

- 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 With annealing or tempering means:**
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 Means dividing and recombining melt in draw chamber:**
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 Vertically upwardly with means bending sheet to horizontal:**
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 With moving endless drawing or flattening table:**
This subclass is indented under subclass 196. Apparatus combined with moving endless support means for drawing and/or flattening the sheet.
- 198 With coacting roll contacting surface of supply bath:**
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 With width maintaining and/or lateral stretching means:**
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 Stretching means:**
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 Adjustable width maintaining means:**
This subclass is indented under subclass 199. Apparatus including means for positional adjustment of the width maintaining means.

- 202 With pivoted lip tile:**
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 With auxiliary heating means for draw pot or drawing chamber:**
This subclass is indented under subclass 193. Apparatus including auxiliary means to heat glass in the draw pot or drawing chamber.
- 204 With cooling means in drawing chamber:**
This subclass is indented under subclass 193. Apparatus including means in a drawing chamber to facilitate 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 With radiant heat reflector in draw pot or drawing chamber:**
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 With skimmer:**
This subclass is indented under subclass 193. Apparatus comprising means to skim the surface of the molten glass.
- 207 GOB CHARGING MEANS WITH SHAPE IMPARTING RECEPTACLE MEANS:**
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 With glass treating means:**
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 By fluid pressure discharge assistant means:**
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, SUB-CLASS:
183, for extrusion die forming means having a positive discharge assistant means.
- 210 By suction gatherer mounted above supply:**
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, SUB-CLASS:
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 With means correlating movable pool-closure:**
This subclass is indented under subclass 210. Apparatus wherein a pool closure means has operating means correlated with means positioning the dispensing means.
- 212 Gatherer moving transversely from orbit of traveling mold (i.e., ram type):**
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 Mold is gatherer:**
This subclass is indented under subclass 210. Apparatus wherein the dispensing means is structurally shaped to form an article or preform in situ.
- 214 Parison mold:**
This subclass is indented under subclass 213. Apparatus wherein the dispensing means is a mold for forming a hollow blank or preform.
- 215 With plunger movable relative to mold:**
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 With separate, distinct blow mold:**
This subclass is indented under subclass 215. Apparatus including a sequentially used separate and distinct blow mold.
- 217 Diverse molds traveling concentric orbits:**
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 Finish mold pivotally mounted below parison's orbit:**
This subclass is indented under subclass 217. Apparatus including means pivotally mounting a finish mold below the orbit of the blank mold.
- 219 With blow means:**
This subclass is indented under subclass 214. Apparatus including means to form the initial opening in the glass charge by gas pressure.
- 220 Sequentially used, distinct molds:**
This subclass is indented under subclass 219. Apparatus wherein the glass is formed in sequentially used distinct molds.
- 221 By delivery from tank feeder:**
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 To parallel mold tables:**
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 With press means:**
This subclass is indented under subclass 221. Apparatus including plunger means coating with the mold means.
- 224 With diverse molding:**
This subclass is indented under subclass 223. Apparatus combined with diverse molding means.

- 225 With gob guide means:**
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, SUB-CLASS:
222, for a charge distributor combined with a tank feeder and mold means.
- 226 With press means:**
This subclass is indented under subclass 207. Apparatus wherein the shaping means includes press molding means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
215, for similar structure combined with a suction gathering means having a dual function of forming a parison.
- 227 DIVERSE DISTINCT GLASSWORKING APPARATUS:**
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, SUB-CLASS:
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 Marvering means with blow means:**
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 Press means with blow means:**
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, SUB-CLASS:
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 With reheating means therebetween:**
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, SUB-CLASS:
63, for a process of forming a glass part from molten glass, reheating and reworking the same.
- 231 Blank mold encaseable in finish mold:**
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 With mold inverting means:**
This subclass is indented under subclass 229. Apparatus including a mold with mounting means for turning the mold upside down or vice versa.
- 233 With pneumatic charge compacting means:**
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 Settle-blow means:**
This subclass is indented under subclass 233. Apparatus comprising means for applying super-atmospheric pressure through the charge opening.
- 235 Neck mold inverting:**
This subclass is indented under subclass 232. Apparatus wherein the mold is a neck mold.
- 236 With parison mold inverting:**
This subclass is indented under subclass 235. Apparatus wherein a parison mold also is inverted.
- 237 Diverse molds traveling concentric orbits:**
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 With diverse motion of mold:**
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 With movable work transfer means between orbits:**
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 Plural traveling mold carriers:**
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 With movable intermediate work transfer means:**
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 Reciprocating mold bottom:**
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 PLURAL DISTINCT GLASSWORKING APPARATUS:**
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, SUB-CLASS:
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 Spaced preform reheating means with reshaping means:**
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, SUB-CLASS:
64, for a process of forming apart from molten glass, reheating and grossly reshaping same.
- 245 Sheet rolling means:**
This subclass is indented under subclass 243. Apparatus comprising plural rolling means arranged to provide plural distinct rolling operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
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 Plural presses:**
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, SUB-CLASS:
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 Plungers sequentially coacting with same mold:**
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, SUB-CLASS:
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 With relative rotation between plunger and mold during withdrawal:**
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 Plungers oppositely disposed:**
This subclass is indented under subclass 248. Apparatus wherein plungers are mounted to coact through opposite walls of a mold.
- 250 Plungers oppositely disposed:**
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, SUB-CLASS:
258, for a press plunger combined with movable core means.

251 Plungers orbiting above orbiting molds:
 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 Fire-polishing means:
 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 ROLLING MEANS TO FORM SHEET OR STRIP:
 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 With treating means:
 This subclass is indented under subclass 253. Apparatus combined with glass treating means.

255 With corrugating or surface imprinting means:
 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 Roll coating with planar platen:**
This subclass is indented under subclass 253. Apparatus in which the coating surface comprises a flat plate.
- 257 Reciprocating platen:**
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 SHEET CASTING AND RECEIVING MEANS:**
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 With pot handling means:**
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 WITH MEANS ABOVE MOLD TO TAKE-OUT OR TRANSFER PRODUCT:**
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 BLOWING MEANS WITH BLOW MOLD:**
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 With treating means:**
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 Combined with vacuum means:**
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 Traveling mold:**
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 With means heating and/or cooling apparatus:**
This subclass is indented under subclass 264. Apparatus in combination with apparatus heating or cooling means.
- 266 Mold rotary about own axis:**
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 With means heating and/or cooling apparatus:**
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 PREFORM RESHAPING MEANS WITH TREATING MEANS:**
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 GLASSWORKING OR PREFORM BY OR WITH REHEATING MEANS (E.G., FLAME SEVERING):**
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, SUB-CLASS:

- 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 Envelope tipping off type:

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, SUB-CLASS:

- 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 Heating means movable relative to work during shaping operation:

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, SUB-CLASS:

- 57, for a process of bonding which includes relative rotation of work and heating means.

272 Work, workholder, or tool correlated burner control:

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 Planar sheet preform:

This subclass is indented under subclass 269. Apparatus including means for converting sheet stock to or from planar sheet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 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 With spaced preheating means:

This subclass is indented under subclass 269. Apparatus including preheating means spaced from the reheating and/or reshaping means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 244, for plural distinct glass working apparatus including spaced preform reheating and reshaping means.

275 Mechanical means to reshape preform:

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, SUB-CLASS:
 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 Tubular type preform:**
 This subclass is indented under subclass 275. Apparatus wherein the preform is of tubular shape.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 108+, for a process of reshaping a tubular preform, with retention of internal cavity.
- 277 By resizing mandrel:**
 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 Means supporting and orbiting preform:**
 This subclass is indented under subclass 276. Apparatus including means movably supporting the stock for travel in a circular or elliptical path.
- 279 Preform supported horizontally:**
 This subclass is indented under subclass 278. Apparatus in which the stock is supported horizontally.
- 280 Preform supported vertically:**
 This subclass is indented under subclass 278. Apparatus in which the stock is supported vertically.
- 281 By bending means:**
 This subclass is indented under subclass 276. Apparatus comprising means to curve stock, or to straighten curved stock.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 273, for means for converting sheet stock to or from planar sheet.
- 282 By internal forming means:**
 This subclass is indented under subclass 276. Apparatus comprising means for reshaping an internal surface of the stock.
- 283 By stretching means:**
 This subclass is indented under subclass 276. Apparatus including means to elongate.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 270, for glass envelope tipping off by stretching means.
 278, for hollow stock stretching means including orbiting stock supporting means.
- 284 Fire-polishing means:**
 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, SUB-CLASS:
 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 To reshape preform by flame pressure or gravity:**
 This subclass is indented under subclass 269. Apparatus wherein a preform supporting means holds a heat softened preform in a man-

ner permitting reshaping by gravity or pressure of a flame.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 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 PREFORM RESHAPING MEANS:
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, SUB-CLASS:

- 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 Sheet bending mold:
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, SUB-CLASS:

- 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 With heat shield or heat sink:
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, SUB-CLASS:

- 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 Including auxiliary movable sheet support or movable sheet guide means:
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 Movable mold section:
This subclass is indented under subclass 289. Apparatus wherein the mold has a movable section.

291 Having movable section:
This subclass is indented under subclass 287. Apparatus wherein the mold has a movable section.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 368+, for a segmented forming mold having a cavity.

- 292 Cylindrical preform:**
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, SUB-CLASS:
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 By threading means:**
This subclass is indented under subclass 292. Apparatus in which the reshaping means includes means to form threads.
- 294 By expansible mandrel:**
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 By crimping means:**
This subclass is indented under subclass 292. Apparatus in which the reshaping means includes crimping means.
- 296 By internal and external forming means:**
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, SUB-CLASS:
282, for similar apparatus combined with reheating means.
- 297 Both rotary driven:**
This subclass is indented under subclass 296. Apparatus in which both forming means are caused to rotate by driving means.
- 298 Rotary internal, stationary external:**
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 By flaring means:**
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, SUB-CLASS:
295, for flaring means combined with crimping means.
- 300 MEANS APPLYING PNEUMATIC PRESSURE INSIDE OF DISCRETE CHARGE (I.E., BLOW MEANS):**
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, SUB-CLASS:
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 With selective control means:**
This subclass is indented under subclass 300. Apparatus in combination with means to selectively control the ballooning.

302 ARTICLE FORMING MEANS UTILIZING MOLD MOTION (E.G., CENTRIFUGAL CASTING):

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 GOB SHAPING OR TREATING MEANS DOWNSTREAM OF GOB SEVERING MEANS:

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 WITH GOB HANDLING MEANS:

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 PRESS MOLDING MACHINE:

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 With product treating means:**
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 Mold ring or baffle laterally and movably supported:**
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 Plunger coacting with successively presented molds:**
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 Relative rotation between plunger and orbiting mold:**
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 Independent dies actuated by common plunger:**
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 Means providing orbiting mold with diverse motion:**
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 Mold orbiting about horizontal axis:**
This subclass is indented under subclass 308. Apparatus wherein a mold while orbiting defines a vertical layer having a horizontal axis.
- 313 Vertically segmented orbiting mold:**
This subclass is indented under subclass 308. Apparatus including an orbiting mold divided perpendicularly with respect to a horizontal plane.
- 314 Plural motors coaxial with plunger:**
This subclass is indented under subclass 305. Apparatus including plural motors arranged coaxially with a plunger.
- 315 With core drawing means:**
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 With means to rotate plunger during withdrawal:**
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, SUB-CLASS:
 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 Means reciprocating or oscillating female mold member:**
 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, SUB-CLASS:
 232+, for mold inverting means in a press and blow machine.
- 318 With means varying plunger pressure during pressing:**
 This subclass is indented under subclass 305. Apparatus including means to vary the pressure applied to a plunger during pressing.
- 319 With means for heating or cooling apparatus:**
 This subclass is indented under subclass 305. Apparatus combined with means to heat or cool the apparatus.
- 320 Selectively operated plural plungers:**
 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, SUB-CLASS:
 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 Plunger penetrating superimposed mold table:**
 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, SUB-CLASS:
 232, for a press and blow machine including mold inverting means, especially subclasses 235+ for a plunger operating from below.
- 322 With means to adjust plunger stroke:**
 This subclass is indented under subclass 305. Apparatus including means to adjust the travel of the plunger.
- 323 PRODUCT OR PARISON CENTERING MEANS, OR MOLD AND/OR CORE ALIGNING MEANS:**
 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 MOLTEN GLASS DISPENSING MEANS (E.G., FEEDER OR LADLE):**
 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 lading means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 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 Discharge orifice below melt level:

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 With auxiliary heating or cooling means:

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 At orifice:

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 tempera-

ture of the glass at or adjacent the orifice.

328 Plural plunger-type discharge assistants or discharge orifices:

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 By differential gas pressure:

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 By reciprocating plunger-type discharge assistant:

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 With diverse motion:**
This subclass is indented under subclass 330. Apparatus wherein the plunger has motion in addition to reciprocating.
- 332 With severing means:**
This subclass is indented under subclass 330. Apparatus combined with means to sever the dispensed glass.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
221+, for similar structure combined with molding apparatus.
- 333 Discharge lip with discharge assistant:**
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 WITH MOLTEN GLASS CHARGE CUTTING OR SCRAPING MEANS:**
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, SUB-CLASS:
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.
- 335 GLASS FURNACE WITH FURNACE CHARGING MEANS:**
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, SUB-CLASS:
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 GATHERING OR DRAWING POOL TYPE FURNACE:**
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, SUB-CLASS:
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:
83, Cutting, appropriate subclasses, especially subclasses 600 and 623 for gob shears, per se.

- 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 Supplemental heating or heat exchange means associated with pool:**
 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 With deputer, draw ring, or draw shield:**
 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 Separate and distinct means defining pool (e.g., floor-supported dam):**
 This subclass is indented under subclass 336. Apparatus including means isolating the pool area from a refining and/or melting area.
- 340 Movably mounted:**
 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 Cascadingly connected:**
 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 By bridge:**
 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 Floating bridge:**
 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 With deputer, draw ring, or draw shield:**
 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 By suspended baffle:**
 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 GLASS CONDITIONING CHANNEL SECTION:**
 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 MELTING POT OR FURNACE WITH STRUCTURALLY DEFINED DELIVERY OR FINING ZONE:**
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 PRODUCT COOLING MEANS (E.G., TEMPERING):**
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 With preceding reheater:**
 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 Plural spaced reheaters:**
 This subclass is indented under subclass 349. Apparatus wherein means to heat comprise spaced distinct heating means.
- 351 Plural spaced cooling means:**
 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 DRAWING BAIT:**
 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 With air supply means:**
 This subclass is indented under subclass 352. Apparatus including means to supply air internally of the glass being drawn.
- 354 With heating or cooling means:**
 This subclass is indented under subclass 353. Apparatus including heating or cooling means.
- 355 MEANS HEATING OR COOLING APPARATUS:**
 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 Internally positioned:**
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 MOLD WITH SEPARATING MEANS OR CLAMPING MEANS:**
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 Core drawing means:**
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 With mold support or carrier:**
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 Pivoted mold sections:**
This subclass is indented under subclass 359. Apparatus in which portions of the mold pivot about an axis during separation.
- 361 MOLD WITH SUPPORTING OR CARRYING MEANS:**
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 PLUNGER:

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 not 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 not 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, SUB-CLASS:
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 nitrides 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 MISCELLANEOUS:

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, subclasses 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 forming 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 discloses but does not claim the assembly operation above is classified in Class 65 even though the sole disclosure relates to the formation of a strand composed of bonded filaments). 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 subclasses 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, evaluating, 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, SUB-CLASS:

- 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, SUB-CLASS:

- 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, SUB-CLASS:

- 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, SUB-CLASS:

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, SUB-CLASS:

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, SUB-CLASS:

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, SUB-CLASS:

436, and below, for processes of manufacturing glass fibers, filaments, or preforms which are not optical.

SEE OR SEARCH CLASS:

359, Optical: Systems 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, Optical: Systems 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 posi-

tive 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, perturbed, 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 radicals 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 radicals 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, perturbed, 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 plastic 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, SUB-CLASS:
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, SUB-CLASS:

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, SUB-CLASS:

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 subclasses 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 signaling, 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 per-

forming 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, subclasses 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