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 longitudinallymoved 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 . [Press driving 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

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)
37/04 [Manufacture of coated wire or bars]
37/04 [Manufacture of wire or bars with particular section or properties]
37/04 [of fine wires]
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; seam ing by folding B21D 39/02)
37/06 [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 { 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 {Prorusions, 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 53/02)
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

47/24 . Transferring 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 and 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 . . expansible 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

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)
47/003 . [Regulation of tension or speed; Braking]
47/006 . [winding-up or winding-off several parallel metal bands]
47/02 . Winding-up or coiling
47/04 . . . on or in reels or drums, without using a moving guide (reels or drums B21C 47/28)
47/045 . . . [in rotating drums]
47/06 . . . with loaded rollers, bolts, or equivalent means holding the material on the reel or drum
47/063 . . . . [with pressure rollers only]
47/066 . . . . . [with belt wrappers only]
47/08 . . . 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