

CPC COOPERATIVE PATENT CLASSIFICATION

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

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 stok 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 operation 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](#))

- 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**

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](#))}
- 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	29/006	. {Gas treatment of work, e.g. to prevent oxidation or to create surface effects}
23/06	. . . Making sheets	29/02	. {Cooling or heating} of containers for metal to be extruded
23/08	. . . Making wire, bars, tubes	29/04	. {Cooling or heating} of press heads, dies or mandrels
23/085	. . . . {Making tubes (B21C 23/10 take precedence)}	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)
23/10	. . . . Making finned tubes	33/00	Feeding extrusion presses with metal to be extruded; {Loading the dummy block}
23/12	. . . . Extruding bent tubes or rods	33/002	. {Encapsulated billet (manufacturing wires or fine wires B21C 37/045 , B21C 37/047)}
23/14	. . . Making other products	33/004	. {Composite billet}
23/142	. . . . {Making profiles}	33/006	. {Consecutive billets, e.g. billet profiles allowing air expulsion or bonding of billets}
23/145	. . . . . {Interlocking profiles}	33/008	. {Scalping billets, e.g. for removing oxide layers prior or during extrusion}
23/147	. . . . {Making drill blanks (making twist-drills B23P 15/32)}	33/02	. the metal being in liquid form
23/16	. . . . Making turbo blades or propellers	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
23/18	. . by impact extrusion	35/02	. Removing or drawing-off work {(linear motor pulling devices B21C 1/305)}
23/183	. . . {by forward extrusion}	35/023	. . {Work treatment directly following extrusion, e.g. further deformation or surface treatment (B21C 35/03 takes precedence; gas treatment B21C 29/006)}
23/186	. . . {by backward extrusion}	35/026	. . . {Removing sections from the extruded work, e.g. removing a strip to create an open profile}
23/20	. . by backward extrusion	35/03	. . Straightening the work (metal straightening in general B21D)
23/205	. . . {Making products of generally elongated shape}	35/04	. Cutting-off or removing waste
23/21	. Presses specially adapted for extruding metal (extrusion presses in general B30B 11/22)	35/06	. Cleaning dies, ducts, containers or mandrels
23/211	. . {Press driving devices}	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
23/212	. . {Details (B21C 23/217 , B21C 23/218 take precedence)}	37/02	. of sheets
23/214	. . . {Devices for changing die or container}	37/04	. of bars or wire {(wire-like electrical connectors in or for semiconductor devices H01L 24/42)}
23/215	. . . {Devices for positioning or centering press components, e.g. die or container}	37/042	. . {Manufacture of coated wire or bars}
23/217	. . {Tube extrusion presses (B21C 23/218 takes precedence)}	37/045	. . {Manufacture of wire or bars with particular section or properties}
23/218	. . {Indirect extrusion presses}	37/047	. . {of fine wires}
23/22	. Making metal-coated products; Making products from two or more metals	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)
23/24	. . Covering indefinite lengths of metal or non-metal material with a metal coating	37/065	. . {starting from a specific blank, e.g. tailored blank}
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}		

- 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)}
- 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 form B21F 3/00; hot coilers in connection with heat-treatment apparatus C21D 9/68)	47/3425	. . . {without lateral edge contact}
47/003	. {Regulation of tension or speed; Braking}	47/3433	. . {for guiding the leading end of the material, e.g. from or to a coiler}
47/006	. {winding-up or winding-off several parallel metal bands}	47/3441	. . . {Diverting the leading end, e.g. from main flow to a coiling device}
47/02	. Winding-up or coiling	47/345	. . {for monitoring the tension or advance of the material}
47/04	. . on or in reels or drums, without using a moving guide (reels or drums B21C 47/28)	47/3458	. . . {Endlessly revolving chain systems (metal drawing B21C 1/30)}
47/045	. . . {in rotating drums}	47/3466	. . {by using specific means}
47/06	. . . with loaded rollers, bolts, or equivalent means holding the material on the reel or drum	47/3475	. . . {Fluid pressure or vacuum}
47/063	. . . . {with pressure rollers only}	47/3483	. . . {Magnetic field}
47/066	. . . . {with belt wrappers only}	47/3491	. . . {Brushes}
47/08	. . without making use of a reel or drum, the first turn being formed by a stationary guide	49/00	Devices for temporarily accumulating material
47/10	. . by means of a moving guide	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
47/12	. . . the guide moving parallel to the axis of the coil (B21C 47/14 takes precedence)	51/005	. {Marking devices}
47/14	. . . by means of a rotating guide, e.g. laying the material around a stationary reel or drum	99/00	Subject matter not provided for in other groups of this subclass
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	. 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 <i>vice versa</i> }		
47/245	. . {Devices for the replacement of full reels by empty reels or <i>vice versa</i> , 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	. . expandible or contractible		
47/32	. Tongs or gripping means specially adapted for reeling operations		
47/323	. . {Slits or pincers 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}		