CPC - COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING
(NOTES omitted)

SHAPING

B21 MECHANICAL METAL-WORKING WITHOUT ESSENTIALLY REMOVING MATERIAL; PUNCHING METAL
(NOTES omitted)

B21C MANUFACTURE OF METAL SHEETS, WIRE, RODS, TUBES OR PROFILES, OTHERWISE THAN BY ROLLING; AUXILIARY OPERATIONS USED IN CONNECTION WITH METAL-WORKING WITHOUT ESSENTIALLY REMOVING MATERIAL

WARNING
In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

Metal-drawing (continuous casting B22D 11/00; pressure welding by means of a rolling mill B23K 20/04)

1/00 Manufacture of metal sheets, metal wire, metal rods, metal tubes by drawing

1/003 . . . [Drawing materials of special alloys so far as the composition of the alloy requires or permits special drawing methods or sequences]

1/006 . . . [using vibratory energy]

1/02 . . . Drawing metal wire or like flexible metallic material by drawing machines or apparatus in which the drawing action is effected by drums

1/04 . . . . with two or more dies operating in series

1/06 . . . . in which the material slips on the drums

1/08 . . . . in which the material does not slip on the drums

1/10 . . . . . with accumulation of material between consecutively-arranged dies

1/12 . . . Regulating or controlling speed of drawing drums, e.g., to influence tension; Drives; Stop or relief mechanisms (couplings for drums B21C 1/14; design or construction of electrical equipment, see the relevant classes)

1/14 . . . Drums, e.g. capstans (capstans or winches in general B66D); Connection of grippers thereto; Grippers specially adapted for drawing machines or apparatus of the drum type; Couplings specially adapted for these drums

1/16 . . . Metal drawing by machines or apparatus in which the drawing action is effected by other means than drums, e.g., by a longitudinally-moving carriage pulling or pushing the work or stock for making metal sheets, bars, or tubes

1/18 . . . . from stock of limited length (B21C 1/22 takes precedence)

1/20 . . . . from stock of essentially unlimited length (B21C 1/22 takes precedence)

1/22 . . . . specially adapted for making tubular articles (bending sheet metal into tubular form by drawing B21D 5/10)

1/24 . . . . by means of mandrels (mandrels B21C 3/16)

1/26 . . . . Push-bench drawing

1/27 . . . Carriages; Drives

1/28 . . . Carriages; Connections of grippers thereto; Grippers (for drawing machines of the drum type B21C 1/14)

1/30 . . . Drives, e.g. carriage-traversing mechanisms; Driving elements, e.g. drawing chains; Controlling the drive (endlessly revolving chain systems for metal coiling: B21C 47/3458)

1/305 . . . . . [Linear motor pulling devices]

1/32 . . . Feeding or discharging the material or mandrels

1/34 . . . Guiding or supporting the material or mandrels

3/00 Profiling tools for metal drawing; Combinations of dies and mandrels

3/02 . . . Dies; Selection of material therefor; Cleaning thereof

3/025 . . . . [comprising diamond parts]

3/04 . . . with non-adjustable section (B21C 3/08 takes precedence)

3/06 . . . with adjustable section (B21C 3/08 takes precedence)

3/08 . . . with section defined by rollers, balls, or the like

3/10 . . . with hydraulic forces acting immediately on work

3/12 . . . Die holders; Rotating dies

3/14 . . . . Die holders combined with devices for guiding the drawing material or combined with devices for cooling heating, or lubricating

3/16 . . . Mandrels (separating mandrels from work B21C 45/00); Mounting or adjusting same

3/18 . . . Making tools by operations not covered by a single other subclass; Repairing

5/00 Pointing; Push-pointing

5/003 . . . . . [of hollow material, e.g. tube]

5/006 . . . . . [of solid material, e.g. wire or profiles]
Metal extruding (continuous casting B22D 11/00)

23/00 Extruding metal; Impact extrusion
23/001 [to improve the material properties, e.g. lateral extrusion]
23/002 [Extruding materials of special alloys so far as the composition of the alloy requires or permits special extruding methods of sequences]
23/004 [using vibratory energy]
23/005 [Continuous extrusion starting from solid state material (B21C 23/008 takes precedence); heat treatment or combinations thereof with mechanical treatments, see appropriate classes]
23/007 [Hydrostatic extrusion]
23/008 [Continuous extrusion]
23/01 starting from material of particular form or shape, e.g. mechanically pre-treated (B21C 23/22 takes precedence; heat treatment or combinations thereof with mechanical treatments, see appropriate classes)
23/02 Making uncoated products
23/03 by both direct and backward extrusion
23/035 Making products of generally elongated shape
23/04 by direct extrusion
23/06 Making sheets
23/08 Making wire, bars, tubes
23/085 Making tubes (B21C 23/10 take precedence)
23/10 Making finned tubes
23/12 Extruding bent tubes or rods
23/14 Making other products
23/142 Making profiles
23/145 Interlocking profiles
23/147 Making drill blanks (making twist-drills B23P 15/32)
23/16 Making turbo blades or propellers
23/18 by impact extrusion
23/183 by forward extrusion
23/186 by backward extrusion
23/20 by backward extrusion
23/205 Making products of generally elongated shape
23/21 Presses specially adapted for extruding metal (extrusion presses in general B30B 11/22)
23/211 Pressing devices
23/212 Details (B21C 23/217, B21C 23/218 take precedence)
23/214 Devices for changing die or container
23/215 Devices for positioning or centering press components, e.g. die or container
23/217 Tube extrusion presses (B21C 23/218 takes precedence)
23/218 Indirect extrusion presses
23/22 Making metal-coated products; Making products from two or more metals

Metal-drawing

9/00 Cooling, heating or lubricating drawing material (B21C 3/14 takes precedence)
9/005 [Cold application of the lubricant (when combined with heating steps B21C 9/00)]
9/02 Selection of compositions therefor
19/00 Devices for straightening wire or like work combined with or specially adapted for use in connection with drawing or winding machines or apparatus

23/24 Covering indefinite lengths of metal or non-metal material with a metal coating
23/26 Applying metal coats to cables, e.g. to insulated electric cables
23/28 on intermittently-operating extrusion presses
23/30 on continuously-operating extrusion presses
23/32 Lubrication of metal being extruded or of dies, or the like, e.g. physical state of lubricant, location where lubricant is applied (chemical composition, see appropriate classes)

25/00 Profiling tools for metal extruding
25/02 Dies
25/025 [Selection of materials therefor]
25/04 Mandrels
25/06 Press heads, dies, or mandrels for coating work
25/08 Dies or mandrels with section variable during extruding, e.g. for making tapered work; Controlling variation
25/10 Making tools by operations not covered by a single other subclass

26/00 Rams or plungers; Discs therefor

27/00 Containers for metal to be extruded (B21C 29/02 takes precedence)
27/02 for making coated work
27/04 Venting metal-container chamber

29/00 Cooling or heating work or parts of the extrusion press; (Gas treatment of work)
29/003 Cooling or heating of work
29/006 Gas treatment of work, e.g. to prevent oxidation or to create surface effects
29/02 Cooling or heating of containers for metal to be extruded
29/04 Cooling or heating of press heads, dies or mandrels

31/00 Control devices, e.g. for regulating the pressing speed or temperature of metal (B21C 25/08 takes precedence); Measuring devices, e.g. for temperature of metal, combined with or specially adapted for use in connection with extrusion presses (measuring devices of more general interest within subclass B21C; see group B21C 51/00)

33/00 Feeding extrusion presses with metal to be extruded (; Loading the dummy block)
33/002 Encapsulated billet (manufacturing wires or fine wires B21C 37/045, B21C 37/047)
33/004 Composite billet
33/006 Consecutive billets, e.g. billet profiles allowing air expulsion or bonding of billets
33/008 Scalping billets, e.g. for removing oxide layers prior or during extrusion
33/02 the metal being in liquid form

35/00 Removing work or waste from extruding presses; Drawing-off extruded work (in connection with the extruding of bent tubes or rods B21C 23/12); Cleaning dies, ducts, containers, or mandrels
35/02 Removing or drawing-off work (linear motor pulling devices B21C 1/305)
Metal extruding

37/00 Manufacture of metal sheets, bars, wire, tubes or like semi-manufactured products, not otherwise provided for (by rolling B21B; by working or processing semi-finished sheet metal, profiles, tubes, or wire B21D or B21F; by casting B22; by material-removing machine tools B23; by welding, e.g. cladding or plating B23K; by grinding or polishing B24; by electroforming C25D 1/00; by drawing or extruding, see the relevant groups); Manufacture of tubes of special shape

37/02 . . . of sheets
37/04 . . . of bars or wire (wire-like electrical connectors in or for semiconductor devices H01L 24/42)
37/06 . . . of tubes or metal hoses; Combined procedures for making tubes, e.g. for making multi-wall tubes (bending sheets for making tubes B21D 500; seaming by folding B21D 39/02)
37/07 . . . starting from a specific blank, e.g. tailored blank
37/08 . . . Making tubes with welded or soldered seams (involving only a soldering or welding operation B23K (; with helically arranged seams B21C 37/122))
37/0803 . . . [the tubes having a special shape, e.g. polygonal tubes]
37/0807 . . . [Tube treating or manipulating combined with, or specially adapted for use in connection with tube making machines, e.g. drawing-off devices, cutting-off]
37/0811 . . . [removing or treating the weld bead]
37/0815 . . . [without continuous longitudinal movement of the sheet during the bending operation (sheet bending in general B21D)]
37/0818 . . . [Manufacture of tubes by drawing of strip material through dies]
37/0822 . . . [Guiding or aligning the edges of the bent sheet]
37/0826 . . . [Preparing the edges of the metal sheet with the aim of having some effect on the weld]
37/083 . . . Supply, or operations combined with supply, of strip material
37/087 . . . using rods or strips of soldering material
37/09 . . . of coated strip material; Making multi-wall tubes
37/10 . . . Making tubes with riveted seams (or with non-welded and non-soldered seams)
37/101 . . . [Making of the seams]
37/102 . . . [of coated strip material (making multi-wall tubes)]
37/104 . . . [the tubes having a special shape, e.g. polygonal tubes]
37/105 . . . [Supply, or operations combined with supply, of strip material]
37/107 . . . [Tube treating or manipulating combined with or specially adapted for use in connection with tube-making machines, e.g. drawing-off devices, cutting-off]
37/108 . . . [without continuous longitudinal movement of the sheet during the bending operation (sheet bending in general B21D)]
37/12 . . . Making tubes or metal hoses with helically arranged seams
37/121 . . . [with non-welded and non-soldered seams]
37/122 . . . [with welded or soldered seams (welding and soldering helically arranged seams, per se B23K)]
37/123 . . . [of coated strip material; Making multi-wall tubes]
37/124 . . . [the tubes having a special shape, e.g. with corrugated wall, flexible tubes]
37/125 . . . [curved section, e.g. elbow]
37/126 . . . [Supply, or operations combined with supply, of strip material]
37/127 . . . [Tube treating or manipulating combined with or specially adapted for use in connection with tube making machines, e.g. drawing-off devices, cutting-off]
37/128 . . . [Control or regulating devices]
37/14 . . . Making tubes from double flat material
37/15 . . . Making tubes of special shape; Making tube fittings ([B21C 37/0803; B21C 37/104; B21C 37/124; take precedence])
37/151 . . . [Making tubes with multiple passages]
37/152 . . . [Making rifle and gunbarrels]
37/153 . . . [Making tubes with inner- and/or outer guides]
37/154 . . . [Making multi-wall tubes]
37/155 . . . [Making tubes with non circular section (B21C 37/151; B21C 37/154 take precedence)]
37/156 . . . [Making tubes with wall irregularities (B21C 37/20; B21C 37/22 take precedence)]
37/157 . . . [Perforations]
37/158 . . . [Protrusions, e.g. dimples]
37/16 . . . Making tubes with varying diameter in longitudinal direction
37/18 . . . conical tubes
37/185 . . . [starting from sheet material]
37/20 . . . Making helical or similar guides in or on tubes without removing material, e.g. by drawing same over mandrels, by pushing same through dies [Making tubes with angled walls, ribbed tubes and tubes with decorated walls]
37/202 . . . [with guides parallel to the tube axis]
37/205 . . . [with annular guides]
37/207 . . . [with helical guides]
37/22 . . . Making finned or ribbed tubes by fixing strip or like material to tubes (making heat exchangers B21D 55/02)
37/225 . . . [longitudinally-ribbed tubes]
37/24 . . . annularly-ribbed tubes
37/26 . . . helically-ribbed tubes
37/28 . . . Making tube fittings for connecting pipes, e.g. U-pieces
Metal extruding

37/283 . . . . [Making U-pieces (B21C 37/286 takes precedence)]
37/286 . . . . [starting from sheet material]
37/29 . . . . . Making branched pieces, e.g. T-pieces
37/292 . . . . . [Forming collars by drawing or pushing a rigid forming tool through an opening in the tube wall]
37/294 . . . . . [Forming collars by compressing a fluid or a yieldable or resilient mass in the tube]
37/296 . . . . . [Making branched pieces starting from strip material; Making branched tubes by securing a secondary tube in an opening in the undeformed wall of a principal tube]
37/298 . . . . . [Forming collars by flow-drilling (flow drilling B21J 5/066)]
37/30 . . . Finishing tubes, e.g. sizing, burnishing

43/00 Devices for cleaning metal products combined with or specially adapted for use with machines or apparatus provided for in this subclass
43/02 . . combined with or specially adapted for use in connection with drawing or winding machines or apparatus
43/04 . . Devices for de-scaling wire or like flexible work

Auxiliary operation used in connection with metal working without essentially removing material

45/00 Separating mandrels from work or vice versa
47/00 Winding-up, coiling or winding-off metal wire, metal band or other flexible metal material characterised by features relevant to metal processing only (coiling wire into particular forms B21F 3/00; hot coilers in connection with heat-treatment apparatus C21D 9/68)
47/000 . . . (Regulation of tension or speed; Braking)
47/006 . . . [winding-up or winding-off several parallel metal bands]
47/002 . . Winding-up or coiling
47/004 . . on or in reels or drums, without using a moving guide (reels or drums B21C 47/28)
47/0045 . . . [in rotating drums]
47/006 . . . with loaded rollers, bolts, or equivalent means holding the material on the reel or drum
47/0063 . . . . [with pressure rollers only]
47/0066 . . . . [with belt wrappers only]
47/008 . . . without making use of a reel or drum, the first turn being formed by a stationary guide
47/10 . . . by means of a moving guide
47/12 . . . the guide moving parallel to the axis of the coil (B21C 47/14 takes precedence)
47/14 . . . by means of a rotating guide, e.g. laying the material around a stationary reel or drum
47/143 . . . [the guide being a tube]
47/146 . . . . [Controlling or influencing the laying pattern of the coils]
47/16 . . Unwinding or uncoiling
47/18 . . . from reels or drums
47/20 . . . the unreeled material moving transversely to the tangent line of the drum, e.g. axially, radially
47/22 . . Unwinding coils without reels or drums

47/24 . . Transfering coils to or from winding apparatus or to or from operative position therein; Preventing uncoiling during transfer
47/242 . . [Devices for swinging the coil from horizontal to vertical, or vice versa]
47/245 . . [Devices for the replacement of full reels by empty reels or vice versa, without considerable loss of time]
47/247 . . [Joining wire or band ends]
47/26 . . Special arrangements with regard to simultaneous or subsequent treatment of the material
47/262 . . . [Treatment of a wire, while in the form of overlapping non-concentric rings]
47/265 . . . ["helicofil" systems]
47/267 . . . [Scrap treatment]
47/28 . . Drums or other coil-holders (gripping means B21C 47/32)
47/30 . . . expandable or contractible
47/32 . . . Tongs or gripping means specially adapted for reeling operations
47/323 . . . [Slits or pinces on the cylindrical wall of a reel or bobbin, adapted to grip the end of the material being wound]
47/326 . . . [Devices for pressing the end of the material being wound against the cylindrical wall of the reel or bobbin]
47/34 . . Feeding or guiding devices not specially adapted to a particular type of apparatus
47/3408 . . . [for monitoring the lateral position of the material]
47/3416 . . . [with lateral edge contact]
47/3425 . . . [without lateral edge contact]
47/3433 . . . [for guiding the leading end of the material, e.g. from or to a coiler]
47/3441 . . . [Diverting the leading end, e.g. from main flow to a coiling device]
47/345 . . . [for monitoring the tension or advance of the material]
47/3458 . . . . [Endlessly revolving chain systems (metal drawing B21C 1/30)]
47/3466 . . . . [by using specific means]
47/3475 . . . . [Fluid pressure or vacuum]
47/3483 . . . . [Magnetic field]
47/3491 . . . . [Brushes]

49/00 Devices for temporarily accumulating material
51/00 Measuring, gauging, indicating, counting, or marking devices specially adapted for use in the production or manipulation of material in accordance with subclasses B21B - B21F
51/005 . . [Marking devices]
99/00 Subject matter not provided for in other groups of this subclass