted.

(1) Note. Processes wherein ebullition or circulating currents of molten glass occur in a glass conditioning channel, generally caused by temperature differences within a pool of molten glass, are proper for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
346, for apparatus with glass conditioning channel section.

135.2 By agitating:
This subclass is indented under subclass 134.1. Processes wherein the molten or softened glass is mixed or stirred.

SEE OR SEARCH THIS CLASS, SUBCLASS:
178+, for glassworking apparatus combined with agitating means for molten or soft glass.
302, for article forming means utilizing mold motion to distribute molten glass therein.

SEE OR SEARCH CLASS:
366, Agitating, appropriate subclasses for apparatus directed to agitating molten glass, per se. Patents defining apparatus for agitating molten glass which includes means for discharging the molten glass to a glassworking zone or in combination with a refining or treating zone of a glass furnace are classified here in Class 65.

135.3 Mechanical stirrers utilized:
This subclass is indented under subclass 135.2. Processes wherein the agitation is performed by the use of mechanical stirrers.

135.4 Spiral:
This subclass is indented under subclass 135.3. Processes wherein the mechanical stirrer is spirally configured.

135.6 Electric furnace utilized (e.g., induction or radiant heat from electric source, etc.):
This subclass is indented under subclass 134.1. Processes wherein glass is melted or maintained in a molten condition (a) by passing an electric current between two electrodes, or (b) by using heat energy resulting directly from electrically induced radiation or induction.

(1) Note. Processes of using an electrical furnace which is not the primary heat source or using an electrical furnace in combination with other heating means are proper for this and indented subclasses.

SEE OR SEARCH CLASS:
373, Industrial Electric Heating Furnaces, subclasses 27+ for apparatus and processes, respectively, directed to electric furnaces for melting glass batch material or heating molten glass. Patents claiming apparatus or a process for purifying or homogenizing molten glass in an electric furnace and defining in the claim specific electrical structure (e.g., electrodes) or specific electrical characteristics or the electrical energy (e.g., at least two different types of electrical energy or defining the magnitude) are classified in Class 373 otherwise the process is classified here in Class 65. The recitation of a glass "working," "treating," or "handling" operation by these words only is insufficient to exclude a patent from Class 373 unless a glass article is formed thereby (e.g., a filament), in which case classification is in Class 65.

135.7 With submerged electrodes:
This subclass is indented under subclass 135.6. Processes wherein heating electrodes are located below the level of molten glass.

135.8 Melting in separate zone of glass furnace:
This subclass is indented under subclass 135.7. Processes wherein glass is melted in a distinct chamber or area apart from where the purifying or homogenizing operation is performed.

(1) Note. Processes of melting glass utilizing a multichambered electric furnace are properly classified here.

135.9 By charging batch material:
This subclass is indented under subclass 134.1. Processes wherein a glass supply material to be liquified is delivered to a furnace (e.g., melter).

136.1 Preheating batch material:
This subclass is indented under subclass 135.9. Processes wherein the batch material is heated before being delivered to a furnace (e.g., melter).

136.2 Directing batch feed to float on molten glass surface:
This subclass is indented under subclass 135.9. Processes wherein the batch feed material is guided to a surface of molten glass and made to float thereon.

136.3 Burner directed towards batch or melt:
This subclass is indented under subclass 135.9. Processes wherein a torch or burner is pointed directly at a batch or melt feed material.

136.4 By cooling molten glass:
This subclass is indented under subclass 134.1. Processes wherein the temperature of the molten glass is reduced.

137 This subclass is indented under subclass 17.1. Processes which include the step of lowering the temperature of molten glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
326+, for means to cool glass in combination with molten glass dispensing means.

SEE OR SEARCH CLASS:
62, Refrigeration, appropriate subclasses, for processes and apparatus for cooling, per se. See notes to Class 62 definition for other pertinent fields of search.

138 This subclass is indented under the class definition. Apparatus for making a glass closure of tube, disc or bead configuration having one or more electrical conductors bonded thereto and passing therethrough for use in manufacturing electric lamps or electronic tubes or space discharge devices.

SEE OR SEARCH THIS CLASS, SUBCLASS:
36, for processes of bonding glass to a formed part, and the "SEARCH CLASS" reference to Class 29 for the line between this class (65) and Class 29.
59.1, for a process of bonding glass to metal.
142, for apparatus of general application for bonding beads of glass to wire, e.g. pin-heading means.
152+, for apparatus for joining a preform to a glass part by means involving fusion, especially subclass 154 for glass to metal bonding means.
270, for apparatus for tipping off an electronic envelope with or without exhausting means.

SEE OR SEARCH CLASS:
257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclass 434 for light responsive active solid- state devices with housing or encapsulation means, including a window (e.g., of glass).
445, Electric Lamp or Space Discharge Component or Manufacturing, subclass 65 for similar subject matter in combination with other manufacturing operations or means (e.g., filament shaping) and see the search notes thereto.

139 This subclass is indented under subclass 138. Apparatus including mechanical means for inserting the conductors into the glass.

140 This subclass is indented under subclass 138. Apparatus including a press mold.

141 This subclass is indented under the class definition. Apparatus comprising melt puffing means or comminuting means comprising means shock cooling a melt by enhancing surface contact therewith by a cooling fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

20, for a process of foaming slag to make cellular bodies.

181, for hard glass comminuting means combined with Class 65 subject matter.

483+, for mineral wool making apparatus.

SEE OR SEARCH CLASS:

62, Refrigeration, for a comminutor or cutter combined with a refrigeration producer.

134, Cleaning and Liquid Contact With Solids, appropriate subclasses, for a fluid-solid contacting apparatus of general application.

241, Solid Material Comminution or Disintegration, subclasses 38+ for comminution apparatus for solids combined with means applying fluid to the material.

261, Gas and Liquid Contact Apparatus, appropriate subclasses for gas-liquid contacting apparatus of general application.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 7 for means making particulate material and means providing a solidifying zone for particles of the comminuted melt.

142 This subclass is indented under the class definition. Apparatus including means working soft or molten glass into small discrete particulate bodies, e.g. spheres, or means to form and to bond by fusion, a glass particle onto rod shaped stock, e.g. wire.

SEE OR SEARCH THIS CLASS, SUBCLASS:

21.1+, for a process of making self-supporting particle.

141, for ball making apparatus including fluid-melt contacting means.

207+, for means for forming glass melt into a gob-type charge combined with glass working means.

SEE OR SEARCH CLASS:

163, Needle and Pin Making, subclasses 6+ for pin making.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 110 for composite article manufacturing apparatus comprising means to shape fluent or bulk stock and unite the same with a preform while in a molding area, subclasses 332+ for means to roll a discrete change into a ball, and subclass 801 for button makers.

143 This subclass is indented under subclass 142. Apparatus wherein the glass working means comprises rolling means.

144 This subclass is indented under the class definition. Apparatus including means to shape an article from a mass of particulate material (e.g. quartz) combined with means to fuse the mass into a preform or article.

SEE OR SEARCH THIS CLASS, SUBCLASS:

17.3+, for a process under the class definition combined with shaping of particulate material into a preform with subsequent firing.

33.1, for a process of melting quartz with subsequent shaping into a preform.

SEE OR SEARCH CLASS:

99, Foods and Beverages: Apparatus, subclass 353 for apparatus to shape and to cook food products.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, appropriate subclasses for apparatus to shape particulate material (e.g., powders, etc.) and downstream firing (e.g., kiln, etc.) means, especially see subclass 404 for a shaping means and downstream product treating means (see the search notes thereunder).

501, Compositions: Ceramic, subclass 86 for processes of making synthetic pre-

cious stones from ceramic compositions.

145 This subclass is indented under the class definition. Apparatus including means feeding diverse glass melts, generally of different color, to a common forming means, e.g. laminating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
121, for a process of blending of separate molten glass streams.

146 This subclass is indented under the class definition. Apparatus including means supplying nonglass material to soft or molten glass being worked to form a composite stock or article.

SEE OR SEARCH THIS CLASS, SUBCLASS:
36+, for a process of bonding glass to a formed part, especially subclasses 49, 50 and 59 for bonding of glass to nonglass.
142+, for means forming a glass bead on a pin.
154, for means uniting glass to metal parts without means feeding the metal parts.
172, for means to add parting material to glass working apparatus.

SEE OR SEARCH CLASS:
221, Article Dispensing, appropriate subclasses for means individually dispensing an article, e.g., electric wire, from a source of supply of a plurality of articles, per se.
228, Metal Fusion Bonding, subclasses 101+ especially subclasses 122.1+, 188 and 903 for the process of uniting glass to metal by a metallurgical bond and see the "SEARCH NOTES", thereunder.

147 This subclass is indented under subclass 146. Apparatus wherein the means feeds wire.

SEE OR SEARCH THIS CLASS, SUBCLASS:
50+, for a process of forming a glass sheet combined with a step of fusion bonding thereto of a nonglass part.

SEE OR SEARCH CLASS:
118, Coating Apparatus, subclasses 404+ for immersion type coating apparatus including means for wiping off excess coating from a coated base.
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses, especially subclass 433 for laminating apparatus, of general application including surface bonding means combined with assembly means for running lengths of sheet or strand.

148 This subclass is indented under subclass 147. Apparatus including rolling means for forming sheet glass.

149 This subclass is indented under subclass 148. Apparatus comprising means feeding wire between plural means feeding glass to the glass forming roll means.

150 This subclass is indented under subclass 148. Apparatus wherein the rolling means cooperates with a flat pressure plate.

151 This subclass is indented under subclass 150. Apparatus including means protruding from the surface of the rolling means which forces the wire into the surface of soft glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
44, for a process of embossing or corrugating while bonding.

152 This subclass is indented under the class definition. Apparatus including means to effect a bonding by a glass working operation, i.e., involving fusion, between: (a) parts, at least one of which is an article or preform, or (b) different parts of the same preform.

SEE OR SEARCH THIS CLASS, SUBCLASS:
36+, for a process of bonding glass to a formed part.
145, for a forming means charged by a feed of diverse glass.
146+, for analogous subject matter combined with means to feed a nonglass material thereto.

SEE OR SEARCH CLASS:

29, Metal Working, subclass 25.35 for piezoelectric device making, subclasses 25.41+ for electric condenser making, 592.1+ for other electric device making, and subclasses 428+ for a process of assembly and/or joining not otherwise provided for.

118, Coating Apparatus, appropriate subclasses for coating apparatus of general application.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses for bonding and/or assembly means utilizing adhesive bonding.

219, Electric Heating, subclasses 603+ for fusion bonding means in metal working apparatus.

269, Work Holders, for work holders, per se, especially subclasses 37+ for plural holders to hold work pieces relative to each other.

285, Pipe Joints or Couplings, subclass 423 for nonmetallic pipe joints or coupling means.

438, Semiconductor Device Manufacturing: Process, particularly subclasses 107+ and 455+ for methods for joining plural semiconductor substrates; see the search notes therein.

445, Electric Lamp or Space Discharge Component or Device Manufacturing, especially subclass 22 for a method under the class definition including shaping of the lamp or device envelope.

153 This subclass is indented under subclass 152. Apparatus including means to hold or assemble parts (e.g., of a vacuum bottle) to be united in a concentric relation.

154 This subclass is indented under subclass 152. Apparatus in which one of the parts is metallic.

SEE OR SEARCH THIS CLASS, SUBCLASS:

142, for pin heading apparatus comprising means to apply a glass bead to a wire.

155 This subclass is indented under subclass 152. Apparatus wherein the parts are elements of an electronic device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

34, for a process of sealing off of an exhaust opening.

138+, for apparatus for making a header, terminal or stem for an electronic device.

146, for similar subject matter combined with means to feed terminals to the joining apparatus.

153, for similar subject matter including means to hold or assemble the parts in concentric relation.

154, for similar subject matter where one part is metallic.

270, for electronic envelope tipping off apparatus, per se.

156 This subclass is indented under subclass 152. Apparatus including a female mold for performing a glass shaping operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

47+, for a process of bonding glass to a formed part combined with a step of molding of an article in a cavity.

140, for a press mold in electronic header, terminal or stem making apparatus.

157 This subclass is indented under the class definition. Apparatus including means providing an atmosphere other than air in which a glass is worked or treated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

30, for chemical treatment of glass involving a reaction.

32.1+, for a process utilizing a reducing or inert atmosphere.

158 This subclass is indented under the class definition. Apparatus combined with a signal, indicator, inspection means, register or recorder means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

29.1+, and 29.12+, for a process which includes the step of testing or inspecting.

SEE OR SEARCH CLASS:

73, Measuring and Testing, appropriate subclasses, for processes and apparatus for making a measurement or test of any kind on glass, per se.

116, Signals and Indicators, appropriate subclasses, for signalling and indicating devices, per se.

177, Weighing Scales, appropriate subclasses for weighing scales, per se.

324, Electricity: Measuring and Testing, appropriate subclasses for apparatus relating to measuring and/or testing (or sensing) of electrical properties. See the "SEARCH NOTES" under the class definition.

340, Communications: Electrical, subclasses 500+ for electrical automatic condition responsive indicating systems.

356, Optics: Measuring and Testing, subclasses 32 through 35.5 for glass strain analysis including the polarized light examination of sheet glass, subclasses 364 through 370 for polarized light testing of glass articles for flaws generally; subclass 600 for flatness testing generally; and subclasses 429 through 431 for monitoring of webs or thread, for optical properties or flaws and subclasses 239.1 through 239.8 for inspection of transparent or translucent articles for flaws or imperfections.

374, Thermal Measuring and Testing, appropriate subclasses for measuring a thermal parameter or characteristic of glass, per se.

159 This subclass is indented under the class definition. Apparatus combined with means to prevent damage of apparatus in event of malfunctioning of a portion thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

181, for a means to protect or to improve comfort of an attendant combined with apparatus under the class definition.

SEE OR SEARCH CLASS:

192, Clutches and Power-Stop Control, subclasses 129+ for safety stop mechanisms of general application.

160 This subclass is indented under the class definition. Apparatus having means responsive to variations in an operating or "stock" condition and control means responsive thereto to effect an operation or change.

SEE OR SEARCH CLASS:

73, Measuring and Testing, appropriate subclasses for condition sensing means, per se, and see the "Search Notes" in Class 73.

161 This subclass is indented under subclass 160. Apparatus in which the means controlled includes regulating means for the delivery of a glass working fluid or glass treating fluid.

SEE OR SEARCH CLASS:

137, Fluid Handling, appropriate subclasses for fluid control means responsive to conditioning sensing means, per se.

162 This subclass is indented under subclass 160. Apparatus in which the means controlled consists of temperature regulating means.

SEE OR SEARCH CLASS:

236, Automatic Temperature and Humidity Regulation, appropriate subclasses for automatic temperature control means, per se, see the "Search Notes" under the class definition.

163 This subclass is indented under subclass 160. Apparatus in which the means controlled includes a speed regulating means for the apparatus or a portion thereof.

164 This subclass is indented under subclass 160. Apparatus in which the means controlled is a molten glass dispenser or gatherer.

165 This subclass is indented under the class definition. Apparatus combined with means to catch, divert or otherwise dispose of rejected material (e.g., broken hard glass or rejected gobs) to prevent contamination of stock or apparatus or to prevent injury of apparatus, or to conserve stock or heat.

SEE OR SEARCH THIS CLASS, SUBCLASS:

28, for a process which includes reclaiming, renewing or repairing or crack run interruption of glass.

269, for means to handle a "moil" after severance from a product.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, appropriate subclasses, for methods and apparatus for rejecting defective glass articles, per se.

166 This subclass is indented under the class definition. Apparatus for making a hole through preshaped glass when in a soft stage, or the combination of glass working means combined with mechanical drilling or boring means for hard glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

56, for a process of bonding glass to a preformed part combined with the step of cutting, perforating or breaking of glass.

105, for a process of reshaping a glass preform combined with cutting, severing or perforating.

112, for a process of severing or perforating a glass preform by a glass working operation.

315, for a press molding means with a core withdrawing means.

SEE OR SEARCH CLASS:

408, Cutting by Use of Rotating Axially Moving Tool, appropriate subclasses for a single operation of that class on hard glass, and see the "Search Notes" under the class definition.

167 This subclass is indented under the class definition. Apparatus to perform a distinct operation but being convertible to perform a different operation either by reassembling of all or some of its parts in a different relationship to each other or by the addition or omission of a part.

SEE OR SEARCH THIS CLASS, SUBCLASS:

231, for diverse distinct glass working apparatus including a blank mold removably encaseable in a blow mold.

168 This subclass is indented under the class definition. Apparatus including positive means to remove undesirable material from a glass working or treating apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:

27, for process of cleaning glass working or treating apparatus.

SEE OR SEARCH CLASS:

134, Cleaning and Liquid Contact With Solids, appropriate subclasses for a process of, or apparatus for cleaning of general application. See the "Search Notes" in the class definition of Class 134.

169 This subclass is indented under the class definition. Apparatus combined with means to apply a material to a work contacting surface of apparatus, which material prevents adhesion of glass being worked or treated.

(1) Note. The parting material may be a preformed layer or a fluent coating material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

24+, for a process which includes the step of utilizing a parting or lubricating layer.

170, for glass working apparatus having means to lubricate moving parts thereof.

170 This subclass is indented under the class definition. Apparatus combined with means to apply a lubricant to moving parts of glass working or treating apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:

169, for apparatus having means to apply a parting material to the work contacting surface of glass working or treating apparatus.

SEE OR SEARCH CLASS:

184, Lubrication, appropriate subclasses, for devices employed to lubricate bearing parts in a machine where such lubricating device forms no part of the machine structure.

171 This subclass is indented under the class definition. Apparatus combined with means (1) to repair the apparatus, or (2) to assemble the apparatus or portions thereof, or (3) to disassemble the apparatus or portions thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

27+, for a glass working process combined with the step of repairing or cleaning of the apparatus, or batch dust prevention or control.

167, for means permitting the substitution of parts so as to permit change in kind or product size.

310, for means to supply detachable independent dies to an actuating common piston rod.

323, for product centering means, or mold and/or core aligning means.

355, for means heating or cooling glass working or treating apparatus.

361, for support means for a mold.

172 This subclass is indented under subclass 171. Apparatus having means to aid repair of worn, or damaged, or destroyed parts by removal of said damaged or worn parts and substitution therefor of spare or usable parts.

173 This subclass is indented under subclass 171. Apparatus including means mounting identical parts permitting use of one and then the other.

SEE OR SEARCH THIS CLASS, SUBCLASS:

168, for a similar arrangement combined with positive cleaning means.

217+, for suction charging means combined with diverse molds mounted to travel in concentric orbits.

221+, for a mold charging feeds of the tank feeder type combined with means movably mounting plural molds for travel.

229+, for diverse distinct glass working apparatus including press and blow means, especially subclass 240 for plural traveling mold carriers.

264, for a blow mold machine including means mounting a mold for travel.

308+, for a press mold machine including a plunger coating with successively presented molds.

174 This subclass is indented under the class definition. Apparatus combined with mechanical means to cut, score, or aid in describing lines on shaped stock (i.e., articles or incomplete articles of manufacture).

SEE OR SEARCH THIS CLASS, SUBCLASS:

56, for a process of bonding glass to a formed part combined with cutting, perforating or breaking of glass.

97, for a process of forming sheet from molten glass combined with severing or perforating.

105, for a process of reshaping a glass preform combined with severing or perforating.

112, for a process of severing or perforating a glass preform by a glass working operation.

207+, for gob charging means including means to sever a stream of glass into increments, combined with shape imparting receptacle means.

303, for gob shaping or treating means downstream of gob severing means.

334, for charge cutting or scraping means coating with a mold or dip stick to remove material therefrom.

SEE OR SEARCH CLASS:

83, Cutting, subclasses 879+ for scoring apparatus, per se; see the collection of search notes thereunder for mechanically cutting, scoring or scribing hard or soft glass.

175 This subclass is indented under subclass 174. Apparatus in combination with annealing means.

176 This subclass is indented under subclass 174. Apparatus wherein the glass working or treating apparatus supplies material in continuously moving lengths to the cutter, scorer or scriber.

177 This subclass is indented under subclass 174. Apparatus wherein the cutter, scorer, or scriber is mounted adjacent to or on an article mold or preform mold.

SEE OR SEARCH THIS CLASS, SUBCLASS:

334, for a dynamic cutting means coating with a surface of a mold or charge confining means to sever a charge (gob) being fed thereto.

178 This subclass is indented under the class definition. Apparatus combined with means to agitate molten glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

35, for a process of vibrating, oscillating or agitating a preform combined with glass working or treating.

132.2+, and 134+, for a process of purifying or homogenizing molten glass which may include agitation of the molten glass.

302, for article forming means utilizing mold motion to distribute molten glass therein.

SEE OR SEARCH CLASS:

366, Agitating, appropriate subclasses, for apparatus directed to agitating molten glass, per se. Patents defining apparatus for agitating molten glass which includes means for discharging the molten glass to a glass working zone or in combination with a refining and/or treating zone of a glass furnace are classified in Class 65.

179 This subclass is indented under subclass 178. Apparatus in which the agitator is associated with a delivery area, e.g., gathering pool or feeding boot.

SEE OR SEARCH THIS CLASS, SUBCLASS:

330+, for glass feeder means including a plunger type discharge assistant means which may inherently agitate.

180 This subclass is indented under subclass 179. Apparatus in which the agitator is located adjacent a delivery orifice.

181 This subclass is indented under the class definition. Apparatus which comprises means in addition to or combined with glass working apparatus (1) having working or treating functions other than glass working or treating, or (2) which serve to perfect the apparatus for its intended purpose.

SEE OR SEARCH THIS CLASS, SUBCLASS:

62, for a glass working process with a nonglass working operation.

335, for batch charging means combined with a glass furnace.

SEE OR SEARCH CLASS:

53, Package Making, subclasses 79+ for means sealing-off glass receptacles by glass working combined with receptacle filling means.

118, Coating Apparatus, subclasses 47+ for coating means involving carbonizing, flame contact or burning off of a coating ingredient (e.g., a carrier for glass enamel or fit); and subclasses 58+ for means for drying or means providing a noncoating treatment by gas or vapor.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 497 and 499 for means for applying and firing or fusing a ceramic decal to a glass substrate.

182.1 WITH FLUID SUPPORT FOR ARTICLE OR PREFORM:
This subclass is indented under the class definition. Apparatus including means for supporting, e.g., floating, the glass on a fluid current or fluid surface, e.g., molten metal.

SEE OR SEARCH THIS CLASS, SUBCLASS:
25.1+, for a process which includes the injection of a gaseous fluid layer (acting as a parting material) between glass and the apparatus.
99.2+, for a process of forming a sheet glass by pouring molten glass onto a molten metal forming surface.

SEE OR SEARCH CLASS:
226, Advancing Material of Indeterminate Length, subclasses 97.1+ for apparatus for advancing material of indeterminate length utilizing fluid current support means.
242, Winding, Tensioning, or Guiding, subclasses 615.11+ a residual locus for a material fluid suspension guide or guard.
406, Conveyors: Fluid Current, appropriate subclasses for fluid current conveyors, per se.

182.2 Gaseous support:
This subclass is indented under subclass 182.1. Apparatus in which the fluid support is gaseous.

182.3 Means for treating or maintaining molten metal:
This subclass is indented under subclass 182.1. Apparatus including means for treating or maintaining the molten metal support.

(1) Note. Included herein are means to maintain better temperature distribution in the metal bath, means to limit contact with atmospheric gas, and means to free or prevent undesirable material from accumulating in the metal bath, etc.

(2) Note. Also included is molten metal effecting treatment of upper surface of glass advanced on molten metal bath.

SEE OR SEARCH THIS CLASS, SUBCLASS:
182.5, for differences in liner thickness or arrangement to cause desired heat transfer conditions along molten metal bath.

182.4 Including preform width maintaining or stretching means:
This subclass is indented under subclass 182.1. Apparatus including means adjacent a sheet source to exert opposed lateral forces thereto to overcome the natural tendency of the sheet to narrow, or to adjust or maintain the sheet width.

182.5 Structure or composition of lining material or arrangement with shell:
This subclass is indented under subclass 182.1. Apparatus in which the refractory lining is (a) made up or associated with specific material or has special structure, (b) specially arranged or associated with the outer shell.

183 This subclass is indented under the class definition. Apparatus including a molding orifice for shaping soft glass extruded therethrough by force applying means upstream thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
495+, for an extrusion bushing in a filament or fiber making apparatus.

SEE OR SEARCH CLASS:
72, Metal Deforming, subclasses 253.1+ for extrusion of metal through an orifice.
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 376.1+ for shaping by die expressing apparatus of other nonmetallic material.

184 This subclass is indented under the class definition. Apparatus including separate and distinct means for charging a claimed glass forming means with a continuous web of preliminary shaped sheet or ribbon of glass while in a workable condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:
89, for a process of forming a film on a surface.

185 This subclass is indented under subclass 184. Apparatus wherein a sheet rolling means is the forming means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
147+, for a similar combination combined with means for feeding and incorporating a wire layer.
245, for plural sheet rolling means.

186 This subclass is indented under subclass 185. Apparatus including means for heating or cooling the charge prior to rolling.

187 This subclass is indented under the class definition. Apparatus comprising means utilizing inherent tackiness of molten glass for pulling glass into tube or rod form from a supply of molten glass - the initial form being defined, generally, by a bait.

SEE OR SEARCH THIS CLASS, SUBCLASS:
86+, for a process of drawing and simultaneously forming hollow stock.
89, for a process of film forming of hollow stock onto a surface.
183, for tube forming means comprising an extrusion die with discharge assistant means.
184, for tube formers including means charging a glass film on a mandrel.

188 This subclass is indented under subclass 187. Apparatus wherein the pulling means is located vertically above the molten supply.

189 This subclass is indented under subclass 188. Apparatus combined with means for subsequently handling a tubular or rod-shaped product thereof.

SEE OR SEARCH CLASS:
414, Material or Article Handling, subclass 24 for glass cylinder take-down means, per se.

190 This subclass is indented under subclass 188. Apparatus including means correlating an internal air supply means for the tube being drawn with movement of a bait.

191 This subclass is indented under subclass 188. Apparatus including means located within a tube being drawn to control the shape of, or the surface of the internal wall of the tube, or means to center the tube during drawing.

192 This subclass is indented under subclass 188. Apparatus wherein an internal air supply means for a tube being formed passes through the molten glass source into the lower portion of the tube.

193 This subclass is indented under the class definition. Apparatus comprising means utilizing inherent tackiness of molten glass for pulling glass in sheet form from a molten mass - the initial form generally being defined by bait means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
90+, for a process of forming sheet from molten glass.
188+, for a means drawing a cylinder which subsequently may be cut and/or reshaped into panes.
253+, for sheet rolling means including means feeding a glass melt thereto.
258+, for a sheet casting means.

SEE OR SEARCH CLASS:
226, Advancing Material of Indeterminate Length, for means handling indeterminate lengths of sheet, per se.

194 This subclass is indented under subclass 193. Apparatus combined with means for annealing or tempering the formed sheet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
95+, for a process of forming a sheet including a step of annealing or tempering of the sheet.

195 This subclass is indented under subclass 193. Apparatus including means to separate a flow of molten glass into plural streams or films,

usually two, and reuniting the streams to form the sheet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
53, for a process of forming plural sheets or sheet-like streams from a common source in combination with a step of bonding; see the "Search Notes" thereunder.

196 This subclass is indented under subclass 193. Apparatus including means for continuously drawing a sheet vertically upwardly combined with means to change the direction of flow to the horizontal.

197 This subclass is indented under subclass 196. Apparatus combined with moving endless support means for drawing and/or flattening the sheet.

198 This subclass is indented under subclass 196. Apparatus including roller means positioned above, but in contact with the molten glass, and which determine the area of draw of sheet from the bath.

SEE OR SEARCH THIS CLASS, SUBCLASS:
185+, for sheet rolling means downstream of means forming and charging a sheet or strip of soft glass thereto.

199 This subclass is indented under subclass 193. Apparatus combined with means adjacent a sheet source or meniscus to exert opposed lateral forces thereto to overcome the natural tendency of the sheet to narrow during drawing or to increase the sheet width.

SEE OR SEARCH THIS CLASS, SUBCLASS:
91, for a process of forming a sheet including a step of applying internal tension to the sheet.

200 This subclass is indented under subclass 199. Apparatus wherein the means applies sufficient forces transverse to the direction of draw to stretch the sheet laterally.

SEE OR SEARCH THIS CLASS, SUBCLASS:
92, for a process of forming a sheet including a step of smoothing the sheet subsequent to sheet formation.

SEE OR SEARCH CLASS:
26, Textiles: Cloth Finishing, subclasses 71+ for cloth finishing apparatus comprising stretching or spreading means.

201 This subclass is indented under subclass 199. Apparatus including means for positional adjustment of the width maintaining means.

202 This subclass is indented under subclass 193. Apparatus including pivoted closure means which substantially isolate the atmosphere of a drawing chamber from that of the remainder of a glass furnace.

203 This subclass is indented under subclass 193. Apparatus including auxiliary means to heat glass in the draw pot or drawing chamber.

204 This subclass is indented under subclass 193. Apparatus including means in a drawing chamber to facilate cooling of the sheet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
83, for a process of forming a glass article from molten glass including a step of cooling the glass at the forming area only.

205 This subclass is indented under subclass 193. Apparatus including means in the drawing chamber or pot adjacent the sheet source for reflecting radiant energy.

206 This subclass is indented under subclass 193. Apparatus comprising means to skim the surface of the molten glass.

207 This subclass is indented under the class definition. Apparatus comprising means dispensing discrete charges or portions of molten or soft glass combined with a receiving container means for preliminary shaping the charge and/or mold means for making a parison or product.

SEE OR SEARCH THIS CLASS, SUBCLASS:

72, for a process of forming a hollow article in mold cavity with step of charging mold cavity.

122, for a process of charging molten glass into mold cavity.

164, for a gatherer with control means responsive to a condition sensing means.

184+, for means charging soft sheet or strip glass to a glass forming means.

187+, for means for drawing a tubular preform.

193+, for means for continuous drawing tube or sheet, respectively.

258+, for sheet casting means including ladling or pot pouring means.

SEE OR SEARCH CLASS:

141, Fluent Material Handling, With Receiver or Receiver Coating Means, appropriate subclasses for a process of, or apparatus of general application for dispensing fluent material including a receiver or receiver coaction.

249, Static Molds, appropriate subclasses, for shape imparting receptacle means, per se, for shaping glass.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 256+ for a female mold and means to feed measured charges of fluent material thereto.

208 This subclass is indented under subclass 207. Apparatus including means to anneal, temper, or otherwise treat the product formed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

30+, for a process of chemically treating glass, and see the "Search Note" therein.

33.1+, for a process of devitrifying or vitrifying a crystalline glass preform.

303, for a gob shaping or treating means, per se, downstream of gob severing means.

209 This subclass is indented under subclass 207. Apparatus including means utilizing differential fluid pressure to assist or cause feeding of a charge.

SEE OR SEARCH THIS CLASS, SUBCLASS:

183, for extrusion die forming means having a positive discharge assistant means.

210 This subclass is indented under subclass 207. Apparatus wherein a suction utilizing dispensing means is movably mounted above a pool of glass and cooperates therewith to gather a charge of glass therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:

73, for a process of forming a hollow article combined with a step of charging a mold cavity by suction from upper surface of pool.

124, for a process of charging molten glass in a mold by utilizing suction.

125, for a process of gathering from an upper surface of a glass pool.

211 This subclass is indented under subclass 210. Apparatus wherein a pool closure means has operating means correlated with means positioning the dispensing means.

212 This subclass is indented under subclass 210. Apparatus including means mounting the gatherer for movement radially into, and out-of an orbit defined by traveling molds.

213 This subclass is indented under subclass 210. Apparatus wherein the dispensing means is structurally shaped to form an article or preform in situ.

214 This subclass is indented under subclass 213. Apparatus wherein the dispensing means is a mold for forming a hollow blank or preform.

215 This subclass is indented under subclass 214. Apparatus including a reciprocating part coating with the mold to force glass into contours of the mold, or which forms the initial cavity for a subsequent blowing.

216 This subclass is indented under subclass 215. Apparatus including a sequentially used separate and distinct blow mold.

217 This subclass is indented under subclass 216. Apparatus including blank molds mounted to travel in an orbit concentric to orbiting molds of diverse type.

218 This subclass is indented under subclass 217. Apparatus including means pivotally mounting a finish mold below the orbit of the blank mold.

219 This subclass is indented under subclass 214. Apparatus including means to form the initial opening in the glass charge by gas pressure.

220 This subclass is indented under subclass 219. Apparatus wherein the glass is formed in sequentially used distinct molds.

221 This subclass is indented under subclass 207. Apparatus wherein dispensing is through orifice means below the level of molten glass in a glass delivery zone.

222 This subclass is indented under subclass 221. Apparatus including means distributing the charges to sets of molds carried by mold supporting means arranged in parallel.

223 This subclass is indented under subclass 221. Apparatus including plunger means coating with the mold means.

224 This subclass is indented under subclass 223. Apparatus combined with diverse molding means.

225 This subclass is indented under subclass 221. Apparatus with means to guide the gob to a shape imparting receptacle means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

222, for a charge distributor combined with a tank feeder and mold means.

226 This subclass is indented under subclass 207. Apparatus wherein the shaping means includes press molding means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

215, for similar structure combined with a suction gathering means having a dual function of forming a parison.

227 This subclass is indented under the class definition. Apparatus having glass working means identifiable as separate units each doing a complete operation of a different kind, e.g. glass pressing means and glass blowing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

78+, for a process including diverse glass working steps for making a hollow product in a mold cavity.

140, for press mold means combined with uniting means in electronic envelope header, terminal or stem making apparatus.

156, for fusion bonding means combined with article molding means.

166+, for a perforator combined with other glass working means.

174+, for cutting, scoring or scribing means combined with a glass working or treating means.

184+, for means charging a strip or sheet to a separate and distinct forming means.

207+, for diverse glass working means combined with means to charge soft glass thereto.

SEE OR SEARCH CLASS:

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 324+ for diverse distinct shaping means; see the search notes thereunder.

228 This subclass is indented under subclass 227. Apparatus including plate on which a gather of glass is rolled, shaped and cooled combined with means to blow glass.

229 This subclass is indented under subclass 227. Apparatus comprising press forming means combined with means to shape by inflating a charge or preform.

SEE OR SEARCH THIS CLASS, SUBCLASS:

79+, for a process of forming a hollow article including steps of pressing and blowing.

215+, for press and blow means combined with a suction gatherer.

224, for press forming means combined with diverse molding means and gob feeding means.

230 This subclass is indented under subclass 229. Apparatus in combination with means located between the press-forming means and the blowing means to reheat the material being shaped.

SEE OR SEARCH THIS CLASS, SUBCLASS:

63, for a process of forming a glass part from molten glass, reheating and reworking the same.

231 This subclass is indented under subclass 229. Apparatus comprising a blank mold nested within a blow mold during a parison forming operation with means withdrawing the blank mold to permit subsequent blowing of the parison mold in the blow mold.

232 This subclass is indented under subclass 229. Apparatus including a mold with mounting means for turning the mold upside down or vice versa.

233 This subclass is indented under subclass 232. Apparatus including means for creating a pressure differential between a charging opening of a mold and another passage whereby a charge is forced into contact with the mold.

234 This subclass is indented under subclass 233. Apparatus comprising means for applying super-atmospheric pressure through the charge opening.

235 This subclass is indented under subclass 232. Apparatus wherein the mold is a neck mold.

236 This subclass is indented under subclass 235. Apparatus wherein a parison mold also is inverted.

237 This subclass is indented under subclass 229. Apparatus including a group of press forming molds and a group of blow molds with movable carrier means therefor, the carrier means transporting one group in an orbit concentric to an orbit over which the other group is moved.

238 This subclass is indented under subclass 237. Apparatus wherein molds of one group are mounted for diverse movement other than for mere opening or closing of a segmented mold.

SEE OR SEARCH THIS CLASS, SUBCLASS:

218, for gob charging and shape imparting receptacle means having diverse molds traveling concentric orbits including a finish mold pivotally mounted below a parison mold's orbit.

239 This subclass is indented under subclass 237. Apparatus in combination with means to transfer work from a mold of one group to a mold in the other group.

240 This subclass is indented under subclass 229. Apparatus combined with movable carrier means for press mold means and movable carrier means for blow mold means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

237+, for diverse molds mounted to travel concentric orbits.

241 This subclass is indented under subclass 240. Apparatus in combination with work transfer means for transferring work from the press mold means to the blow mold means.

242 This subclass is indented under subclass 229. Apparatus including a mold having a bottom portion mounted to reciprocate with respect to side walls thereof between a first and second position.

SEE OR SEARCH THIS CLASS, SUBCLASS:

231, for a parison mold encaseable in a finish mold.

243 This subclass is indented under the class definition. Apparatus comprising two or more glass working means, identifiable as separate units, of the same kind, e.g. plural pressing apparatus.

(1) Note. Plural preform reshaping apparatus which cooperate to produce a unitary result are excluded from this subclass and are located in subclasses 275 and 286.

SEE OR SEARCH THIS CLASS, SUBCLASS:

77, for a process of forming a hollow article involving plural distinct shaping steps.

227+, for plural blow means combined with press means (generally the press means being limited to the formation of the initial cavity in a charge with simultaneous neck forming of the article).

SEE OR SEARCH CLASS:

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 334 for sets of preform convoluting or twisting means, subclasses 335+ for sets of shaping means comprising an endless surface, subclasses 340+ for plural preform reshaping means, and subclasses 346+ for plural sets of male-female shaping couples.

244 This subclass is indented under subclass 243. Apparatus comprising at least two work stations each including reheating and reshaping means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

64, for a process of forming apart from molten glass, reheating and grossly reshaping same.

245 This subclass is indented under subclass 243. Apparatus comprising plural rolling means arranged to provide plural distinct rolling operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

98, for a process of simultaneously forming plural separate sheets.

185+, for means charging sheet or strip to separate and distinct glass forming rolls.

246 This subclass is indented under subclass 243. Apparatus comprising plural male-die means and plural molds, each die-mold couple providing a separate shaping of soft glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

227+, for diverse distinct glass working apparatus.

305+, for a press molding machine having a single plunger and plural molds or having plural plungers and a single mold.

247 This subclass is indented under subclass 246. Apparatus including plural plunger means mounted and actuated to cooperate sequentially with the same mold.

SEE OR SEARCH THIS CLASS, SUBCLASS:

305+, for a press molding machine and especially subclasses 308+ for a single plunger coating with successively presented molds; see the “Search Notes” under subclass 305.

248 This subclass is indented under subclass 246. Apparatus including means to cause relative rotation between the plunger and mold during the extraction of the plunger from a molded article.

249 This subclass is indented under subclass 248. Apparatus wherein plungers are mounted to coact through opposite walls of a mold.

250 This subclass is indented under subclass 246. Apparatus wherein plungers are mounted to coact through opposite walls of a mold.

SEE OR SEARCH THIS CLASS, SUBCLASS:

258, for a press plunger combined with movable core means.

251 This subclass is indented under subclass 246. Apparatus including means orbiting the plungers above orbiting molds.

SEE OR SEARCH THIS CLASS, SUBCLASS:

237+, for a similar relationship in a press and blow machine including molds traveling concentric orbits.

240+, for a similar relationship in a press and blow machine including traveling mold carriers.

252 This subclass is indented under subclass 243. Apparatus comprising distinct fire-polishing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

284, for fire-polishing means, per se, and see the "Search Notes" thereunder.

253 This subclass is indented under the class definition. Apparatus comprising a pass defined by a roll, and a coating surface between which a feed of soft glass is formed into a sheet.

SEE OR SEARCH THIS CLASS, SUBCLASS:

90+, for a process of forming sheet from molten glass, especially subclasses 99+ for sheet rolling.

143+, for ball rolling apparatus; see the "Search Notes" thereunder.

148+, for glass to wire laminating means including means to feed the wire thereto.

154, for glass to wire laminating means.

185+, for means charging a continuous strip or film to sheet rolling means.

193+, for forming rolls combined with sheet drawing means.

245, for plural distinct rolling means.

370.1, for roller means for glassworking, tempering, or annealing.

SEE OR SEARCH CLASS:

29, Metal Working, appropriate subclasses, for combined metal working and diverse mechanical or miscellaneous manufacturing devices which include rollers.

72, Metal Deforming, subclasses 199+ and 365.2 for a process or apparatus for rolling metal.

100, Presses, appropriate subclasses, for presses having rolls.

164, Metal Founding, subclass 428 for continuous metal casting apparatus including cooperating rolls.

165, Heat Exchange, subclasses 89+ for heated or cooled rolls, per se.

404, Road Structure, Process, or Apparatus, subclasses 122+, for road and pavement smoothing devices.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 363+ for a press forming means, press reshaping means or vulcanizing means comprising an endless surface and coating means; see the search notes thereunder.

492, Roll or Roller, for a roll, per se, not elsewhere classified.

254 This subclass is indented under subclass 253. Apparatus combined with glass treating means.

255 This subclass is indented under subclass 253. Apparatus including (1) a means for impressing a design or particular configuration in the surface of the sheet, or (2) means for corrugating the sheet.

SEE OR SEARCH THIS CLASS, SUBCLASS:

93, for a process of sheet forming with step of corrugating, embossing or surface deformation of sheet.

SEE OR SEARCH CLASS:

101, Printing, appropriate subclasses, especially subclasses 3.1+ for embossing apparatus, per se.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses for laminating combined with surface deformation; note especially subclasses 183+ for sheet deforming means, per se.

428, Stock Material or Miscellaneous Articles, subclass 152 for a glass sheet which may have a rugose or other textured surface, subclasses 156+ for stock material including a layer of varying thickness, subclasses 182+

for a stock material product having corrugations, and subclasses 194+ for a glass article having a differential or discontinuous coating thereon (e.g., print, design).

256 This subclass is indented under subclass 253. Apparatus in which the coating surface comprises a flat plate.

257 This subclass is indented under subclass 256. Apparatus including means to reciprocate the plate with respect to the roll.

SEE OR SEARCH THIS CLASS, SUBCLASS:
100, for a process of forming a sheet including the step of pouring molten glass onto a moving surface.

258 This subclass is indented under the class definition. Apparatus comprising molten glass pouring means combined with a receiving means providing a flat surface in which the molten glass spreads by force of gravity.

SEE OR SEARCH THIS CLASS, SUBCLASS:
99.2+, for a process of forming sheet glass by pouring molten glass onto a forming surface.

SEE OR SEARCH CLASS:
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 500 for casting means combined with adhesive bonding apparatus.
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 396 for means casting on an endless surface with cooperating harvesting means, and subclass 224 for a fluent stock casting means operably associated with a shaping surface to form an indefinite length product.

259 This subclass is indented under subclass 258. Apparatus wherein the pouring means comprises a melting pot combined with means for handling and pouring from the pot.

260 This subclass is indented under the class definition. Apparatus including mold means combined with means mounted to remove the product from an upper side of the mold.

(1) Note. Since product ejectors working through the bottom of the mold are widely used, no collection of art has been made; thus, a search for such ejectors includes all of subclasses 261+ and 305+.

SEE OR SEARCH THIS CLASS, SUBCLASS:
239, and 241, for transfer means in a press-blow machine.

SEE OR SEARCH CLASS:
414, Material or Article Handling, appropriate subclasses for article transfer means, per se.

261 This subclass is indented under the class definition. Apparatus comprising means utilizing differential gas pressure inflating a glass charge having a preliminary cavity therein in a female mold thereby imparting a shape thereto.

SEE OR SEARCH THIS CLASS, SUBCLASS:
81, for a process of forming a hollow product in a mold cavity utilizing differential gas pressure.
207+, for glass blowing apparatus combined with means charging a gob thereto.
227+, for glass blowing apparatus combined with diverse glass working means.
243+, for apparatus including plural distinct glass blowing units.

SEE OR SEARCH CLASS:
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 297 for the combination of means shaping a parison from bulk material with downstream blow shaping means and severing means therebetween; subclass 326 for extrusion shaping apparatus with downstream blow shaping means and subclasses 387+ for a preform reshaping means utilizing work contacting fluid pressure.

262 This subclass is indented under subclass 261. Apparatus in combination with means to treat a product being formed.

SEE OR SEARCH THIS CLASS, SUBCLASS:
69, for a process of forming a hollow article in a mold cavity combined with annealing or tempering.

263 This subclass is indented under subclass 261. Apparatus in combination with means to reduce the pressure exteriorly of the charge to less than atmospheric.

SEE OR SEARCH THIS CLASS, SUBCLASS:
233+, for a press and blow machine utilizing vacuum means to compact a charge in a mold.

264 This subclass is indented under subclass 261. Apparatus including moving mold support means mounting a mold for travel from one position to another.

(1) Note. Opening and closing means for segmented molds are classified below in subclasses 357+.

265 This subclass is indented under subclass 264. Apparatus in combination with apparatus heating or cooling means.

266 This subclass is indented under subclass 261. Apparatus in combination with means to rotate the mold about its own axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:
71, for a process of forming a hollow article in a mold cavity combined with a step of spreading the glass by rotation of the mold.

267 This subclass is indented under subclass 261. Apparatus in combination with apparatus heating or cooling.

SEE OR SEARCH THIS CLASS, SUBCLASS:
265, for a blow mold machine including a traveling mold and apparatus heating or cooling means.

268 This subclass is indented under the class definition. Apparatus comprising preform reshaping means combined with distinct treating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
104, for a process of reshaping a glass preform combined with annealing, tempering or fire-polishing.
227+, for diverse distinct glass working apparatus including fire-polishing means.

SEE OR SEARCH CLASS:
148, Metal Treatment, subclass 11.5 for combined working and heat treatment of metals; see the “Search Notes” thereunder.

269 This subclass is indented under the class definition. Apparatus comprising preform supporting means combined with heating means for accomplishing a glass working operation.

(1) Note. Heating of a preform so that the outer surface becomes molten and is shaped by surface tension and/or gravity is considered a glass working operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102+, for a process of reshaping a glass preform.
152+, for fusion bonding means including work holders and heating means; see the “Search Notes” thereunder.

SEE OR SEARCH CLASS:
148, Metal Treatment, subclass 9 for a process of cutting metal by heat.
432, Heating, subclasses 122+, for a residual heating device having means manipulating or orienting an article.

270 This subclass is indented under subclass 269. Apparatus for tipping off a glass envelope (e.g., of an electronic device) with or without means to exhaust gas therein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
34, for a process of sealing off a gas evacuating opening.

SEE OR SEARCH CLASS:
53, Package Making, subclasses 79+ for apparatus including means for gas filling and/or evacuating of a receptacle and closing means.
141, Fluent Material Handling, With Receiver or Receiver Coating Means, subclass 65 for evacuation means in fluent material handling apparatus having receiver or receiver coating means.

271 This subclass is indented under subclass 269. Apparatus in which the heating means is movable relative to the stock during a reshaping operation.

(1) Note. Means merely positioning a burner are classified in the remaining subclasses under subclass 269.

SEE OR SEARCH THIS CLASS, SUBCLASS:
57, for a process of bonding which includes relative rotation of work and heating means.

272 This subclass is indented under subclass 269. Apparatus wherein the heating means is a burner having control means therefore mechanically connected for correlation with the movement of a preform, a work holder, or tool.

273 This subclass is indented under subclass 269. Apparatus including means for converting sheet stock to or from planar sheet.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103, for a process of reshaping a preform utilizing a heat sink or shield.
106, for a process of bending or curving sheet stock.
197, for means drawing sheet vertically combined with means to flattening the sheet after directional change to the horizontal.
268, for sheet flattening means combined with annealing means.
287+, for sheet bending molds, per se.

274 This subclass is indented under subclass 269. Apparatus including preheating means spaced from the reheating and/or reshaping means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
244, for plural distinct glass working apparatus including spaced preform reheating and reshaping means.

275 This subclass is indented under subclass 269. Apparatus in combination with mechanical means for performing a shaping or finishing operation on a softened preform.

SEE OR SEARCH THIS CLASS, SUBCLASS:
64, for a process of forming a glass part from molten glass, reheating and grossly reshaping it.
140, for press mold means used to reshape preforms in electronic envelope header making apparatus.
244+, for preform heating means combined with spaced reshaping means.

SEE OR SEARCH CLASS:
72, Metal Deforming, appropriate subclasses, for apparatus for bending or otherwise shaping metal while in self-sustaining condition.

276 This subclass is indented under subclass 275. Apparatus wherein the preform is of tubular shape.

SEE OR SEARCH THIS CLASS, SUBCLASS:
108+, for a process of reshaping a tubular preform, with retention of internal cavity.

277 This subclass is indented under subclass 276. Apparatus including means internally of the stock to shape the bore thereof to an accurate cross-section (generally utilizing differential

air pressure to force the softened glass to conform to the contour of the internal means).

278 This subclass is indented under subclass 276. Apparatus including means movably supporting the stock for travel in a circular or elliptical path.

279 This subclass is indented under subclass 278. Apparatus in which the stock is supported horizontally.

280 This subclass is indented under subclass 278. Apparatus in which the stock is supported vertically.

281 This subclass is indented under subclass 276. Apparatus comprising means to curve stock, or to straighten curved stock.

SEE OR SEARCH THIS CLASS, SUBCLASS:
273, for means for converting sheet stock to or from planar sheet.

282 This subclass is indented under subclass 276. Apparatus comprising means for reshaping an internal surface of the stock.

283 This subclass is indented under subclass 276. Apparatus including means to elongate.

SEE OR SEARCH THIS CLASS, SUBCLASS:
270, for glass envelope tipping off by stretching means.
278, for hollow stock stretching means including orbiting stock supporting means.

284 This subclass is indented under subclass 269. Apparatus including means to heat a surface layer of a preform to a molten condition whereby surface tension and/or gravity eliminates defects thereon.

SEE OR SEARCH THIS CLASS, SUBCLASS:
65, for a process of forming an article from molten glass followed by fire-polishing.
104, for a process of reshaping combined with fire-polishing a preform.
120, for a process of treating a preform by flame only.
227+, for diverse glass working including fire-polishing.
252, for plural distinct fire-polishing means in a single apparatus.

285 This subclass is indented under subclass 269. Apparatus wherein a preform supporting means holds a heat softened preform in a manner permitting reshaping by gravity or pressure of a flame.

SEE OR SEARCH THIS CLASS, SUBCLASS:
113, for a treating process including perforating or severing by flame.
166, for perforating apparatus including flame means.
273, for apparatus for reshaping sheet stock including sagging on a bending mold.

286 This subclass is indented under the class definition. Apparatus including means for performing a shaping operation on a previously formed blank while in a soft state.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102+, for a process of reshaping of a glass preform.
275+, for glass preform reshaping apparatus combined with reheating means.

SEE OR SEARCH CLASS:
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 383+ for a preform reshaping or resizing means, or means to vulcanize a preform on a conforming support; see the search notes thereunder.

287 This subclass is indented under subclass 286. Apparatus for bending sheet glass which apparatus includes a mold surface having a desired configuration onto which a sheet in a soft state settles freely into conformity with the shaping surface.

(1) Note. Also included within the scope of this and indented subclasses are patents claiming means to assist in the bending operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
106+, for a process of reshaping a glass sheet.
197, for flattening tables combined with glass drawing means.
273, for apparatus to reshape planar stock combined with reheating means.

SEE OR SEARCH CLASS:
72, Metal Deforming, appropriate subclasses, for a process or an apparatus for bending or otherwise shaping metal plastically.
269, Work Holders, appropriate subclasses for work holders of general application.

288 This subclass is indented under subclass 287. Apparatus having (1) means thereon capable of absorbing large quantities of heat and used as a heat absorber or reservoir, or (2) barrier means preventing heat from reaching a portion of an apparatus or stock.

SEE OR SEARCH THIS CLASS, SUBCLASS:
103, for a process reshaping a glass preform utilizing a heat shield or sink.
104, for a process of reshaping a glass preform which includes a step of fire polishing, tempering or annealing.

SEE OR SEARCH CLASS:
126, Stoves and Furnaces, subclass 400 for a heat accumulator, per se.

289 This subclass is indented under subclass 287. Apparatus wherein additional movable sheet supporting or sheet guide means are provided to aid in the glass bending operation.

290 This subclass is indented under subclass 289. Apparatus wherein the mold has a movable section.

291 This subclass is indented under subclass 287. Apparatus wherein the mold has a movable section.

SEE OR SEARCH THIS CLASS, SUBCLASS:
368+, for a segmented forming mold having a cavity.

292 This subclass is indented under subclass 286. Apparatus in which the preformed blank is cylindrical in cross-section, e.g. bottle necks.

SEE OR SEARCH THIS CLASS, SUBCLASS:
108+, for a process of reshaping a hollow glass preform.
276+, for hollow stock reshaping apparatus combined with reheating means.

SEE OR SEARCH CLASS:
72, Metal Deforming, subclasses 274+ for a process or apparatus for “drawing” metal through an orifice.

293 This subclass is indented under subclass 292. Apparatus in which the reshaping means includes means to form threads.

294 This subclass is indented under subclass 292. Apparatus in which the reshaping means includes an internal forming spindle having means to increase its effective diameter.

295 This subclass is indented under subclass 292. Apparatus in which the reshaping means includes crimping means.

296 This subclass is indented under subclass 292. Apparatus wherein the reshaping means includes separate means for simultaneously reshaping internal and external surfaces of cylindrical stock.

SEE OR SEARCH THIS CLASS, SUBCLASS:
282, for similar apparatus combined with reheating means.

297 This subclass is indented under subclass 296. Apparatus in which both forming means are caused to rotate by driving means.

298 This subclass is indented under subclass 296. Apparatus in which the internal forming means is caused to rotate while the external forming means remains stationary.

299 This subclass is indented under subclass 292. Apparatus in which the shaping means consists of means to spread or flare the end portion of cylindrical stock.

SEE OR SEARCH THIS CLASS, SUBCLASS:
295, for flaring means combined with crimping means.

300 This subclass is indented under the class definition. Apparatus including means subjecting a discrete portion of soft glass, having a cavity therein, to a differential gas pressure to cause ballooning thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
110, for a process for reshaping hollow shaped preform utilizing vacuum or gas pressure.
187+, for tube drawing means including means for introducing air in the tube simultaneously.
243+, for plural blowing means.
261+, for a glass blowing machine utilizing a blow mold.
276+, for hollow glass preform reshaping means including inflating means combined with reheating means.
292+, for apparatus for reshaping cylindrical stock including inflating means.
353+, for a drawing bait with air supply means.

301 This subclass is indented under subclass 300. Apparatus in combination with means to selectively control the ballooning.

302 This subclass is indented under the class definition. Apparatus comprising forming means including a mold, and means imparting motion to the mold to cause or enhance shaping of a charge of soft glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
71, for a process of forming a hollow article in a mold cavity combined with the step of spreading the glass by rotating the mold.
266, for blow molding apparatus including means to rotate a mold about its axis.

SEE OR SEARCH CLASS:
164, Metal Founding, subclasses 286+ for centrifugal metal casting apparatus and subclass 114 for corresponding methods.
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 425+ for means utilizing mold motion to distribute or compact stock therein.

303 This subclass is indented under the class definition. Apparatus comprising means to shape, modify, or treat a gob prior to its entry into a mold, with a severing means located upstream therefrom.

SEE OR SEARCH THIS CLASS, SUBCLASS:
127, for a process of gob shaping or treating subsequent to the discharge of the gob through an orifice.

304 This subclass is indented under the class definition. Apparatus combined with means for conveying and/or delaying a glass charge from a feeding means to its point of use, e.g. a mold.

SEE OR SEARCH THIS CLASS, SUBCLASS:
225, for the combination of a gob feeder, conveyor, or guide means and shape imparting receptacle means.

SEE OR SEARCH CLASS:
193, Conveyors, Chutes, Skids, Guides, and Ways, appropriate subclasses, for chute type apparatus for handling glass charges, per se.

305 This subclass is indented under the class definition. Article forming means comprising a dynamic male member co-acting with a cavity in a female mold.

(1) Note. If a neck-ring, baffle, or plunger follower contacts the female mold prior to, or simultaneous with a pressing operation on a charge, the patent is placed here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

140, for electronic envelope header, terminal or stem making apparatus including press mold means.

156, for article forming means combined with uniting means.

166, for perforating means combined with glass press molding means.

177, for mechanical cutting scoring or scribing means combined with mold means.

207+, for press means combined with means to charge a mold, especially subclasses 215+, 223 and 226.

227+, for a press molding machine combined with diverse glass working means.

246+, for a combination of plural press machines.

247+, for press molding apparatus wherein a neck-ring, baffle, or plunger follower preliminarily shapes a charge with subsequent and final shaping accomplished by a dynamic plunger.

SEE OR SEARCH CLASS:

100, Presses, appropriate subclasses, for residual processes and apparatus for subjecting material to compressive forces.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 406+ for a press forming apparatus having opposed press members; see the search notes thereunder.

306 This subclass is indented under subclass 305. Apparatus combined with product treating (e.g. annealing) means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

69, for a process of forming a hollow article in a mold cavity with the step of annealing or tempering.

307 This subclass is indented under subclass 305. Apparatus including mold closure means or mold rings mounted by a lateral support for movement to or from engagement with a mold body.

308 This subclass is indented under subclass 305. Apparatus comprising a single plunger co-acting with individual molds of a group successively presented by movable mold support means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

251+, for orbiting plungers cooperating with orbiting molds in a press molding machine.

309 This subclass is indented under subclass 308. Apparatus including means providing relative rotation between a plunger and a mold traveling in an orbit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

248+, for similar structure in a multiple press.

310 This subclass is indented under subclass 309. Apparatus comprising a plurality of male shaping members detachably carried and independently inserted into a mold by a single, commonly used reciprocating shaft.

311 This subclass is indented under subclass 308. Apparatus including means to cause movement (other than mere opening and closing in situ) of an orbiting mold, as a unit, into and out of a path defined by the orbit of the mold.

312 This subclass is indented under subclass 308. Apparatus wherein a mold while orbiting defines a vertical layer having a horizontal axis.

313 This subclass is indented under subclass 308. Apparatus including an orbiting mold divided perpendicularly with respect to a horizontal plane.

314 This subclass is indented under subclass 305. Apparatus including plural motors arranged coaxially with a plunger.

315 This subclass is indented under subclass 305. Apparatus in combination with means to withdraw a core from a mold cavity.

SEE OR SEARCH CLASS:
249, Static Molds, subclasses 63+ for mold with core and having means to remove core.

316 This subclass is indented under subclass 305. Apparatus including means to provide relative rotation between a plunger and a mold during separation thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
248+, for a similar relationship in apparatus providing plural molds and plural co-acting plungers.
309+, for a similar relationship of plunger and mold in apparatus providing plural orbiting molds with a single co-acting plunger.

317 This subclass is indented under subclass 305. Apparatus including means movably mounting a female mold for oscillatory or reciprocatory movement, generally to provide engagement with a substantially stationary male member.

SEE OR SEARCH THIS CLASS, SUBCLASS:
232+, for mold inverting means in a press and blow machine.

318 This subclass is indented under subclass 305. Apparatus including means to vary the pressure applied to a plunger during pressing.

319 This subclass is indented under subclass 305. Apparatus combined with means to heat or cool the apparatus.

320 This subclass is indented under subclass 305. Apparatus comprising plural plungers with means to selectively present and individually operate them at a single station - generally to a manually presented female mold.

SEE OR SEARCH THIS CLASS, SUBCLASS:
308+, for apparatus including a single plunger co-acting with a single mold of a group with movable mold supporting means successively presenting a mold to the plunger.

321 This subclass is indented under subclass 305. Apparatus comprising a plunger reciprocating from a position below a mold table into a pressing position through the table.

SEE OR SEARCH THIS CLASS, SUBCLASS:
232, for a press and blow machine including mold inverting means, especially subclasses 235+ for a plunger operating from below.

322 This subclass is indented under subclass 305. Apparatus including means to adjust the travel of the plunger.

323 This subclass is indented under the class definition. Apparatus including means for (1) orientating a product with respect to a glass working or handling means prior to co-action therewith, or (2) product hold-down means for retaining a product's position upon opening of a mold or shaping means, or (3) means for aligning parts of a mold or a mold and its core during or upon completion of translation thereof.

324 This subclass is indented under the class definition. Apparatus including means (with or without severing means) to supply increments of molten glass to a shaping tool or machine by slug feeding means, gathering means or ladling means.

SEE OR SEARCH THIS CLASS, SUBCLASS:
125, for a process of gathering from an upper surface of a glass pool.
207+, for the combination of molding apparatus and means to charge the apparatus.
336, for a gathering pool-type glass furnace.
347+, for residual glass furnaces.

SEE OR SEARCH CLASS:
212, Traversing Hoists, subclasses 336+ for non motor powered traversing hoists.
221, Article Dispensing, appropriate subclasses, for article dispensing of general utility.
222, Dispensing, appropriate subclasses, for processes and apparatus of general

application for dispensing of materials which may be in any physical state, e.g. liquid, gas, etc.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 447+ for a shaping surface and means to feed fluent stock thereto; see the search notes thereunder.

325 This subclass is indented under subclass 324. Apparatus wherein the glass is discharged through an orifice or weir located below the level of the melt.

SEE OR SEARCH THIS CLASS, SUBCLASS:

126+, for a process of discharging molten glass downwardly through an orifice.

221+, for similarly apparatus combined with shape imparting receiving means.

326 This subclass is indented under subclass 325. Apparatus with additional heating or cooling means for conditioning the glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

337+, for supplemental heating or cooling means associated with the pool of a glass furnace.

327 This subclass is indented under subclass 326. Apparatus wherein the heating or cooling means is located at, or immediately adjacent to the discharge orifice.

SEE OR SEARCH THIS CLASS, SUBCLASS:

128, for a process of discharging molten glass downwardly through an orifice with the step of varying the temperature of the glass at or adjacent the orifice.

328 This subclass is indented under subclass 325. Apparatus having: (1) A plurality of plungers which act as discharge assistants, or (2) a plurality of orifices through which glass is discharged.

329 This subclass is indented under subclass 325. Apparatus in which the molten glass is caused to be discharged through the orifice by (1) fluid means under pressure and in direct contact with the glass, or (2) vacuum means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

124, for a process of charging a mold with molten glass by suction.

130+, for a process of controlling flow through a delivery orifice by use of differential gas pressure.

209, for gob charging means utilizing fluid pressure discharge assistant means in combination with shape imparting receiving means.

330 This subclass is indented under subclass 325. Apparatus including means reciprocally plunging within the molten glass substantially coaxial with the orifice whereby the volume is controlled or varied.

SEE OR SEARCH THIS CLASS, SUBCLASS:

129, for a process of discharging molten glass downwardly through an orifice with means permitting flow control or arresting of flow through the orifice.

SEE OR SEARCH CLASS:

222, Dispensing, subclasses 282+ for dispensing means having volume varying means, and subclass 340 for reciprocating impeller volume varying means.

331 This subclass is indented under subclass 330. Apparatus wherein the plunger has motion in addition to reciprocating.

332 This subclass is indented under subclass 330. Apparatus combined with means to sever the dispensed glass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

221+, for similar structure combined with molding apparatus.

333 This subclass is indented under subclass 324. Apparatus comprising a pulsating means creating wave like motion in the glass causing discrete portions of glass to break over a weir-type discharge opening.

334 This subclass is indented under the class definition. Apparatus including (1) molten glass severing or scraping means, per se, constructed to co-act with a surface of a charge confining means (e.g. a surface of a mold), or (2) such means claimed in combination with a fragment of glass working apparatus, or (3) gob shears, per se, not elsewhere classified.

SEE OR SEARCH THIS CLASS, SUBCLASS:

133, for a process comprising severing a stream of molten glass; see the "Search Notes" thereunder.

207+, for combination apparatus comprising gob charging means and shape imparting receptacle means with or without molten glass severing means.

303, for a gob shaping or treating means located downstream of a gob severing means.

324, for molten glass dispensing means with or without molten glass severing means, especially subclass 332 for a tank feeder with a plunger-type discharge assistant and a severing means.

SEE OR SEARCH CLASS:

83, Cutting, appropriate subclasses, especially subclass 600 and 623 for gob shears, per se.

335 This subclass is indented under the class definition. Apparatus including means to feed raw materials combined with a melting furnace including structurally defined refining or delivery zones.

SEE OR SEARCH THIS CLASS, SUBCLASS:

146, for means to feed coloring additives to a glass melt.

347, for glass furnaces, per se.

SEE OR SEARCH CLASS:

414, Material or Article Handling, subclasses 147+ for a chamber of a type utilized for a heating function and means for charging or discharging the chamber, and see particularly subclasses 165+ of that area.

432, Heating, appropriate subclasses for glass heating apparatus combined with a glass batch feeder to form molten glass and not including structural features peculiar to working or treating of the molten glass. The claiming of means to convey the molten glass to a working zone does not exclude the patent from Class 432 unless the zone is structurally defined.

336 This subclass is indented under the class definition. Apparatus comprising furnaces having a structurally defined area, permitting removal (e.g., by drawing, ladling, etc.) of molten glass from a pool by means located there above.

SEE OR SEARCH THIS CLASS, SUBCLASS:

125, for a process of gathering from an upper surface of a glass pool.

324+, for glass furnaces including means to dispense glass.

SEE OR SEARCH CLASS:

432, Heating, appropriate subclasses, for glass heating apparatus including means to heat molten glass in a receptacle from which molten glass is gathered or drawn therefrom to form a glass product; however, structure peculiar to gathering, or drawing will cause placement in Class 65.

337 This subclass is indented under subclass 336. Apparatus including heating or cooling means located within or immediately adjacent the pool area.

SEE OR SEARCH THIS CLASS, SUBCLASS:

203, for sheet drawing means in combination with heating means in the drawing area.

204, for sheet drawing means in combination with cooling means in the drawing area.

338 This subclass is indented under subclass 337. Apparatus including (1) means in molten glass defining a source of draw and/or (2) means shielding an area of draw.

339 This subclass is indented under subclass 336. Apparatus including means isolating the pool area from a refining and/or melting area.

340 This subclass is indented under subclass 339. Apparatus comprising support means movably mounting structure defining a pool.

SEE OR SEARCH THIS CLASS, SUBCLASS:
173, for identical pool structures mounted for alternate use.

341 This subclass is indented under subclass 339. Apparatus including a connection between two pools arranged in a step wise or cascading fashion wherein the glass residing in the upper pool flows into the lower level in a falling stream.

342 This subclass is indented under subclass 339. Apparatus wherein the isolating means is a wall retained bridge-type barrier providing for molten glass passage thereunder.

343 This subclass is indented under subclass 342. Apparatus wherein a bridge floats in the molten glass and is restrained to vertical movement by guide means in a furnace wall.

(1) Note. A floating bridge, per se, is placed here.

344 This subclass is indented under subclass 339. Apparatus including (1) means in a pool of molten glass defining a source of draw and/or (2) means shielding an area of draw.

(1) Note. A deputer, per se, is placed in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
338, for a similar combination combined with a heater or heat exchange means for the deputer, draw ring, or draw shield.

345 This subclass is indented under subclass 339. Apparatus including baffle means suspended downward from above the molten glass into or adjacent the glass for controlling the flow of heater gasses above the glass.

346 This subclass is indented under the class definition. Apparatus comprising means defining a flow confining channel between furnace sections with means in the channel to adjust the consistency of molten glass therein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
324+, for a glass furnace combination including molten glass dispensing means especially subclass 326 for auxiliary heating or cooling means in a dispensing zone.
337+, for supplemental heating or heat exchange means in a gathering pool type furnace.

347 This subclass is indented under the class definition. Apparatus comprising a furnace or melting pot including (1) a melting zone and a structural defined refining zone and/or (2) a structurally defined delivery zone without requiring a dispensing means or structure defining a gathering pool.

SEE OR SEARCH THIS CLASS, SUBCLASS:
134.1+, for a process of purifying glass subsequent to flowing from a melting zone.
178+, for a glass furnace combined with means for agitating molten glass.
324+, for a glass furnace combined with molten glass dispensing means.
335+, for a combination of furnace charging means and a glass furnace.
336+, for a glass furnace of the gathering or drawing pool type.
346+, for a channel section including means to place a glass melt into working condition.

SEE OR SEARCH CLASS:
219, Electric Heating, appropriate subclasses, especially 772 for a capacitive dielectric heater peculiar to fluent material.
373, Industrial Electric Heating Furnaces, subclasses 27+ for glass furnaces having electrical heating means and for processes of manipulating an electric glass furnace. See subclass 134 in Class 65 for the lines between Class 65 and Class 373.
432, Heating, appropriate subclasses for furnaces or melting pots of general application including glass melting

furnaces or pots without structurally defined fining or delivery zones.

348 This subclass is indented under the class definition. Apparatus including positive means to cool a glass product, e.g. air blast tempering means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

69, for a process of forming a hollow article in mold cavity with the step of annealing or tempering.

114+, for a process of tempering.

161, for similar apparatus including automatic control means.

194, for sheet drawing means combined with annealing or tempering means.

204, for sheet drawing means combined with sheet cooling means.

262, for glass blowing apparatus combined with treating means.

268, for the combination of preform reshaping means and treating means.

303, for gob treating means downstream of gob shearing means.

306, for a press molding machine combined with treating means.

507+, and 510+, for means to heat or cool a formed glass fiber.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses for a process or apparatus for gas-solid contacting not elsewhere provided for.

148, Metal Treatment, appropriate subclasses for a metal treating process.

165, Heat Exchange, appropriate subclasses for process or apparatus of general application for exchanging heat, especially subclasses 58+ for combined heating and cooling.

219, Electric Heating, subclass 388 for electrical heating means combined with an article conveyor.

239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclasses for spray nozzle arrangements and nozzle detail.

266, Metallurgical Apparatus, subclasses 249+ for solid metal treating apparatus.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 445+ for means treating a product of apparatus of this class not otherwise provided for; see the search notes thereunder.

349 This subclass is indented under subclass 348. Apparatus combined with means to heat the product prior to exposure to positive cooling means.

SEE OR SEARCH CLASS:

165, Heat Exchange, subclass 65 for a heater and cooler successively traversed by material moving through a heat exchanger of general utility.

219, Electric Heating, appropriate subclasses for an electric heater.

373, Industrial Electric Heating Furnaces, appropriate subclasses for an electric furnace.

432, Heating, subclasses 77+, for a residual heater combined with work cool down means.

350 This subclass is indented under subclass 349. Apparatus wherein means to heat comprise spaced distinct heating means.

351 This subclass is indented under subclass 349. Apparatus including spaced cooling means providing distinct cooling zones downstream of the heating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

115, for a process of differential or localized tempering.

352 This subclass is indented under the class definition. Apparatus comprising means for starting and defining the shape of a draw of glass from a source molten glass.

353 This subclass is indented under subclass 352. Apparatus including means to supply air internally of the glass being drawn.

354 This subclass is indented under subclass 353. Apparatus including heating or cooling means.

355 This subclass is indented under the class definition. Apparatus including means to heat or cool the apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:

169, for positive means for cleaning apparatus some of which inherently heat or cool.

265, for apparatus heating or cooling means in a glass blowing machine having traveling molds.

267, for similar structure combined with blowing apparatus.

319, for a press molding machine including apparatus heating or cooling means.

326+, for molten glass dispensing means with auxiliary heating or cooling means.

337+, for supplemental heating or heat exchange means in a gathering pool of a furnace.

354, for a bait having heating or cooling means.

SEE OR SEARCH CLASS:

165, Heat Exchange, appropriate subclasses for residual heat exchange apparatus of general application.

219, Electric Heating, appropriate subclasses for electrical heating means, per se.

249, Static Molds, subclasses 79+ for molds including heating means and subclass 111 for molds including a solid heat conductor, i.e., chill or insulator.

431, Combustion, appropriate subclasses for liquid or gaseous fuel burners, per se.

432, Heating, subclasses 233+, for a residual heating apparatus element having protective cooling structure.

356 This subclass is indented under subclass 355. Apparatus in which the heating or cooling means is (1) encased by parts of the apparatus, or (2) involves internal structure thereof.

357 This subclass is indented under the class definition. Apparatus including (1) a mold and means which acts to separate the mold into two or more distinct portions, or (2) a mold combined with mold clamping means.

SEE OR SEARCH CLASS:

24, Buckles, Buttons, Clasps, etc., subclasses 455+ for clamps of general utility; see the "Search Notes" thereunder.

74, Machine Element or Mechanism, appropriate subclasses, for mechanical movements, per se.

292, Closure Fasteners, appropriate subclasses for closure fasteners of general application.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 450+ for a segmented female mold and mold opening and closing or clamping means.

358 This subclass is indented under subclass 357. Apparatus in which the separating action includes or consists of drawing a core from the mold.

SEE OR SEARCH THIS CLASS, SUBCLASS:

219+, for a combination of gob charging and blow molding means including movable core means.

250, for a plunger oppositely disposed from a movable core means.

315, for a press molding machine including core withdrawing means.

359 This subclass is indented under subclass 357. Apparatus in combination with means to support or carry the mold or portions thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

361, for molds with supporting means, per se; see the "Search Notes" thereunder.

360 This subclass is indented under subclass 359. Apparatus in which portions of the mold pivot about an axis during separation.

361 This subclass is indented under the class definition. Apparatus comprising molds supporting means combined with only those details of a mold required to cooperate therewith.

SEE OR SEARCH THIS CLASS, SUBCLASS:

207+, for mold support means combined with gob charge and shape imparting means.

232+, for mold inverting means in a press and blow machine.

237+, for mold support means movably mounting diverse molds for travel in concentric paths in a press and blow machine.

240+, for plural mold carriers supporting diverse molds in a press and blow machine.

246+, for a plural press machine including mold support means.

264+, for a blow mold machine including movable support means for a mold.

266, for mold support means mounted on a mold for rotation about its own axis in a blow machine.

302, for article forming utilizing mold motion.

308+, for means successively presenting molds in a press mold machine.

317, for mold support means reciprocating or oscillating a mold in a press machine.

SEE OR SEARCH CLASS:

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 453+ for the combination of a dynamic carrier or a dynamic support and a female mold; see the search notes thereunder.

362 This subclass is indented under the class definition. Apparatus comprising (1) a male forming element constructed to cooperate with a female mold, or (2) a plunger-type discharge assistant for a molten glass feeder.

SEE OR SEARCH THIS CLASS, SUBCLASS:

305+, for a press molding machine including a plunger, especially subclass 317 for a reciprocating female mold member co-acting with a stationary male die; see the "Search Notes" thereunder.

SEE OR SEARCH CLASS:

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 457 for a dynamic male shaping means including mechanical movement or power means and subclass 469 for a shaping plunger, per se.

370.1 ROLLER MEANS FOR GLASSWORKING, TEMPERING, OR ANNEALING: This subclass is indented under the class definition. Apparatus having a generally cylindrical work contacting surface, which surface revolves about the longitudinal axis of the cylinder with rolling motion relative to the surface (a) of molten or hot semisolid glass during glassworking or (b) of solid or semisolid glass during heat treatment to effect tempering or annealing thereof or during other treatment to effect physical or chemical changes thereof.

(1) Note. A patent to a roller, per se, disclosed solely for use in a glassworking apparatus is <u>not</u> classified in Class 65 if the roller is solely for conveying or feeding to a work treating station or between work treating stations provided that the roller is <u>not</u> synchronized with or controlled by means associated with the operation of a work treating station.

SEE OR SEARCH THIS CLASS, SUBCLASS:

253+, for a rolling means to form sheet or strip.

SEE OR SEARCH CLASS:

165, Heat Exchange, subclasses 86+ for a roller with heating or cooling surfaces under the class definition.

193, Conveyors, Chutes, Skids, Guides, and Ways, subclass 37 for a nonpowered conveying

198, Conveyors: Power-Driven, subclasses 780+ for a powered conveying roller.

219, Electric Heating, subclass 244 for an electric heating device combined with a rotatable pressure application means.

226, Advancing Material of Indeterminate Length, subclasses 190+ for a roll under the class definition.

271, Sheet Feeding or Delivering, subclasses 264+ for a sheet feeding roller.
432, Heating, subclasses 239+ for a work feeding, agitating or conveying roller within a furnace.
492, Roll or Roller, for a roller, per se, not elsewhere provided for.

374.1 APPARATUS MADE OF SPECIAL MATERIAL:
This subclass is indented under the class definition. Apparatus characterized in part by the material of which it is made.

SEE OR SEARCH CLASS:
106, Compositions: Coating or Plastic, subclasses 38.2+ for compositions, per se, formulated for use in making or coating molds.
249, Static Molds, subclasses 114+ for a mold having a specific coating or adherent layer; and subclasses 134+ for a mold made of a specific composition.

374.11 Metal-nonmetal composite:
This subclass is indented under subclass 374.1. Apparatus in which at least one layer or portion is made of a specified metal or alloy and at least one other layer or portion is made of a nonmetallic material.

374.12 Metallic:
This subclass is indented under subclass 374.1. Apparatus made of a specified metal or alloy.

(1) Note. There may be one or more defined metal layers in the apparatus.

SEE OR SEARCH THIS CLASS, SUBCLASS:
374.11, for apparatus comprising a metal layer or portion together with a nonmetal layer or portion.

374.13 Ceramic material:
This subclass is indented under subclass 374.1. Apparatus comprising a ceramic material.

(1) Note. For the purpose of this classification, a ceramic material is an inorganic composition which may be either thermoplastic, such as a glass, or thermosetting, such as a refractory composition, frequently, although not necessarily, made of a mixture of metallic oxides and/or silicates, or baked clay-like substances. All substance defined in Class 501, Compositions: Ceramic, as being ceramic are herein contemplated. Thus, e.g., apparatus made of a composition comprising primarily carbides or nitrites would be included herein.

374.14 Asbestos containing:
This subclass is indented under subclass 374.1. Apparatus which is made, at least in part, of asbestos.

374.15 Elemental carbon containing (e.g., graphite, charcoal, etc.):
This subclass is indented under subclass 374.1. Apparatus wherein at least part of the apparatus is made of a substance containing elemental carbon.

(1) Note. The elemental carbon may be disclosed as, e.g., graphite, charcoal, etc.

375 This subclass is indented under the class definition. Subject matter not elsewhere provided for.

376 PROCESSES OF MANUFACTURING FIBERS, FILAMENTS, OR PREFORMS:
This subclass is indented under the class definition. Processes directed to producing (a) rod-like stock of sufficiently small diameter, either as (i) continuous filaments of indefinite length, or (ii) short discrete pieces, or (b) stock material intended to be used in fiber and filament making.

(1) Note. For the purposes of this class “mineral wool” is wool formed from slag.

(2) Note. Fiber and filament treating combined with a step of making stock material intended to be used in fiber and filament making are included herein.

SEE OR SEARCH CLASS:
28, Textiles: Manufacturing, subclass 103 , 172.1, 178, 190, 217, and 247 for processes and apparatus involving mechanical interengaging of fibers or

strands not combined with a glass-working or glass treating operation.

73, Measuring and Testing, subclass 159 for measuring and testing of a fiber, per se.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 62.4 for processes for adhesively laminating plural preforms which include the step of liberating or form glass fibers with bulk deposition thereof to form at least one of the preforms. See subclasses 167 and 433-441 for a process or apparatus for forming glass filaments combined with the steps of applying an adhesive to the filaments and assembling them to form a strand (a patent which dis but does not claim the assembly operation above is classified in Class 65 even though the sole disclo relates to the formation of a strand composed of bonded fila). A patent claiming the steps of applying a coating material to glass filaments and assembling the coated filaments and having a specification disclosing several coating materials one of which is not an adhesive is classified in Class 65 unless a claim recites an adhesive coating material, in which case the patent is classified in Class 156; and see subclasses 345.1-345.55 for apparatus for etching of glass fibers or filaments, per se.

162, Paper Making and Fiber Liberation, appropriate subclasses, especially subclass 3 and 100+ for chemical liberation of fibers and felting in paper manufacturing.

204, Chemistry: Electrical and Wave Energy, subclass 192.29 for forming a transparent optical conductor by sputtering; follow the general guidelines for placement of an operation involving the combination of at least one Class 204 step in sequence with a separate Class 65 step as explained at the beginning of the Class 204 definition under I, (4) and (5) Notes.

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 687+ for electrolytic material treatment, especially subclass 769 for electrolytic treatment of solid glass, silica, quartz, or optical material.

241, Solid Material Comminution or Disintegration, appropriate subclasses for comminution of solid materials of general application.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, for shaping, molding, or casting of nonmetallic materials other than glass, especially subclasses 1.24+ for shaping, treating, or extruding optical fibers, subclasses 5+ for processes, within the class definition, of liquid comminuting and solidifying of general application, and subclasses 165+ for processes of forming indefinite-length fibers or filaments from materials which may be disclosed to be siliceous materials in solution or suspension by precipitation in a reactive or solvent extractive bath or by evaporation of the solvent.

425, Plastic Article or Earthenware Shaping or Treating: Processes, for molding, casting, or shaping plastic, ceramic, or nonmetallic material (excluding glass, Class 65), subclasses 6+ for liquid comminuting means forming particulate material (e.g., granules, fibers, etc.) directly from molten material including means providing a solidifying zone, subclass 66 for filament forming means combined with product advancing means, subclasses 67+ for apparatus comprising a filament shaping orifice discharging into a liquid bath or shower, subclasses 80.1+ for molding apparatus including air-felting means for forming self-sustaining bodies from particulate material, and for processes directed to the formation of filaments from siliceous materials in solution (e.g., silicates by precipitation from said solution or evaporation of solvent therefrom, etc.).

377 With measuring, controlling, sensing, programming, timing, indicating, or testing:
This subclass is indented under subclass 376. Processes including measuring, controlling, programming, sensing, timing, indicating, or testing fibers, filaments, or preforms during any stage of their manufacture or treatment.

(1) Note. Patents directed to measuring, controlling, sensing, inspecting, indicating, or testing the contour, shape, coating, internal molecular arrangement, or specific composition of fibers, filaments, or preforms are included in this subclass.

(2) Note. Process controls responsive to sensed conditions including program, cyclic, time, or automatic controls are proper for this and indented subclasses.

(3) Note. Equivalent terms include examining, diagnosing, analyzing, eval uating, and monitoring.

SEE OR SEARCH THIS CLASS, SUBCLASS:
29.12, for processes of measuring, controlling, sensing, indicating, or testing glass during any stage of manufacture or treatment excluding fibers, filaments, or preforms thereof.
158, for apparatus for measuring, sensing, indicating, or testing glass manufacture or treatment excluding fibers, filaments, and preforms thereof.
484, for apparatus for measuring, controlling, sensing, programming, timing, indicating, or testing glass fibers, filaments, or preforms during any stage of manufacture or treatment.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclass 293 for liquid level/depth gauge with illumination, subclasses 488+ for speed/acceleration testing that may use optical waveguides, subclass 653 for optical indication of vibration, subclass 705 for an optical fluid pressure gauge, subclass 800 for optical stress or strain testing, and subclass 861.08 for optical measurement of volume or rate of flow.
116, Signals and Indicators, subclass 202 for visual light signal indicators.
356, Optics: Measuring and Testing, subclass 73.1 for optical fiber or waveguide inspection subclasses 241.1 for inspection borescopes in general, subclass 459 for ring laser gyros including optical waveguides, and subclasses 454, 506, and 519 for Fabry-Perot cavities.
436, Chemistry: Analytical and Immunological Testing, appropriate subclasses, especially subclasses 73+ for testing for the presence of metals or metal compounds, 83 for testing for the presence of synthetic or natural resin, 106+ for testing for the presence of nitrogen, and 124+ for testing for the presence of halogen involving a chemical reaction.

378 Optical property:
This subclass is indented under subclass 377. Processes combined with measuring, controlling, programming, sensing, timing, indicating, or testing the properties of light or visual characteristics associated with the fibers, filaments, or preforms during manufacture or treatment thereof.

(1) Note. Class 65 patents directed to measuring, controlling, sensing, indicating, inspecting, or testing divergence, convergence, transmittance, or internal reflection of light rays passing through optical fibers, filaments, or preforms are proper for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
485, for apparatus having means for measuring, controlling, sensing, indicating, or testing visual characteristics or light properties associated with the fibers, filaments, or preforms during manufacture or treatment thereof.

379 Fluid pressure:
This subclass is indented under subclass 377. Processes including measuring, controlling, sensing, programming, timing, indicating, or testing a force per unit area of fluid associated with the fibers, filaments, or preforms during manufacture or treatment thereof.

(1) Note. Patents directed to measuring, controlling, sensing, programming, timing, indicating, or testing vacuum, atmospheric pressure, or flow rates are proper for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

489, for apparatus having means for measuring, controlling, sensing, programming, timing, indicating, or testing a force per unit area of a fluid associated with the manufacture or treatment of fibers, filaments, or preforms.

380 Molten material level:

This subclass is indented under subclass 377. Processes directed to measuring, controlling, sensing, programming, timing, indicating, or testing any height variance of the surface of a molten pool of glass used during manufacture or treatment of the fibers, filaments, or preforms.

SEE OR SEARCH THIS CLASS, SUBCLASS:

490, for apparatus having means for measuring, controlling, sensing, programming, timing, indicating, or testing any variance of the height of a pool of molten glass.

381 Winder or puller movement:

This subclass is indented under subclass 377. Processes directed to measuring, controlling, sensing, programming, timing, indicating, or testing (a) fiber tautness, (b) rotational speed, or (c) position of a winder or puller during any stage of manufacture or treatment of the fibers, filaments, or preforms.

SEE OR SEARCH THIS CLASS, SUBCLASS:

486, for apparatus having means to measure, control, sense, program, time, indicate, or test (a) fiber tautness, (b) rotational speed, or (c) position of a winder or puller during any stage of manufacture or treatment of the fibers, filaments, or preforms.

382 Diameter or coating thickness:

This subclass is indented under subclass 377. Processes directed to measuring, controlling, sensing, programming, indicating, or testing a (a) thickness of an applied coating or (b) diameter of the formed fiber, filament, or preform.

SEE OR SEARCH THIS CLASS, SUBCLASS:

491, for apparatus having means to measure, control, sense, program, time, indicate, or test a (a) thickness of an applied coating or (b) diameter of the formed fiber, filament, or preform.

384 Temperature:

This subclass is indented under subclass 377. Processes directed to measuring, controlling, sensing, programming, indicating, or testing a change in sensible heat during any stage of manufacturing or treating the fibers, filaments, or preforms.

SEE OR SEARCH THIS CLASS, SUBCLASS:

488, for apparatus having means to measure, control, sense, program, time, indicate, or test a change in sensible heat during any stage or manufacturing or treating the fibers, filaments, or preforms.

SEE OR SEARCH CLASS:

374, Thermal Measuring and Testing, for processes of determining either (a) a characteristic or a condition of glass fibers, filaments, preforms or (b) a system utilizing heating or cooling as a significant part of the test, wherein no glass working or treating is involved.

385 Process of manufacturing optical fibers, waveguides, or preforms thereof:

This subclass is indented under subclass 376. Processes directed to producing (a) fibers having light transmitting regions, (b) waveguides which transmit radiation (light) in the visible and near-visible portions of the spectrum, or (c) stock materials intended to be used in optical fiber or waveguide making.

(1) Note. Optical fibers are considered to be light transmitting waveguides, formed in a generally cylindrical form, often of extremely small diameter and of great length, which confine transmitted radiation therewithin by means of the principle of total reflection. Optical fibers are usually comprised of a central light transmitting core of relatively high refractive index, surrounded by a concentric cladding of relatively low refractive index.

(2) Note. An optical waveguide is considered to be a thin dielectric guide film of high refractive index formed adjacent to a substrate or support region of lower refractive index. The thin-film relies upon modal transmission to transmit light along its length.

SEE OR SEARCH THIS CLASS, SUBCLASS:

436, and below, for processes of manufacturing glass fibers, filaments, or preforms which are not optical.

SEE OR SEARCH CLASS:

359, Optics: Systems (Including Communication) and Elements, appropriate subclasses, especially subclasses 227+ for elements controlling light movement through or in a path, 237+ for optical elements which vary the characteristics of a traversing optical light beam in proportion to an applied time varying signal.

385, Optical Waveguides, appropriate subclasses for optical fibers and optical waveguides, especially subclasses 15+ for optical waveguides in combination with interface elements which enable efficient transfer of light.

386 Planar waveguides:

This subclass is indented under subclass 385. Processes wherein the material which transmits light has a surface that is flat.

(1) Note. Processes of forming multiple layered optical planar waveguides are properly classified here.

SEE OR SEARCH CLASS:

385, Optical Waveguides, subclass 129 for planar optical waveguides, per se.

387 Forming lens integral with optical fiber:

This subclass is indented under subclass 385. Processes directed to producing an optical product having an optical component which focuses transmitting light waves joined directly to an optical fiber.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 60+ for processes of adhesively securing parts utilizing nonmetallic cementing media.

359, Optics: Systems (Including Communication) and Elements, subclasses 642+ for a lens element, per se.

385, Optical Waveguides, subclass 15 for optical waveguides combined with an interface element which enables efficient transfer of light between the waveguide and a point external to the interface element.

388 Nonoxygen halide glass (e.g., metal halide, etc.):

This subclass is indented under subclass 385. Processes wherein a major component of the optical fiber, waveguide, or preform glass composition is a halide, fluorine, chlorine, bromine, iodine, or astatine devoid of oxygen.

(1) Note. Halide glass for optical fibers, waveguides, or preforms which contain minuscule or trace amounts of oxygen, wherein the expressed intent is to exclude oxygen, is found in this subclass.

(2) Note. The most commonly occurring nonoxygen halides are metal halides.

389 Nonoxygen chalcogenide glass containing:

This subclass is indented under subclass 385. Processes wherein a major component of the optical fiber, waveguide, or preform glass composition is a chalcogen containing compound (i.e., compounds of sulfur, selenium, or tellurium) devoid of oxygen.

(1) Note. Placement of nonoxygen chalcogenide documents containing a mere presence of oxygen wherein that oxygen inclusion is considered accidental or unintentional are found in this subclass.

390 Scandium (Sc), yttrium (Y), or rare earth doped core or preform (i.e., atomic numbers 21, 39, 57-72):
This subclass is indented under subclass 385. Processes directed to treating the optical fiber, waveguide, or preform with property altering constituents consisting of scandium, yttrium, or rare earth material.

(1) Note. The rare earths are: Lanthanum (La); Cerium (Ce); Praseodymium (Pr); Neodymium (Nd); Promethium (Pm); Samarium (Sm); Europium (Eu); Gadolinium (Gd); Terbium (Tb); Dysprosium (Dy); Holmium (Ho); Erbium (Er); Thulium (Tm); Ytterbium (Yb); Lutetium (Lu)

(2) Note. Scandium, yttrium, or rare earth material doping changes the refractive properties of the optical fiber, waveguide, or fiber preform.

391 Plasma utilized:
This subclass is indented under subclass 385. Processes wherein a plasma is used during any stage of manufacturing or treating the optical fiber, waveguide, or preform.

(1) Note. A plasma is generally considered to be (a) a gaseous flame or (b) a highly ionized gas composed of ions, electrons, and neutral particles in which the positive ions and negative electrons are roughly equal in number.

(2) Note. Processes wherein a plasma torch or a plasma electric arc is used to form or treat an optical fiber, waveguide, or preform are properly classified in this subclass.

SEE OR SEARCH CLASS:
219, Electric Heating, subclasses 121.36+ for methods and apparatus for fusing (splicing) optical fibers, per se.

392 Laser utilized:
This subclass is indented under subclass 385. Processes wherein a laser is used during any stage of manufacturing or treating the optical fiber, waveguide, or preform.

(1) Note. A laser is generally considered to be a narrow beam of coherent light (light amplification by stimulated emissions of radiation).

SEE OR SEARCH THIS CLASS, SUBCLASS:
441, for processes of using a laser to form or treat glass fibers or filaments, which are not optical.

393 Hollow optical fibers or waveguides:
This subclass is indented under subclass 385. Processes wherein the optical fiber or waveguide produced has an empty space or cavity.

(1) Note. Only processes for making hollow optical fibers and waveguides which are the final product and not preforms are classified here.

394 Ion implantation:
This subclass is indented under subclass 385. Processes wherein ion implantation is utilized during any stage of manufacturing or treating the optical fiber, waveguide, or fiber preform.

(1) Note. Ion implantation generally involves a process wherein an accelerated stream of energetic (charged) ions is introduced into or penetrates the near-surface region of a core or clad of the optical fiber, waveguide, or preform.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 492.1+ for irradiation treatment, per se, of an optical fiber, waveguide, or preform without any glassworking step (e.g., melting, shaping, etc.).

395 Sol-gel or liquid phase route utilized:
This subclass is indented under subclass 385. Processes wherein a sol-gel route or liquid phase route procedure is used during any stage

of manufacturing or treating the optical fiber, waveguide, or preform.

(1) Note. These processes generally include compositions which have been prepared by a method other than melting, including at least one step in which the glass forming ingredients are in a gel or sol state or involves the use of liquids such as water at relatively low temperatures.

396 Sonic or ultrasonic energy utilized (e.g., homogenizing, dispersing, etc.):
This subclass is indented under subclass 395. Processes wherein the vibratory energy used during any stage of the sol-gel or liquid phase route procedure is sonic or ultrasonic.

(1) Note. Ultrasonic waves vibrate at frequencies beyond the hearing power of human beings (above 20,000 Hz). Sonic frequencies are vibrations which can be heard by the human ear (from about 15 Hz to approximately 20,000 Hz).

397 Fluorine doping:
This subclass is indented under subclass 385. Processes wherein the property altering material used to treat the optical fiber, waveguide, or preform consists of fluorine.

(1) Note. Doping in this art is most commonly used to alter the refractive index of an optical fiber, waveguide, or preform.

398 Germanium or boron containing:
This subclass is indented under subclass 397. Processes wherein the fluorine doped optical fiber, waveguide, or preform additionally contains germanium or boron.

(1) Note. The germanium or boron material in the core or clad of the optical fiber, waveguide, or preform may be in the form of a compound or composition.

399 Incorporating dopant into porous body:
This subclass is indented under subclass 385. Processes directed to a step of diffusing a small quantity of material into a porous material used during any stage of manufacturing the optical fiber, waveguide, or preform.

(1) Note. A dopant material in this art is generally used to alter the refractive index of an optical fiber, waveguide, or preform.

400 Ion exchange utilized:
This subclass is indented under subclass 385. Processes which include a step of exchanging selected ions of the optical fiber, waveguide, or preform at any stage during manufacture or treatment.

(1) Note. In this art processes using ion exchange are generally for the purpose of altering the refractive index of an optical fiber, waveguide, or preform.

401 Extruding:
This subclass is indented under subclass 385. Processes of forming an optical fiber, waveguide, or preform including a step wherein a positive force or pressure is used to push glass through a die.

402 Producing bent, crimped, twisted, textured, or curled optical fibers or waveguides:
This subclass is indented under subclass 385. Processes wherein the longitudinal axis of the optical fiber or waveguide follows a curvilinear or multidirectional path (e.g., nonlinear, perturbated, etc.).

SEE OR SEARCH CLASS:
385, Optical Waveguides, subclass 146 for noncylindrical or nonplanar shaped waveguides, per se.

403 Producing noncircular optical fibers or waveguides (e.g., particular cross section, etc.):
This subclass is indented under subclass 385. Processes wherein a cross section of the optical fiber or waveguide produced is not circular (e.g., elliptical, star, hexagonal, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
386, for processes of forming planar optical waveguides.

SEE OR SEARCH CLASS:

385, Optical Waveguides, subclass 146 for noncylindrical or nonplanar shaped waveguides, per se.

404 With step of casting or forming nonfiber workpiece (e.g., molding liquid preform, shaping molten glass against a forming surface, etc.):

This subclass is indented under subclass 385. Processes including a step of molding or casting at least some portion of the optical fiber, waveguide, preform, or associated nonfiber workpiece.

(1) Note. Casting is generally considered a process of flowing molten glass in the form of a stream into or onto molds, rolls, or tables.

405 Utilizing multiple crucibles or multiple feed streams of molten glass:

This subclass is indented under subclass 385. Processes wherein molten glass is drawn into a fiber and a coating layer applied thereto from at least two containers or feed streams to form a contiguous optical fiber, waveguide, or preform.

(1) Note. Both containers may contain molten glass, in which case the resultant product is a glass coated glass optical fiber.

(2) Note. Containers may contain glasses of different refractive properties allowing the formation of gradient optical fibers.

(3) Note. Processes involving simultaneous drawing and coating forming a single fiber are proper for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

444, for processes of making nonoptical glass coated glass fibers not involving simultaneous fiber forming and coating, and subclass 121 for other processes of blending separate streams of molten glass.

406 Joining or bonding optical fibers, waveguides, or preforms (e.g., coupling, etc.):

This subclass is indented under subclass 385. Processes which involve assembling at least two individually distinct optical fibers, waveguides, or preforms directly to each other.

(1) Note. Processes of joining optical fibers, waveguides, or preforms in a “T” or “Y” coupled arrangement are properly classified in this subclass.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 62.4+ for processes for adhesively laminating plural preforms which include the step of liberating or forming fibers with bulk deposition thereof to form at least one of the preforms.

407 End to end (i.e., butt end joining):

This subclass is indented under subclass 406. Processes wherein a terminal end of the optical fiber, waveguide, or preform is connected or fused to a terminal end of another optical fiber, waveguide, or preform.

408 Side to side:

This subclass is indented under subclass 406. Processes wherein the optical fiber, waveguide or preform is connected or fused adjacent to another optical fiber, waveguide, or preform.

409 Having plural adjacent fibers or rods sheathed (i.e., bundle) in tube or enclosure:

This subclass is indented under subclass 408. Processes wherein at least two optical fibers, waveguides, or preforms, parallel to one another, are inserted into or encompassed by an outer elongated hollow sheathing structure (e.g., clad).

410 By fusing preformed fibers without attenuating stock material:

This subclass is indented under subclass 408. Processes wherein at least two of the previously formed optical fibers or waveguides are fused adjacent to one another without prior stretching of the stock material.

411 With stretching or drawing:
This subclass is indented under subclass 408. Processes involving an operation of pulling, lengthening, or attenuating the joined optical fibers, waveguides, or preforms.

412 Rod placed inside of tube:
This subclass is indented under subclass 406. Processes including a step of placing a single solid elongated optical core material inside of a hollow elongated sheathing structure.

413 With step of vapor deposition:
This subclass is indented under subclass 385. Processes wherein the optical fiber, waveguide, or preform is manufactured or treated depositing a material utilizing a gas, mist, or smoke.

(1) Note. Processes commonly called "chemical vapor deposition," "physical vapor deposition," and "soot processes" are properly classified here and below.

(2) Note. Soot as used in this art generally refers to particulate material buildup resulting from a gas phase reaction.

414 Forming optical fiber or fiber preform by soot buildup (i.e., vapor axial deposition, VAD):
This subclass is indented under subclass 413. Processes including a step whereby the vaporized material is deposited at a starting point or on a starting material and is tiered or grown in a straight line about which a line or curve is conceived to revolve.

(1) Note. Lacking an indication to the contrary, growth of the fiber or preform by buildup of deposited soot in a vertical direction in respect to an initiating collecting substrate is proper for this subclass.

(2) Note. Processes commonly called "vertical axial deposition" and "horizontal axial deposition" are properly classified here.

415 Forming glass layers with graded or radially varying refractive index:
This subclass is indented under subclass 414. Processes wherein therefractive index of (a) each layer of glass formed varies or (b) the preform varies radially outward.

SEE OR SEARCH CLASS:
385, Optical Waveguides, subclass 124 for graded index core or cladding, per se.

416 Consolidation in situ (e.g., sintering, etc.):
This subclass is indented under subclass 414. Processes including a step of densifying the porous preform into a solid rod in place.

417 Inside of tube or hollow form by soot buildup:
This subclass is indented under subclass 413. Processes wherein the vaporized soot material is deposited onto an inner surface of an elongated hollow structure or cavity.

(1) Note. Processes commonly called "modified chemical vapor deposition" or "inside chemical vapor deposition" are properly classified here.

418 Elongated material feed means within tube (e.g., reactant feed means placed inside of tube, etc.):
This subclass is indented under subclass 417. Processes wherein an elongated vapor material delivery means is inserted into the tube to coat the inner surface of said tube.

419 With step of collapsing tube:
This subclass is indented under subclass 417. Processes including a step of reducing or shrinking the tube.

420 Maintaining isotropic conditions inside of tube:
This subclass is indented under subclass 417. Processes wherein an environment is sustained that causes the vaporized material to be deposited evenly on the inner surface of the tube.

421 Outside of tube or rod by soot buildup:
This subclass is indented under subclass 413. Processes wherein the vaporized soot material is deposited generally perpendicular to the outermost surface of a rod or tube.

(1) Note. Processes commonly called "outside chemical vapor deposition" are properly classified here and below.

422 With dehydration (e.g., OH removal, etc.):
This subclass is indented under subclass 421. Processes wherein moisture or hydroxyl radicles are eliminated.

SEE OR SEARCH CLASS:
34, Drying and Gas or Vapor Contact With Solids, for drying processes, per se. Combinations of glassworking and drying operations are proper for Class 65.

423 Inorganic carbon, metal oxide, or inorganic nitrogen containing material deposited (e.g., elemental carbon, carbides, nitrides, etc.):
This subclass is indented under subclass 413. Processes wherein the vaporized material deposited contains inorganic carbon, metal oxides, or inorganic nitrogen.

(1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the terms "organic" and "inorganic."

(2) Note. Metal compounds excluding steel, containing more than 1.7 percent of inorganic carbon are properly classified in this subclass.

424 Inert, nonoxidizing, or reducing environment:
This subclass is indented under subclass 385. Processes wherein the reactive conditions or atmosphere (a) is inactive, (b) does not support oxidation, or (c) does support reduction.

425 Electromagnetic, magnetic, wave, or particulate energy utilized:
This subclass is indented under subclass 385. Processes wherein electrical, magnetic, particulate, or electromagnetic wave energy is used during any stage of manufacturing or treating the optical fiber, waveguide, or preform.

(1) Note. The wave energy applied may be light, sonic, supersonic, ultrasonic, gamma rays, infrared rays, X-rays, etc. Particulate energy includes charged particles and atomic emissions, such as alpha rays, beta rays, and neutrons.

(2) Note. Patent documents claiming the use of electrostatic charge, field, or force to form an optical fiber, waveguide, or preform are properly classified herein.

(3) Note. Patent documents claiming the use of electric arc heating to form a glass fiber are properly classified herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
441, for processes wherein the electrical, magnetic, wave, or particulate energy is used to form nonoptical glass fibers, filaments, or preforms.
509, for apparatus utilizing electric or electromagnetic wave energy as heat to manufacture or treat fibers, waveguides, or preforms.

SEE OR SEARCH CLASS:
250, Radiant Energy, appropriate subclasses, especially subclasses 492.1+ for irradiation treatment, per se, of an optical fiber, waveguide, or preform without any glassworking step (e.g., melting, shaping, etc.).

426 Drying, dehydration, OH removal or prevention:
This subclass is indented under subclass 385. Processes wherein moisture or hydroxyl radicles are eliminated or prevented from forming on the optical fiber, waveguide, or preform.

SEE OR SEARCH CLASS:
34, Drying and Gas or Vapor Contact With Solids, subclasses 266+, 418+, and 420+ for processes utilizing radiant energy to dry, per se. Combinations of glass working and drying operations are proper for Class 65.

427 Consolidating preform (e.g., sintering, etc.):
This subclass is indented under subclass 385. Processes wherein a porous preform is densified.

(1) Note. Processes wherein porous or tubular preforms are consolidated into solid rods which are used to make optical

fibers or waveguides are found in this and indented subclasses.

428 Collapsing tube:
This subclass is indented under subclass 427. Processes including a step causing an innermost surface of a tube to cave in upon itself.

429 With etching or leaching:
This subclass is indented under subclass 385. Processes wherein a chemical reagent is used to remove only a portion or constituent of the optical fiber, waveguide, preform, or coating thereon.

(1) Note. The chemical material or reagent usually referred to in this art is an etching material or etchant.

SEE OR SEARCH THIS CLASS, SUBCLASS:
31, for processes in which a chemical reagent is used to remove a portion or constituent of glass other than fibers, filaments, waveguides, or preforms.

SEE OR SEARCH CLASS:
216, Etching a Substrate: Processes, for methods of etching glass, per se. See the SEARCH CLASS notes thereunder.
427, Coating Processes, subclasses 299+ for processes of coating combined with a pretreatment of a base.

430 With significant coating step:
This subclass is indented under subclass 385. Processes including a recitation of a specific step used to apply a coating to the optical fiber, waveguide, or preform.

(1) Note. A specific recitation of how a coating is applied (e.g., brushing, dipping, spraying, immersion, etc.) is considered significant, and is properly classified here.

(2) Note. In this and indented subclasses coatings or clads are generally applied to protect a newly formed optical fiber or waveguide.

431 Free metal or metal alloy containing coating:
This subclass is indented under subclass 430. Processes wherein the applied cladding or coating material is or contains an elemental metal or metal alloy.

432 Synthetic or natural resin containing coating:
This subclass is indented under subclass 430. Processes wherein the applied coating material is a natural or synthetic resin.

(1) Note. Attention is directed to the definitions of Class 106, Compositions: Coating or Plastic, and Classes 524 and 525, Synthetic Resins or Natural Rubbers, for the distinction between natural and synthetic resins.

433 With cutting or severing:
This subclass is indented under subclass 385. Processes wherein the optical fiber, waveguide, or preform forming operation is combined with a process step of breaking, cutting, or severing.

SEE OR SEARCH THIS CLASS, SUBCLASS:
56, 70, 87, and 174+, for glass cutting operations excluding fibers, waveguides, and preforms thereof.

434 With quench cooling (e.g., forced air or cryogenic immersion, etc.):
This subclass is indented under subclass 385. Processes combined with a step of rapidly lowering the temperature of the optical fiber, waveguide, or preform.

435 With fiber stretching, drawing, or pulling (e.g., from rod, etc.):
This subclass is indented under subclass 385. Processes including a step of elongating the optical fiber, waveguide, or preform by imposing a strain or tension thereto.

436 Plasma utilized:
This subclass is indented under subclass 376. Processes wherein plasma is used during any stage of manufacturing or treating the glass fiber, filament, or fiber preform.

(1) Note. Utilizing a plasma torch or plasma electric arc to form a glass fiber is properly classified in this subclass.

(2) Note. A plasma is considered to be (a) a gaseous flame or (b) a highly ionized gas composed of ions, electrons, and neutral particles in which the positive ions and negative electrons are roughly equal in number.

SEE OR SEARCH CLASS:
219, Electric Heating, subclasses 121.36+ for methods and apparatus for fusing (splicing) glass fibers, per se.

437 Producing noncircular fibers (e.g., particular cross section, flat, elliptical, etc.):
This subclass is indented under subclass 376. Processes wherein the cross section of the glass fiber or filament produced is not circular.

438 Producing crimped, twisted, or curled fibers (e.g., textured, etc.):
This subclass is indented under subclass 376. Processes wherein the longitudinal axis of the glass fiber or filament follows a curvilinear or multidirectional path (e.g., nonlinear, perturbated, etc.).

439 Producing hollow fibers or tubular preforms:
This subclass is indented under subclass 376. Processes wherein the glass fiber or tubular preform produced has a hollow core or an empty cavity.

440 Sol-gel route or ion exchange utilized:
This subclass is indented under subclass 376. Processes wherein (a) a sol-gel route or (b) an exchanging of selected ions is used during any stage of manufacturing or treating the glass fiber, filament or preform.

(1) Note. The sol-gel route process generally includes compositions which have been prepared by a method other than melting having at least one step in which the glass forming ingredients are in a gel or sol state.

441 Electromagnetic, magnetic, wave, or particulate energy utilized:
This subclass is indented under subclass 376. Processes involving the use of electrical, magnetic, particulate, or electromagnetic wave energy during any stage of forming or treating the glass fiber, filament, or preform.

(1) Note. The wave energy applied may be light, sonic, supersonic, ultrasonic, gamma rays, infrared rays, X-rays etc. Particulate energy includes charged particles and atomic emissions, such as alpha rays, beta rays, and neutrons.

(2) Note. Patent documents claiming the use of electrostatic charge, field, or force to form or treat a glass fiber, filament, or preform are properly classified herein.

(3) Note. Patent documents claiming the use of electric arc heating to form a glass fiber are properly classified herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:
425, for processes wherein the electrical, magnetic, wave, or particulate energy is used to form an optical fiber, waveguide, or preform.
509, for fiber making apparatus utilizing electric or electromagnetic wave energy.

SEE OR SEARCH CLASS:
250, Radiant Energy, appropriate subclasses, especially subclasses 492.1+ for irradiation treatment, per se, of a glass fiber, filament or preform without any glassworking step (e.g., melting, shaping, etc.).

442 Composite fiber matrix (e.g., carbon or metal fiber with glass matrix or vice versa, etc.):
This subclass is indented under subclass 376. Processes including a step of surrounding or encasing the fiber or filament by a different material (e.g., binder, etc.).

443 With coating (e.g., lubricant, sizing, etc.):
This subclass is indented under subclass 376. Processes including a step of applying a coating material to the fibers, filaments, or preforms which clings thereto.

SEE OR SEARCH THIS CLASS, SUBCLASS:
43, and 60.1+, for processes of coating nonfilamentary glass combined with glassworking or treating, and see the SEARCH CLASS notes thereunder.

444 Glass (i.e., nonoptical fiber, metal oxide):
This subclass is indented under subclass 443. Processes wherein the coating material for the glass fibers, filaments, or fiber preforms is itself a glass composition.

SEE OR SEARCH THIS CLASS, SUBCLASS:
405, for multiple crucible methods of making glass coated optical fibers.

445 Free metal or alloy containing:
This subclass is indented under subclass 443. Processes wherein the coating material contains elemental metal or metal alloy.

446 Vapor deposition of free metal or free metal containing material:
This subclass is indented under subclass 445. Processes wherein the free metal or metal alloy containing material is deposited from a gas, mist, or smoke.

447 Synthetic resin, natural resin, or asphalt coating:
This subclass is indented under subclass 443. Processes wherein the coating material comprises a natural or synthetic resin, rubber, asphalt, or a bitumen.

448 Organic silicon containing (e.g., coupling agent, etc.):
This subclass is indented under subclass 447. Processes wherein the coating material includes an organic silicon material.

(1) Note. The coating may comprise a silane, siloxane, silicone polymeric material, or another polymer with a silicon containing linking or coupling agent.

449 Asphalt:
This subclass is indented under subclass 447. Processes wherein the coating material includes bitumen or asphalt.

450 Thermosetting or thermoplastic resin:
This subclass is indented under subclass 447. Processes wherein the coating material includes a thermosetting or thermoplastic resin.

451 Nitrogen or phenol containing:
This subclass is indented under subclass 450. Processes wherein the thermosetting or thermoplastic coating material contains nitrogen or phenol.

452 With severing:
This subclass is indented under subclass 443. Processes including a step of dividing the coated fibers, filaments, or preforms by a severing operation (e.g., cutting, breaking, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
56, 70, 87, and 174+, for glass cutting operations.

453 With advancing, gathering, or winding continuous fiber or filament:
This subclass is indented under subclass 443. Processes including a step of moving forward, collecting, or convolving the coated continuous fibers or filaments.

SEE OR SEARCH THIS CLASS, SUBCLASS:
535, for continuous fiber or filament advancing apparatus.
539, for continuous fiber or filament winding apparatus.

SEE OR SEARCH CLASS:
242, Winding, Tensioning, or Guiding, appropriate subclasses for means for winding elongated material.

454 Formation of fiber or preform utilizing fluid blast (e.g., from molten glass, etc.):
This subclass is indented under subclass 376. Processes wherein a forcible stream of an extraneous fluid is directed against (a) a molten glass stream, or (b) a rod or filament in a plas-

tic state to subdivide the stream rod or filament into discrete fibers or fiber preforms.

SEE OR SEARCH THIS CLASS, SUBCLASS:
524, for fluid blast apparatus utilized in fiber formation.

SEE OR SEARCH CLASS:
264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 5+ for processes directed to fluid blast comminuting of plastic materials not provided for elsewhere.
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 7 for apparatus for making particulate material directly from molten material including a fluid jet or blast type comminuting means.

455 During slinging or rotary-centrifugal fiber distribution:
This subclass is indented under subclass 454. Processes including a step of (a) throwing or flinging the newly formed discrete fibers or (b) forming the discrete fibers by projecting them from a rotating source.

SEE OR SEARCH THIS CLASS, SUBCLASS:
518, for analogous apparatus.

SEE OR SEARCH CLASS:
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 214+ for delivering fluid material from a supply source by slinger or centrifugal distributing means.
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 9 for apparatus for spinning a candy floss from a melt.

456 Depositing molten glass on periphery of rotating fiberizing means (e.g., disc, rotor, wheel, etc.):
This subclass is indented under subclass 455. Processes including a step of depositing molten glass on an outermost edge of a rotating disc or wheel.

457 Specified composition of slinger or rotary-centrifugal fiber distributor:
This subclass is indented under subclass 455. Processes wherein the material comprising the slinger or rotary-centrifugal fiber distributor is identified.

458 Fluid blast guide, baffle, or deflector:
This subclass is indented under subclass 455. Processes combined with means to turn, divert, or redirect the fluid blast path.

459 Centrifuge with fiberizing holes:
This subclass is indented under subclass 455. Processes wherein the rotary-centrifugal fiber distributor is a centrifuge having fiber forming holes.

460 Adjacent combustion chamber, burner, or blower utilized:
This subclass is indented under subclass 459. Processes including use of a combustion chamber, blower, or burner adjacent to the centrifuge.

461 Having at least two concentric burners or blowers:
This subclass is indented under subclass 460. Processes wherein more than one burner or blower sharing a common center is used.

462 Solid fibers comminuted by fluid blast:
This subclass is indented under subclass 454. Processes which include a step of subjecting a rod or filament while in a plastic condition to the fluid blast to subdivide said filament or rod into discrete solid fibers.

463 Specified nozzle opening or configuration (e.g., opening size, cross section, etc.):
This subclass is indented under subclass 454. Processes which include a recitation identifying a size or geometrical cross section of a nozzle opening.

464 Fluid discharge skirt or shield utilized:
This subclass is indented under subclass 454. Processes wherein a baffle or screen is used to confine, aim, or redirect the fluid blast.

465 Attenuation by fluid blast contacting glass:
This subclass is indented under subclass 454. Processes wherein the fluid blast is used to draw or extend the fiber.

466 Plural fluid blasts or jets contacting single glass stream:
This subclass is indented under subclass 465. Processes wherein more than one fluid blast or fluid jet is directed toward a single glass stream.

467 Fluid blast penetrated transversely by jet (e.g., toration, etc.):
This subclass is indented under subclass 466. Processes wherein the fluid blast, usually of high temperature, is pierced transversely by a fluid jet, usually of high velocity.

468 Flame or combustible fluid blast utilized:
This subclass is indented under subclass 454. Processes wherein the fluid blast used is a flame or the result of combusted flammable material.

469 By slinging or rotary-centrifugal fiber distribution (i.e., without fluid blast):
This subclass is indented under subclass 376. Processes wherein the fibers are formed by (a) throwing or flinging molten glass or (b) subjecting a melt to a rotary projecting movement.

SEE OR SEARCH THIS CLASS, SUBCLASS:
455, for a process for forming fibers or filaments including rotary-centrifugal distribution combined with a fluid blast.
516+, for apparatus having slinger means for forming fibers or filaments from molten glass.

SEE OR SEARCH CLASS:
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 214+ for slinger, splasher, or rotary-centrifugal fluid distributors.

470 Centrifuge with fiberizing holes:
This subclass is indented under subclass 469. Processes wherein the rotary-centrifugal fiber distributor or slinger is a centrifuge with fiber forming holes.

471 With bushing flood prevention, removal, or breakout prevention:
This subclass is indented under subclass 376. Processes including a step of (a) removing or avoiding flooding at a bushing opening or (b) avoiding fiber breakout.

472 With chemical etching or leaching:
This subclass is indented under subclass 376. Processes wherein a chemical reagent is used to remove a portion or constituent of the fiber, filament, or fiber preform.

SEE OR SEARCH THIS CLASS, SUBCLASS:
31, for processes in which a chemical reagent is used to remove a portion or constituent of glass exclusive of fibers, filaments, or fiber preforms.
429, for processes in which a chemical reagent is used to remove a portion or constituent of an optical fiber, waveguide, or preform.

SEE OR SEARCH CLASS:
216, Etching a Substrate: Processes, for methods of etching glass, per se. See the SEARCH CLASS notes thereunder.
427, Coating Processes, subclasses 299+ for processes of coating combined with a pretreatment of a base.

473 With removal of coating (e.g., desizing, oxidizing coating, etc.):
This subclass is indented under subclass 376. Processes wherein at least a portion of a size, coating, or clad is removed from the fiber or filament.

(1) Note. Processes involving a step of oxidation to remove a coating are proper for this subclass.

SEE OR SEARCH CLASS:
134, Cleaning and Liquid Contact With Solids, appropriate subclasses, especially subclass 14 and 22.1+ for cleaning and liquid contact with coiled or hollow fibers and filaments.

474 With purifying or homogenizing molten glass (e.g., removing bubbles, etc.):
This subclass is indented under subclass 376. Processes including a step of treating molten stock material by (a) removing foreign or objectionable material or (b) making a melt uniform in physical characteristics or in composition throughout.

(1) Note. Processes of removing undissolved batch materials or gaseous impurities are properly classified here.

475 With fiber drawing or pulling (e.g., attenuating, etc.):
This subclass is indented under subclass 376. Processes including an operation of placing a tension on the forming fiber, filament, or preform.

(1) Note. The processes of drawing or pulling of glass into fibers or filaments are similar to a "taffy pull" operation.

476 By modifying fluid pressure (e.g., vacuum, reduced or superatmospheric pressure, etc.):
This subclass is indented under subclass 475. Processes including a step of changing or varying an existing pressure to perfect the drawing operation.

477 Drawing fiber from rod:
This subclass is indented under subclass 475. Processes wherein the forming fiber or filament is from rod stock.

478 Fluid assisted attenuation or directing of fiber or filament:
This subclass is indented under subclass 475. Processes wherein a fluid is used (a) to assist the stretching or drawing operation or (b) to steer or guide a drawn or stretched fiber or filament.

479 Reeling or winding:
This subclass is indented under subclass 475. Processes including a step of reeling or winding combined with the drawing or pulling operation.

SEE OR SEARCH CLASS:
242, Winding, Tensioning, or Guiding, appropriate subclasses for means for winding or reeling elongated material.

480 Cutting or severing:
This subclass is indented under subclass 475. Processes including a step of dividing the drawn fiber or filament by a severing or cutting operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
56, 70, 87, and 174+, for glass cutting operations exclusive of fibers, filaments, or preforms thereof.
433, for cutting or severing of optical fibers, waveguides, or preforms thereof.

481 Cooling of molten glass at forming area (e.g., cooling fins, etc.):
This subclass is indented under subclass 475. Processes which include a step of reducing the temperature of molten glass in an area where the fiber is formed.

482 With charging or pretreatment of batch material (e.g., gas heating, crushing, etc.):
This subclass is indented under subclass 376. Processes including the step of (a) feeding raw material or stock to a melting area or (b) treating said raw material or stock prior to melting.

483 FIBER MAKING APPARATUS:
This subclass is indented under the class definition. Apparatus directed to producing (a) rod-like stock of sufficiently small diameter, either (i) as continuous filaments of indefinite length, or (ii) short discrete pieces, or (b) stock material intended to be used in fiber and filament making.

SEE OR SEARCH CLASS:
241, Solid Material Comminution or Disintegration, appropriate subclasses, for comminution of solid materials of general application.
264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 5+ for processes, within the class definition, of liquid comminuting and solidifying of general application and

subclasses 165+ for processes of forming indefinite-length fibers or filaments from materials which may be disclosed to be siliceous materials in solution or suspension by precipitation in a reactive or solvent extractive bath or by evaporation of the solvent.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 6+ for liquid comminuting means forming particulate material (e.g., granules, fibers, etc.) directly from molten material including means providing a solidifying zone, subclass 66 for filament forming means combined with product advancing means, subclasses 67+ for apparatus comprising a liquid bath or shower, and subclasses 80+ for molding apparatus including air-felting means for forming self-sustaining bodies from particulate material.

484 With measuring, controlling, sensing, timing, inspecting, indicating, or testing means: This subclass is indented under subclass 483. Apparatus having means (a) for sensing a condition and in response thereto actuate a signalling, regulating, or indicating device, (b) for regulating an operation in response to a set of coded instructions or the sequence of operational steps preformed, (c) for determining the time an operation occurs or the length of time taken to perform such operation, (d) for performing a test upon, permitting observation of, or performing a measuring operation upon the fiber, filament, or preform thereof.

(1) Note. Equivalent terms include examining, diagnosing, analyzing, observing, viewing, evaluating, and monitoring.

SEE OR SEARCH THIS CLASS, SUBCLASS:

29.12, for processes of testing, inspecting, sensing, or indicating the treatment or formation of glass excluding fibers, filaments, or preforms thereof.

158, for apparatus for measuring, sensing, indicating, or testing the treatment or formation of glass excluding fibers, filaments, and preforms thereof.

377, for processes of measuring, sensing, inspecting, indicating, or testing the formation or treatment of fibers, filaments, or preforms thereof.

SEE OR SEARCH CLASS:

73, Measuring and Testing, appropriate subclasses for testing or measuring of general application; see the search notes under the class definition of Class 73, especially subclass 293 for liquid level/depth gauge with illumination, subclasses 488+ for speed/acceleration testing that may use optical waveguides, subclass 653 for optical indication of vibration, subclass 705 for an optical fluid pressure gauge, subclass 800 for optical stress or strain testing, and subclass 861.08 for optical measurement of volume or rate of flow.

116, Signals and Indicators, subclass 202 for visual light signal indicators.

356, Optics: Measuring and Testing subclass 73.1 for optical fiber or waveguide inspection subclasses 241.1 for inspection borescopes in general, subclass 459 for ring laser gyros including optical waveguides, and subclasses 454, 506, and 519 for Fabry-Perot cavities.

436, Chemistry: Analytical and Immunological Testing, appropriate subclasses, especially subclasses 73+ for testing for the presence of metals or metal compounds, 83 for testing for the presence of synthetic or natural resin, 106+ for testing for the presence of nitrogen, and 124+ for testing for the presence of halogen involving a chemical reaction.

485 By optical means or of optical property: This subclass is indented under subclass 484. Apparatus having means for measuring, controlling, analyzing, inspecting, or testing visual characteristics or properties of light used to produce the fibers, filaments, or preforms.

(1) Note. Patents directed to means for measuring, controlling, analyzing, inspecting, or testing divergence, convergence, or internal reflection of light rays passing through fibers or fiber preforms are included in this subclass.

486 Winder or puller movement (e.g., drawing sensor, etc.):
This subclass is indented under subclass 484. Apparatus including means to wind or pull the fiber, filament, or preform.

487 Having fiber breakout detection, compensation, or prevention means:
This subclass is indented under subclass 484. Apparatus provided with means to (a) recognize breaks, (b) adjust or vary tension, or (c) avoid breaks of the fibers, filaments, or preforms thereof.

488 Temperature:
This subclass is indented under subclass 484. Apparatus having means to sense, measure, analyze, indicate, control, or test a change in sensible heat associated with producing the fiber, filament, or preform.

SEE OR SEARCH CLASS:
374, Thermal Measuring and Testing, for processes of determining either (a) a characteristic or a condition of glass fibers, filaments, preforms, or (b) a system utilizing heating or cooling as a significant part of the test, wherein no glass working or treating is involved.

489 Fluid pressure:
This subclass is indented under subclass 484. Apparatus having means for measuring, controlling, analyzing, indicating, or testing any change in force per unit area associated with producing the fibers, filaments, or preforms.

490 Molten glass level (e.g., sensor, check valve, etc.):
This subclass is indented under subclass 484. Apparatus including the means to measure, control, recognize, indicate, or test any variance in height of a level of the molten glass.

491 Diameter or coating thickness:
This subclass is indented under subclass 484. Apparatus including the means to measure, control, or indicate a diameter or coating thickness of the fiber, filament, or preform.

492 With designated composition of dies, bushings, or nozzles:
This subclass is indented under subclass 483. Apparatus wherein the dies, bushings, or nozzle means utilized are comprised of specified material.

493 Platinum group metal containing (i.e., ruthenium (Ru), rhodium (Rh), osmium (Os), iridium (Ir), palladium (Pd), platinum (Pt)):
This subclass is indented under subclass 492. Apparatus wherein the specified composition of the nozzles, bushings, or dies includes a platinum group metal.

(1) Note. The platinum group metals are: Iridium (Ir); Osmium (Os); Ruthenium (Ru); Rhodium (Rh); Palladium (Pd); Platinum (Pt)

494 With means to form hollow fiber or preform:
This subclass is indented under subclass 483. Apparatus having means to produce a fiber or preform with an empty core or cavity.

495 With specified bushing, tip, or feeder structure:
This subclass is indented under subclass 483. Apparatus wherein the structure of a molten glass feeder, tip, or bushing is defined.

496 Tipless:
This subclass is indented under subclass 495. Apparatus wherein the bushing has no projection tip structure at its opening.

497 Noncircular tip opening (e.g., elliptical, polygonal, etc.):
This subclass is indented under subclass 495. Apparatus wherein the bushing tip opening is not circular.

(1) Note. Elliptical, square, and polygonal configured bushing openings are found in this subclass.

498 With cooling means for bushing (e.g., orifice plate cooling, etc.):
This subclass is indented under subclass 495. Apparatus provided with means to reduce the temperature of the bushing.

(1) Note. Bushings having pipes installed therein to facilitate the circulation of cooling fluid will be considered proper for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:
510, for apparatus used to cool the formed fiber, filament, or fiber preform, per se.

499 With heating means for bushing:
This subclass is indented under subclass 495. Apparatus provided with means to increase the temperature of the bushing.

500 With means to align preform with drawing apparatus or form multifilament fibers (e.g., gathering shoe, etc.):
This subclass is indented under subclass 483. Apparatus having means to (a) arrange in line a preform and a drawing means or (b) form a fiber made with more than one filament.

501 With fiber splicing or coupling means (e.g., fusion splicing, end to end, side to side, etc.):
This subclass is indented under subclass 483. Apparatus including means to join or fuse discrete fibers or filaments one to another.

(1) Note. This subclass includes apparatus used to connect optical fibers, optical fiber bundles, waveguides, or preforms thereof, providing a stable region of light transfer.

(2) Note. The connecting or coupling means may be mechanical or physical (i.e., permanent or disengageable).

SEE OR SEARCH CLASS:
385, Optical Waveguides, subclass 15 and 53 for optical fiber or waveguide couplers or connectors, per se.

502 With multiple crucible or multichamber system:
This subclass is indented under subclass 483. Apparatus having (a) at least two melting containers or (b) a melting container with at least two chambers.

503 With cleaning means:
This subclass is indented under subclass 483. Apparatus provided with means to remove extraneous materials.

504 With crimping or curling means:
This subclass is indented under subclass 483. Apparatus including means to bow, warp, or twist the fibers, filaments, or fiber preforms.

505 With means to distribute fibers across collecting surface (e.g., blower, mechanical distribution means, reciprocating, oscillating, etc.):
This subclass is indented under subclass 483. Apparatus including a fiber depositing means which moves the fibers in a desired pattern over a collecting surface.

506 With assorting means:
This subclass is indented under subclass 483. Apparatus comprising means to separate shots, slugs, beads, etc. from the formed fibers or filaments.

507 With means for heating newly formed filament, fiber, or preform:
This subclass is indented under subclass 483. Apparatus having means to raise the temperature of the newly formed or forming fiber, filament, or preform.

(1) Note. The heating for this subclass is in addition to the heat used to form the fiber, filament, or preform.

508 Having means to shape or modify:
This subclass is indented under subclass 507. Apparatus including means to mold or fashion the newly formed or forming fiber, filament, or preform.

509 Electric or electromagnetic heating utilized (e.g., induction heat, etc.):
This subclass is indented under subclass 507. Apparatus wherein electric or electromagnetic energy is used to create or cause the heat.

510 With means for cooling newly formed fiber, filament, or preform (e.g., nascent fiber, etc.):
This subclass is indented under subclass 483. Apparatus including means to lower the temperature of the newly formed or forming fiber, filament, or preform.

511 With cooling surfaces or fins:
This subclass is indented under subclass 510. Apparatus wherein the cooling means are surface areas or fins used to exchange heat.

512 Fluid cooling agent circulated:
This subclass is indented under subclass 511. Apparatus having means to pass a temperature lowering fluid through, around, or over the cooling surface or fins.

513 Gas column (e.g., generally upward gas stream, etc.):
This subclass is indented under subclass 510. Apparatus including means to forcibly cause a slender stream of gas to contact the forming fiber, filament, or preform.

514 Liquid stream or spray:
This subclass is indented under subclass 510. Apparatus including means to atomize or project a cooling liquid.

515 Specified composition of slinger or rotary-centrifugal fiber forming means:
This subclass is indented under subclass 483. Apparatus wherein the formulation of material comprising the slinger or centrifugal fiber producing means is stipulated.

516 Rotary-centrifugal fiber forming means (e.g., slinger, rotary disc, no fiberizing holes, etc.):
This subclass is indented under subclass 483. Apparatus including means devoid of fiberizing holes which (a) throws or flings into a space or (b) projects by rotary movement the forming fibers.

517 Having fluid blast means for contacting glass:
This subclass is indented under subclass 516. Apparatus including the use of a forcible stream of extraneous fluid to directly contact a molten glass stream.

518 With fluid blast guide, baffle, or deflector:
This subclass is indented under subclass 517. Apparatus including means to turn, divert, or direct the fluid blast path.

519 Having means to pass cooling fluid through apparatus:
This subclass is indented under subclass 483. Apparatus including means to pass a cooling fluid within the apparatus.

520 Depositing glass on periphery of rotating fiber forming means (e.g., disc, rotor, wheel, etc.):
This subclass is indented under subclass 516. Apparatus including means to deposit molten glass on an outermost edge of the rotating member.

521 Centrifuge with fiberizing holes (e.g., rotor, etc.):
This subclass is indented under subclass 483. Apparatus wherein the rotary distribution means is a centrifuge having fiber forming apertures.

522 Having adjacent combustion chamber, burner, or blower utilized:
This subclass is indented under subclass 521. Apparatus including use of a combustion chamber, blower, or burner adjacent to the centrifuge.

523 With at least two concentric blowers or burners:
This subclass is indented under subclass 522. Apparatus wherein more than one burner or blower sharing a common center is used.

524 With fluid blast means:
This subclass is indented under subclass 483. Apparatus comprising means for forming or attenuating the fiber, filament, or preform by using a fluid blast.

525 Having specified nozzle opening size or nozzle cross section:
This subclass is indented under subclass 524. Apparatus having a fluid blast nozzle size opening or cross section stipulated (e.g., elliptical, flat, etc.).

526 Having fluid discharge skirt or deflector:
This subclass is indented under subclass 524. Apparatus comprising means to turn, divert, or direct the fluid blast path.

527 Toration means utilized:
This subclass is indented under subclass 526. Apparatus comprising means which directs a gaseous jet transversely into the gaseous fluid blast thereby attenuating the delivered fiber material.

528 Combustion or flame attenuation:
This subclass is indented under subclass 524. Apparatus including means wherein a flame or combustion product discharged from a burner is used to attenuate the fibers or filaments.

529 Having coating or treating means:
This subclass is indented under subclass 483. Apparatus combined with means for treating or applying a coating material to a fiber, filament, or preform.

(1) Note. Apparatus used to coat optical fibers, waveguides, or preforms thereof is properly classified here and below.

530 Having gas feeding or withdrawal means:
This subclass is indented under subclass 529. Apparatus comprising a means for (a) directing a gas to or (b) removing a gas from an area surrounding the fiber, filament, or fiber preform.

531 Having soot forming flame hydrolysis burner (e.g., flame oxidation, etc.):
This subclass is indented under subclass 530. Apparatus comprising means for forming soot (i.e., coating material) by using a hydrolyzing flame burner.

532 With means for recovery, recirculation, or elimination of excess gas feed or coating material:
This subclass is indented under subclass 530. Apparatus comprising means for returning, reusing, or destroying excess gas feed or coating material.

533 With drawing means:
This subclass is indented under subclass 483. Apparatus including means for imposing a predetermined strain or tension on the fiber, filament, or preform.

534 Movable furnace or bushing (e.g., rotatable, reciprocating, etc.):
This subclass is indented under subclass 533. Apparatus including a mounting means which enables a furnace or bushing to be mobile.

535 Pulling wheels or rolls:
This subclass is indented under subclass 533. Apparatus wherein the drawing means consists of a wheel or roll.

536 With severing:
This subclass is indented under subclass 535. Apparatus including means to divide a fiber, filament, or fiber preform by a severing operation (e.g., cutting, breaking, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
56, 70, 87, and 174+, for glass cutting operations other than fibers or filaments.

537 From rod stock:
This subclass is indented under subclass 533. Apparatus utilizing glass rods as stock material from which the filament or fiber is formed.

538 With fluid assisting means:
This subclass is indented under subclass 533. Apparatus utilizing a fluid to aid the drawing means.

539 With winding means:
This subclass is indented under subclass 483. Apparatus having means to convolve the filament or fiber.

SEE OR SEARCH CLASS:
242, Winding, Tensioning, or Guiding, appropriate subclasses for means for winding elongated material.

540 With furnace charging means:
This subclass is indented under subclass 483. Apparatus including means to feed raw materials to a melting furnace.

CROSS-REFERENCE ART COLLECTIONS

900 DRYING, DEHYDRATION, MINIMIZING OH GROUPS:
Art collection involving the formation of glass without going through the melt stage, usually via a sintering or consolidating step. Included herein are converting silicon and metal alkoxides (and like precursors) into oxides in the formation of oxide glass product and the "gel route" formation of glass.

901 LIQUID PHASE REACTION PROCESS:
Art collection involving the provision of precursors for oxides with ultimate consolidation to provide a glass product.

END