

ECLA EUROPEAN 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

Guide heading: [Metal-drawing \(continuous casting B22D11/00; pressure welding by means of a rolling mill B23K20/04\) \[C9611\]](#)

- B21C1/00** Manufacture of metal sheets, metal wire, metal rods, metal tubes by drawing
- B21C1/00B . [N: Drawing materials of special alloys so far as the composition of the alloy requires or permits special drawing methods or sequences]
 - B21C1/00C . [N: using vibratory energy]
 - B21C1/02 . Drawing metal wire or like flexible metallic material by drawing machines or apparatus in which the drawing action is effected by drums
 - B21C1/04 . . with two or more dies operating in series
 - B21C1/06 . . . in which the material slips on the drums
 - B21C1/08 . . . in which the material does not slip on the drums
 - B21C1/10 with accumulation of material between consecutively-arranged dies
 - B21C1/12 . . Regulating or controlling speed of drawing drums, e.g. to influence tension; Drives; Stop or relief mechanisms ([couplings for drums B21C1/14](#); [design or construction of electrical equipment, see the relevant classes](#))
 - B21C1/14 . . 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
 - B21C1/16 . 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
 - B21C1/18 . . from stock of limited length ([B21C1/22 takes precedence](#))
 - B21C1/20 . . from stock of essentially unlimited length ([B21C1/22 takes precedence](#))
 - B21C1/22 . . specially adapted for making tubular articles ([bending sheet metal into tubular form by drawing B21D5/10](#))
 - B21C1/24 . . . by means of mandrels ([mandrels B21C3/16](#))
 - B21C1/26 Push-bench drawing
 - B21C1/27 . . Carriages; Drives
 - B21C1/28 . . . Carriages; Connections of grippers thereto; Grippers ([for drawing machines of the drum type B21C1/14](#))
 - B21C1/30 . . . Drives, e.g. carriage-traversing mechanisms; Driving elements, e.g. drawing chains; Controlling the drive [N: (endlessly revolving chain systems for metal coiling: B21C47/34F2)] [N1204]
 - B21C1/30B [N: Linear motor pulling devices] [N1204]

- B21C1/32 . . Feeding or discharging the material or mandrels
- B21C1/34 . . Guiding or supporting the material or mandrels

B21C3/00 Profiling tools for metal drawing; Combinations of dies and mandrels

- B21C3/02 . Dies; Selection of material therefor; Cleaning thereof
- B21C3/02D . . [N: comprising diamond parts] [N9611]
- B21C3/04 . . with non-adjustable section ([B21C3/08](#) takes precedence)
- B21C3/06 . . with adjustable section ([B21C3/08](#) takes precedence)
- B21C3/08 . . with section defined by rollers, balls, or the like
- B21C3/10 . . with hydraulic forces acting immediately on work
- B21C3/12 . . Die holders; Rotating dies
- B21C3/14 . . . Die holders combined with devices for guiding the drawing material or combined with devices for cooling heating, or lubricating
- B21C3/16 . Mandrels ([separating mandrels from work B21C45/00](#)); Mounting or adjusting same
- B21C3/18 . Making tools by operation not covered by a single other subclass; repairing

B21C5/00 Pointing; Push-pointing

- B21C5/00B . [N: of hollow material, e.g. tube] [N1204]
- B21C5/00C . [N: of solid material, e.g. wire or profiles] [N1204]

B21C9/00 Cooling, heating or lubricating drawing material ([B21C3/14](#) takes precedence)

- B21C9/00B . [N: Cold application of the lubricant ([when combined with heating steps B21C9/00](#))]
- B21C9/02 . Selection of compositions therefor

B21C19/00 Devices for straightening wire or like work combined with or specially adapted for use in connection with drawing or winding machines or apparatus

Guide heading: **Metal extruding** ([continuous casting B22D11/00](#))

B21C23/00 Extruding metal; Impact extrusion

- B21C23/00A . [N: to improve the material properties, e.g. lateral extrusion] [N1204]
- B21C23/00B . [N: Extruding materials of special alloys so far as the composition of the alloy requires or permits special extruding methods of sequences]
- B21C23/00C . [N: using vibratory energy]
- B21C23/00D . [N: Continuous extrusion starting from solid state material ([B21C23/00H2](#) takes precedence)]

- B21C23/00H . [N: Hydrostatic extrusion]
- B21C23/00H2 . . [N: Continuous extrusion]
- B21C23/01 . starting from material of particular form or shape, e.g. mechanically pre-treated ([B21C23/22](#) takes precedence; heat treatment or combinations thereof with mechanical treatments, see appropriate classes)
- B21C23/02 . Making uncoated products
- B21C23/03 . . by both direct and backward extrusion
- B21C23/03B . . . [N: Making products of generally elongated shape]
- B21C23/04 . . by direct extrusion
- B21C23/06 . . . Making sheets
- B21C23/08 . . . Making wire, bars, tubes
- B21C23/08B [N: Making tubes ([B21C23/10](#) take precedence)]
- B21C23/10 Making finned tubes
- B21C23/12 Extruding bent tubes or rods
- B21C23/14 . . . Making other products
- B21C23/14B [N: Making profiles] [N1204]
- B21C23/14B2 [N: Interlocking profiles] [N1204]
- B21C23/14D [N: Making drill blanks (making twist-drills [B23P15/32](#))]
- B21C23/16 Making turbo blades or propellers
- B21C23/18 . . by impact extrusion
- B21C23/18B . . . [N: by forward extrusion]
- B21C23/18C . . . [N: by backward extrusion]
- B21C23/20 . . by backward extrusion
- B21C23/20B . . . [N: Making products of generally elongated shape]
- B21C23/21 . Presses specially adapted for extruding metal ([extrusion presses in general B30B11/22](#))
- B21C23/21B . . [N: Press driving devices]
- B21C23/21C . . [N: Details (B21C23/21D, B21C23/12F take precedence)] [N1204]
- B21C23/21C2 . . . [N: Devices for changing die or container] [N1204]
- B21C23/21C4 . . . [N: Devices for positioning or centering press components, e.g. die or container] [N1204]
- B21C23/21D . . [N: Tube extrusion presses ([B21C23/21F](#) takes precedence)]
- B21C23/21F . . [N: Indirect extrusion presses]
- B21C23/22 . Making metal-coated products; Making products from two or more metals
- B21C23/24 . . Covering indefinite lengths of metal or non-metal material with a metal coating
- B21C23/26 . . . Applying metal coats to cables, e.g. to insulated electric cables
- B21C23/28 on intermittently-operating extrusion presses
- B21C23/30 on continuously-operating extrusion presses
- B21C23/32 . 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)

- B21C25/00** **Profiling tools for metal extruding**
- B21C25/02 . Dies
- B21C25/02B . . [N: Selection of materials therefor]
- B21C25/04 . Mandrels
- B21C25/06 . Press heads, dies, or mandrels for coating work
- B21C25/08 . Dies or mandrels with section variable during extruding, e.g. for making tapered work; Controlling variation
- B21C25/10 . Making tools by operations not covered by a single other subclass
- B21C26/00** **Rams or plungers; Discs therefor**
- B21C27/00** **Containers for metal to be extruded** ([B21C29/02](#) takes precedence)
- B21C27/02 . for making coated work
- B21C27/04 . Venting metal-container chamber
- B21C29/00** **Cooling or heating work or parts of the extrusion press; [N: Gas treatment of work]**
[N1204]
- B21C29/00B . [N: Cooling or heating of work] [N1204]
- B21C29/00D . [N: Gas treatment of work, e.g. to prevent oxidation or to create surface effects]
[N1204]
- B21C29/02 . [N: Cooling or heating] of containers for metal to be extruded [N1204]
- B21C29/04 . [N: Cooling or heating] of press heads, dies or mandrels [N1204]
- B21C31/00** **Control devices, e.g. for regulating the pressing speed or temperature of metal**
([B21C25/08](#) 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
[B21C51/00](#))
- B21C33/00** **Feeding extrusion presses with metal to be extruded; [N: Loading the dummy**
block] [N1204]
- B21C33/00B . [N: Encapsulated billet (manufacturing wires or fine wires B21C37/04C, B21C37/04D)]
[N1204]
- B21C33/00D . [N: Composite billet] [N1204]

- B21C33/00F . [N: Consecutive billets, e.g. billet profiles allowing air expulsion or bonding of billets] [N1204]
- B21C33/00H . [N: Scalping billets, e.g. for removing oxide layers prior or during extrusion] [N1204]
- B21C33/02 . the metal being in liquid form
- B21C35/00** **Removing work or waste from extruding presses; Drawing-off extruded work (in connection with the extruding of bent tubes or rods [B21C23/12](#)); Cleaning dies, ducts, containers, or mandrels**
- B21C35/02 . Removing or drawing-off work [N: (linear motor pulling devices [B21C1/30B](#))] [N1204]
- B21C35/02B . . [N: Work treatment directly following extrusion, e.g. further deformation or surface treatment ([B21C35/03](#) takes precedence; gas treatment [B21C29/00D](#))] [N1204]
- B21C35/02B2 . . . [N: Removing sections from the extruded work, e.g. removing a strip to create an open profile] [N1204]
- B21C35/03 . . Straightening the work ([metal straightening in general \[B21D\]\(#\)](#))
- B21C35/04 . Cutting-off or removing waste
- B21C35/06 . Cleaning dies, ducts, containers or mandrels
- B21C37/00** **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 [B21E](#); by casting [B22](#); by material-removing machine tools [B23](#); by welding, e.g. cladding or plating [B23K](#); by grinding or polishing [B24](#); by electroforming [C25D1/00](#); by drawing or extruding, see the relevant groups); Manufacture of tubes of special shape [\[C9611\]](#)**
- B21C37/02 . of sheets
- B21C37/04 . of bars or wire [N: ([wire-like electrical connectors in or for semiconductor devices \[H01L24/42\]\(#\)](#))] [\[C1108\]](#)
- B21C37/04B . . [N: Manufacture of coated wire or bars]
- B21C37/04C . . [N: Manufacture of wire or bars with particular section or properties]
- B21C37/04D . . [N: of fine wires]
- B21C37/06 . of tubes or metal hoses; Combined procedures for making tubes, e.g. for making multi-wall tubes ([bending sheets for making tubes \[B21D5/00\]\(#\)](#); [seaming by folding \[B21D39/02\]\(#\)](#))
- B21C37/06B . . [N: starting from a specific blank, e.g. tailored blank] [N1204]
- B21C37/08 . . Making tubes with welded or soldered seams ([involving only a soldering or welding operation \[B23K\]\(#\)](#)) [N: with helically arranged seams [B21C37/12C](#)]
- B21C37/08E . . . [N: the tubes having a special shape, e.g. polygonal tubes]
- B21C37/08G . . . [N: Tube treating or manipulating combined with, or specially adapted for use in connection with tube making machines, e.g. drawing-off devices, cutting-off]
- B21C37/08G1 [N: removing or treating the weld bead]
- B21C37/08H . . . [N: without continuous longitudinal movement of the sheet during the bending operation ([sheet bending in general \[B21D\]\(#\)](#))]

- B21C37/08K . . . [N: Manufacture of tubes by drawing of strip material through dies]
- B21C37/08L . . . [N: Guiding or aligning the edges of the bent sheet]
- B21C37/08N . . . [N: Preparing the edges of the metal sheet with the aim of having some effect on the weld] [N1204]
- B21C37/083 . . . Supply, or operations combined with supply, of strip material
- B21C37/087 . . . using rods or strips of soldering material
- B21C37/09 . . . of coated strip material; [N: Making multi-wall tubes]
- B21C37/10 . . . Making tubes with riveted seams [N: or with non-welded and non-soldered seams]
- B21C37/10B . . . [N: Making of the seams]
- B21C37/10D . . . [N: of coated strip material (making multi-wall tubes)]
- B21C37/10E . . . [N: the tubes having a special shape, e.g. polygonal tubes]
- B21C37/10F . . . [N: Supply, or operations combined with supply, of strip material]
- B21C37/10G . . . [N: Tube treating or manipulating combined with or specially adapted for use in connection with tube-making machines e.g. drawing-off devices, cutting-off]
- B21C37/10H . . . [N: without continuous longitudinal movement of the sheet during the bending operation (sheet bending in general [B21D](#))]
- B21C37/12 . . . Making tubes or metal hoses with helically arranged seams
- B21C37/12B . . . [N: with non-welded and non-soldered seams]
- B21C37/12C . . . [N: with welded or soldered seams (welding and soldering helically arranged seams, per se [B23K](#))]
- B21C37/12D . . . [N: of coated strip material; Making multi-wall tubes]
- B21C37/12E . . . [N: the tubes having a special shape, e.g. with corrugated wall, flexible tubes]
- B21C37/12E2 [N: curved section, e.g. elbow] [N1204]
- B21C37/12F . . . [N: Supply, or operations combined with supply, of strip material]
- B21C37/12G . . . [N: Tube treating or manipulating combined with or specially adapted for use in connection with tube making machines, e.g. drawing-off devices, cutting-off]
- B21C37/12L . . . [N: Control or regulating devices]
- B21C37/14 . . . Making tubes from double flat material
- B21C37/15 . . . Making tubes of special shape; Making tube fittings [N: [B21C37/08E](#), [B21C37/10E](#), [B21C37/12E](#), take precedence]
- B21C37/15B [N: Making tubes with multiple passages]
- B21C37/15C [N: Making rifle and gunbarrels]
- B21C37/15C1 [N: Making tubes with inner- and/or outer guides]
- B21C37/15D [N: Making multi-wall tubes]
- B21C37/15E [N: Making] tubes with non circular section (B21C37/15B, B21C37/15D take precedence) [N1204]
- B21C37/15G [N: Making tubes with wall irregularities (B21C37/20, B21C37/22 take precedence)] [N1204]
- B21C37/15G2 [N: Perforations] [N1204]
- B21C37/15G4 [N: Protrusions, e.g. dimples] [N1204]
- B21C37/16 Making tubes with varying diameter in longitudinal direction
- B21C37/18 conical tubes
- B21C37/18B [N: starting from sheet material]
- B21C37/20 Making helical or similar guides in or on tubes without removing material, e.g. by drawing same over mandrels, by pushing same through dies; [N: Making

- tubes with angled walls, ribbed tubes and tubes with decorated walls]
- B21C37/20B [N: with guides parallel to the tube axis]
- B21C37/20C [N: with annular guides]
- B21C37/20D [N: with helical guides]
- B21C37/22 . . . Making finned or ribbed tubes by fixing strip or like material to tubes ([making heat exchangers B21D53/02](#))
- B21C37/22B [N: longitudinally-ribbed tubes]
- B21C37/24 annularly-ribbed tubes
- B21C37/26 helically-ribbed tubes
- B21C37/28 . . . Making tube fittings for connecting pipes, e.g. U-pieces
- B21C37/28B [N: Making U-pieces ([B21C37/28C](#) takes precedence)]
- B21C37/28C [N: starting from sheet material]
- B21C37/29 Making branched pieces, e.g. T-pieces
- B21C37/29B [N: Forming collars by drawing or pushing a rigid forming tool through an opening in the tube wall]
- B21C37/29C [N: Forming collars by compressing a fluid or a yieldable or resilient mass in the tube]
- B21C37/29D [N: 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]
- B21C37/29F [N: Forming collars by flow-drilling ([flow drilling B21J5/06B2](#))] [C0902]
- B21C37/30 . . . Finishing tubes, e.g. sizing, burnishing [C9611]

B21C43/00 **Devices for cleaning metal products combined with or specially adapted for use with machines or apparatus provided for in this subclass**

- B21C43/02 . . . combined with or specially adapted for use in connection with drawing or winding machines or apparatus
- B21C43/04 . . . Devices for de-scaling wire or like flexible work

Guide heading: **Auxiliary operation used in connection with metal working without essentially removing material**

B21C45/00 **Separating mandrels from work or vice-versa**

B21C47/00 **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 B21F3/00](#); hot coilers in connection with heat-treatment apparatus [C21D9/68](#)) [C9611]**

- B21C47/00B . . . [N: Regulation of tension or speed; Braking]
- B21C47/00C . . . [N: winding-up or winding-off several parallel metal bands]
- B21C47/02 . . . Winding-up or coiling
- B21C47/04 . . . on or in reels or drums, without using a moving guide ([reels or drums B21C47/28](#))

- B21C47/04B . . . [N: in rotating drums]
- B21C47/06 . . . with loaded rollers, bolts, or equivalent means holding the material on the reel or drum
- B21C47/06B [N: with pressure rollers only]
- B21C47/06C [N: with belt wrappers only]
- B21C47/08 . . without making use of a reel or drum, the first turn being formed by a stationary guide
- B21C47/10 . . by means of a moving guide
- B21C47/12 . . . the guide moving parallel to the axis of the coil ([B21C47/14](#) takes precedence)
- B21C47/14 . . . by means of a rotating guide, e.g. laying the material around a stationary reel or drum
- B21C47/14C [N: the guide being a tube] [N9702]
- B21C47/14D [N: Controlling or influencing the laying pattern of the coils] [N9702]
- B21C47/16 . Unwinding or uncoiling
- B21C47/18 . . from reels or drums
- B21C47/20 . . . the unreeled material moving transversely to the tangent line of the drum, e.g. axially, radially
- B21C47/22 . . Unwinding coils without reels or drums
- B21C47/24 . Transferring coils to or from winding apparatus or to or from operative position therein; Preventing uncoiling during transfer
- B21C47/24A . . [N: Devices for swinging the coil from horizontal to vertical, or vice versa] [N1204]
- B21C47/24B . . [N: Devices for the replacement of full reels by empty reels or vice versa, without considerable loss of time] [C9611]
- B21C47/24C . . [N: Joining wire or band ends]
- B21C47/26 . Special arrangements with regard to simultaneous or subsequent treatment of the material
- B21C47/26B . . [N: Treatment of a wire, while in the form of overlapping non-concentric rings]
- B21C47/26C . . [N: "helicofil" systems]
- B21C47/26E . . [N: Scrap treatment] [N1204]
- B21C47/28 . Drums or other coil-holders ([gripping means B21C47/32](#))
- B21C47/30 . . expansible or contractible
- B21C47/32 . Tongs or gripping means specially adapted for reeling operations
- B21C47/32B . . [N: Slits or pincers on the cylindrical wall of a reel or bobbin, adapted to grip the end of the material being wound]
- B21C47/32C . . [N: Devices for pressing the end of the material being wound against the cylindrical wall of the reel or bobbin]
- B21C47/34 . Feeding or guiding devices not specially adapted to a particular type of apparatus
- B21C47/34B . . [N: for monitoring the lateral position of the material] [N1204]
- B21C47/34B2 . . . [N: with lateral edge contact] [N1204]
- B21C47/34B4 . . . [N: without lateral edge contact] [N1204]
- B21C47/34D . . [N: for guiding the leading end of the material, e.g. from or to a coiler] [N1204]

- B21C47/34D2 . . . [N: Diverting the leading end, e.g. from main flow to a coiling device] [N1204]
- B21C47/34F . . [N: for monitoring the tension or advance of the material] [N1204]
- B21C47/34F2 . . . [N: Endlessly revolving chain systems (metal drawing B21C1/30)] [N1204]
- B21C47/34H . . [N: by using specific means] [N1204]
- B21C47/34H2 . . . [N: Fluid pressure or vacuum] [N1204]
- B21C47/34H4 . . . [N: Magnetic field] [N1204]
- B21C47/34H6 . . . [N: Brushes] [N1204]

B21C49/00 **Devices for temporarily accumulating material** [C9611]

B21C51/00 **Measuring, gauging, indicating, counting, or marking devices specially adapted for use in the production or manipulation of material in accordance with subclasses [B21B](#) to [B21F](#)**

- B21C51/00B . [N: Marking devices]

B21C99/00 **Subject matter not provided for in other groups of this subclass** [N0904]