

**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
<b>B21C3/00</b>	<b>Profiling tools for metal drawing; Combinations of dies and mandrels</b>
B21C3/02	. Dies; Selection of material therefor; Cleaning thereof
B21C3/02D	. . [N: comprising diamond parts] [N9611]
B21C3/04	. . with non-adjustable section ( <a href="#">B21C3/08</a> takes precedence)
B21C3/06	. . with adjustable section ( <a href="#">B21C3/08</a> 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 ( <a href="#">separating mandrels from work B21C45/00</a> ); Mounting or adjusting same
B21C3/18	. Making tools by operation not covered by a single other subclass; repairing
<b>B21C5/00</b>	<b>Pointing; Push-pointing</b>
B21C5/00B	. [N: of hollow material, e.g. tube] [N1204]
B21C5/00C	. [N: of solid material, e.g. wire or profiles] [N1204]
<b>B21C9/00</b>	<b>Cooling, heating or lubricating drawing material (<a href="#">B21C3/14</a> takes precedence)</b>
B21C9/00B	. [N: Cold application of the lubricant ( <a href="#">when combined with heating steps B21C9/00</a> )]
B21C9/02	. Selection of compositions therefor
<b>B21C19/00</b>	<b>Devices for straightening wire or like work combined with or specially adapted for use in connection with drawing or winding machines or apparatus</b>
<b>Guide heading:</b>	<b><u>Metal extruding</u> (<a href="#">continuous casting B22D11/00</a>)</b>
<b>B21C23/00</b>	<b>Extruding metal; Impact extrusion</b>
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 ( <a href="#">B21C23/00H2</a> 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 <a href="#">B21D</a> )]
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 <a href="#">B23K</a> )]
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: <a href="#">B21C37/08E</a> , <a href="#">B21C37/10E</a> , <a href="#">B21C37/12E</a> , 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 <a href="#">B21D53/02</a> )
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 ( <a href="#">B21C37/28C</a> 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 <a href="#">B21J5/06B2</a> )] [C0902]
B21C37/30	. . Finishing tubes, e.g. sizing, burnishing [C9611]
<b>B21C43/00</b>	<b>Devices for cleaning metal products combined with or specially adapted for use with machines or apparatus provided for in this subclass</b>
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
<b>Guide heading:</b>	<b><u>Auxiliary operation used in connection with metal working without essentially removing material</u></b>
<b>B21C45/00</b>	<b>Separating mandrels from work or vice-versa</b>
<b>B21C47/00</b>	<b>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 <a href="#">B21F3/00</a>; hot coilers in connection with heat-treatment apparatus <a href="#">C21D9/68</a>) [C9611]</b>
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 <a href="#">B21C47/28</a> )



- 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]