

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-moved 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}

9/00	Cooling, heating or lubricating drawing material (B21C 3/14 takes precedence)	23/24	. . . Covering indefinite lengths of metal or non-metal material with a metal coating
9/005	. {Cold application of the lubricant (when combined with heating steps B21C 9/00)}	23/26	. . . . Applying metal coats to cables, e.g. to insulated electric cables
9/02	. Selection of compositions therefor	23/28	. . . . on intermittently-operating extrusion presses
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	23/30	. . . . 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)
Metal extruding (continuous casting B22D 11/00)			
23/00	Extruding metal; Impact extrusion	25/00	Profiling tools for metal extruding
23/001	. {to improve the material properties, e.g. lateral extrusion}	25/02	. Dies
23/002	. {Extruding materials of special alloys so far as the composition of the alloy requires or permits special extruding methods of sequences}	25/025	. . { Selection of materials therefor }
23/004	. {using vibratory energy}	25/04	. Mandrels
23/005	. {Continuous extrusion starting from solid state material (B21C 23/008 takes precedence)}	25/06	. Press heads, dies, or mandrels for coating work
23/007	. {Hydrostatic extrusion}	25/08	. Dies or mandrels with section variable during extruding, e.g. for making tapered work; Controlling variation
23/008	. . {Continuous extrusion}	25/10	. Making tools by operations not covered by a single other subclass
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)	26/00	Rams or plungers; Discs therefor
23/02	. Making uncoated products	27/00	Containers for metal to be extruded (B21C 29/02 takes precedence)
23/03	. . by both direct and backward extrusion	27/02	. for making coated work
23/035	. . . {Making products of generally elongated shape}	27/04	. Venting metal-container chamber
23/04	. . by direct extrusion	29/00	Cooling or heating work or parts of the extrusion press; {Gas treatment of work}
23/06	. . . Making sheets	29/003	. {Cooling or heating of work}
23/08	. . . Making wire, bars, tubes	29/006	. {Gas treatment of work, e.g. to prevent oxidation or to create surface effects}
23/085	. . . . {Making tubes (B21C 23/10 take precedence)}	29/02	. {Cooling or heating} of containers for metal to be extruded
23/10	. . . . Making finned tubes	29/04	. {Cooling or heating} of press heads, dies or mandrels
23/12	. . . . Extruding bent tubes or rods	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)
23/14	. . . Making other products	33/00	Feeding extrusion presses with metal to be extruded {; Loading the dummy block}
23/142	. . . . {Making profiles}	33/002	. {Encapsulated billet (manufacturing wires or fine wires B21C 37/045 , B21C 37/047)}
23/145	. . . . . {Interlocking profiles}	33/004	. {Composite billet}
23/147	. . . . {Making drill blanks (making twist-drills B23P 15/32)}	33/006	. {Consecutive billets, e.g. billet profiles allowing air expulsion or bonding of billets}
23/16	. . . . Making turbo blades or propellers	33/008	. {Scalping billets, e.g. for removing oxide layers prior or during extrusion}
23/18	. . by impact extrusion	33/02	. the metal being in liquid form
23/183	. . . {by forward extrusion}	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
23/186	. . . {by backward extrusion}	35/02	. Removing or drawing-off work ({ linear motor pulling devices B21C 1/305)}
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		

- 35/023 . . {Work treatment directly following extrusion, e.g. further deformation or surface treatment ([B21C 35/03](#) takes precedence; gas treatment [B21C 29/006](#))}
- 35/026 . . . {Removing sections from the extruded work, e.g. removing a strip to create an open profile}
- 35/03 . . Straightening the work ([metal straightening in general B21D](#))
- 35/04 . Cutting-off or removing waste
- 35/06 . Cleaning dies, ducts, containers or mandrels
- 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](#))}
 - 37/042 . . {Manufacture of coated wire or bars}
 - 37/045 . . {Manufacture of wire or bars with particular section or properties}
 - 37/047 . . {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 5/00](#); [seaming by folding B21D 39/02](#))
 - 37/065 . . {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 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

37/283	. . . . {Making U-pieces (B21C 37/286 takes precedence)}	47/24	. Transferring coils to or from winding apparatus or to or from operative position therein; Preventing uncoiling during transfer
37/286	. . . . {starting from sheet material}	47/242	. . {Devices for swinging the coil from horizontal to vertical, or vice versa }
37/29	. . . . Making branched pieces, e.g. T-pieces	47/245	. . {Devices for the replacement of full reels by empty reels or vice versa , without considerable loss of time}
37/292	. . . . . {Forming collars by drawing or pushing a rigid forming tool through an opening in the tube wall}	47/247	. . {Joining wire or band ends}
37/294	. . . . . {Forming collars by compressing a fluid or a yieldable or resilient mass in the tube}	47/26	. Special arrangements with regard to simultaneous or subsequent treatment of the material
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}	47/262	. . {Treatment of a wire, while in the form of overlapping non-concentric rings}
37/298	. . . . . {Forming collars by flow-drilling (flow drilling B21J 5/066)}	47/265	. . {"helicofil" systems}
37/30	. . Finishing tubes, e.g. sizing, burnishing	47/267	. . {Scrap treatment}
43/00	Devices for cleaning metal products combined with or specially adapted for use with machines or apparatus provided for in this subclass	47/28	. Drums or other coil-holders (gripping means B21C 47/32)
43/02	. combined with or specially adapted for use in connection with drawing or winding machines or apparatus	47/30	. . expansible or contractible
43/04	. . Devices for de-scaling wire or like flexible work	47/32	. Tongs or gripping means specially adapted for reeling operations
<u>Auxiliary operation used in connection with metal working without essentially removing material</u>		47/323	. . {Slits or pincins on the cylindrical wall of a reel or bobbin, adapted to grip the end of the material being wound}
45/00	Separating mandrels from work or vice versa	47/326	. . {Devices for pressing the end of the material being wound against the cylindrical wall of the reel or bobbin}
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)	47/34	. Feeding or guiding devices not specially adapted to a particular type of apparatus
47/003	. {Regulation of tension or speed; Braking}	47/3408	. . {for monitoring the lateral position of the material}
47/006	. {winding-up or winding-off several parallel metal bands}	47/3416	. . . {with lateral edge contact}
47/02	. Winding-up or coiling	47/3425	. . . {without lateral edge contact}
47/04	. . on or in reels or drums, without using a moving guide (reels or drums B21C 47/28)	47/3433	. . {for guiding the leading end of the material, e.g. from or to a coiler}
47/045	. . . {in rotating drums}	47/3441	. . . {Diverting the leading end, e.g. from main flow to a coiling device}
47/06	. . . with loaded rollers, bolts, or equivalent means holding the material on the reel or drum	47/345	. . {for monitoring the tension or advance of the material}
47/063	. . . . {with pressure rollers only}	47/3458	. . . {Endlessly revolving chain systems (metal drawing B21C 1/30)}
47/066	. . . . {with belt wrappers only}	47/3466	. . . {by using specific means}
47/08	. . without making use of a reel or drum, the first turn being formed by a stationary guide	47/3475	. . . {Fluid pressure or vacuum}
47/10	. . by means of a moving guide	47/3483	. . . {Magnetic field}
47/12	. . . the guide moving parallel to the axis of the coil (B21C 47/14 takes precedence)	47/3491	. . . {Brushes}
47/14	. . . by means of a rotating guide, e.g. laying the material around a stationary reel or drum	49/00	Devices for temporarily accumulating material
47/143	. . . . {the guide being a tube}	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
47/146	. . . . {Controlling or influencing the laying pattern of the coils}	51/005	. {Marking devices}
47/16	. Unwinding or uncoiling	99/00	Subject matter not provided for in other groups of this subclass
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		