

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.

<u>Metal drawing</u>	1/28	. . . Carriages; Connections of grippers thereto; Grippers
1/00 Manufacture of metal sheets, metal wire, metal rods, metal tubes by drawing	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)}
1/003 . {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}	1/305	. . . . {Linear motor pulling devices}
1/02 . Drawing metal wire or like flexible metallic material by drawing machines or apparatus in which the drawing action is effected by drums	1/32	. . Feeding or discharging the material or mandrels
	1/34	. . Guiding or supporting the material or mandrels
1/04 . . with two or more dies operating in series	3/00	Profiling tools for metal drawing; Combinations of dies and mandrels
1/06 . . . in which the material slips on the drums		
1/08 . . . in which the material does not slip on the drums	3/02	. Dies; Selection of material therefor; Cleaning thereof
1/10 with accumulation of material between consecutively-arranged dies	3/025	. . {comprising diamond parts}
1/12 . . Regulating or controlling speed of drawing drums, e.g. to influence tension; Drives; Stop or relief mechanisms	3/04	. . with non-adjustable section (B21C 3/08 takes precedence)
	3/06	. . with adjustable section (B21C 3/08 takes precedence)
1/14 . . Drums, e.g. capstans; Connection of grippers thereto; Grippers specially adapted for drawing machines or apparatus of the drum type; Couplings specially adapted for these drums	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
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	3/16	. Mandrels; Mounting or adjusting same
	3/18	. Making tools by operations not covered by a single other subclass; Repairing
1/18 . . from stock of limited length (B21C 1/22 takes precedence)	5/00	Pointing; Push-pointing
1/20 . . from stock of essentially unlimited length (B21C 1/22 takes precedence)	5/003	. {of hollow material, e.g. tube}
	5/006	. {of solid material, e.g. wire or profiles}
1/22 . . specially adapted for making tubular articles (bending sheet metal into tubular form by drawing B21D 5/10)	9/00	Cooling, heating or lubricating drawing material (B21C 3/14 takes precedence)
1/24 . . . by means of mandrels	9/005	. {Cold application of the lubricant (when combined with heating steps B21C 9/00) }
1/26 Push-bench drawing		
1/27 . . Carriages; Drives	9/02	. Selection of compositions therefor

<p>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</p> <p>Metal extruding</p> <p>23/00 Extruding metal; Impact extrusion</p> <p>23/001 . {to improve the material properties, e.g. lateral extrusion}</p> <p>23/002 . {Extruding materials of special alloys so far as the composition of the alloy requires or permits special extruding methods of sequences}</p> <p>23/004 . {using vibratory energy}</p> <p>23/005 . {Continuous extrusion starting from solid state material (B21C 23/008 takes precedence)}</p> <p>23/007 . {Hydrostatic extrusion}</p> <p>23/008 . . {Continuous extrusion}</p> <p>23/01 . starting from material of particular form or shape, e.g. mechanically pre-treated (B21C 23/22 takes precedence)</p> <p>23/02 . Making uncoated products</p> <p>23/03 . . by both direct and backward extrusion</p> <p>23/035 . . . {Making products of generally elongated shape}</p> <p>23/04 . . by direct extrusion</p> <p>23/06 . . . Making sheets</p> <p>23/08 . . . Making wire, bars, tubes</p> <p>23/085 {Making tubes (B21C 23/10 take precedence)}</p> <p>23/10 Making finned tubes</p> <p>23/12 Extruding bent tubes or rods</p> <p>23/14 . . . Making other products</p> <p>23/142 {Making profiles}</p> <p>23/145 {Interlocking profiles}</p> <p>23/147 {Making drill blanks (making twist-drills B23P 15/32)}</p> <p>23/16 Making turbo blades or propellers</p> <p>23/18 . . by impact extrusion</p> <p>23/183 . . . {by forward extrusion}</p> <p>23/186 . . . {by backward extrusion}</p> <p>23/20 . . by backward extrusion</p> <p>23/205 . . . {Making products of generally elongated shape}</p> <p>23/21 . Presses specially adapted for extruding metal</p> <p>23/211 . . {Press driving devices}</p> <p>23/212 . . {Details (B21C 23/217, B21C 23/218 take precedence)}</p> <p>23/214 . . . {Devices for changing die or container}</p> <p>23/215 . . . {Devices for positioning or centering press components, e.g. die or container}</p> <p>23/217 . . {Tube extrusion presses (B21C 23/218 takes precedence)}</p> <p>23/218 . . {Indirect extrusion presses}</p> <p>23/22 . Making metal-coated products; Making products from two or more metals</p> <p>23/24 . . Covering indefinite lengths of metal or non-metal material with a metal coating</p> <p>23/26 . . . Applying metal coats to cables, e.g. to insulated electric cables</p> <p>23/28 on intermittently-operating extrusion presses</p> <p>23/30 on continuously-operating extrusion presses</p>	<p>23/32 . Lubrication of metal being extruded or of dies, or the like, e.g. physical state of lubricant, location where lubricant is applied</p> <p>25/00 Profiling tools for metal extruding</p> <p>25/02 . Dies</p> <p>25/025 . . {Selection of materials therefor}</p> <p>25/04 . Mandrels</p> <p>25/06 . Press heads, dies, or mandrels for coating work</p> <p>25/08 . Dies or mandrels with section variable during extruding, e.g. for making tapered work; Controlling variation</p> <p>25/10 . Making tools by operations not covered by a single other subclass</p> <p>26/00 Rams or plungers; Discs therefor</p> <p>27/00 Containers for metal to be extruded (B21C 29/02 takes precedence)</p> <p>27/02 . for making coated work</p> <p>27/04 . Venting metal-container chamber</p> <p>29/00 Cooling or heating work or parts of the extrusion press; {Gas treatment of work}</p> <p>29/003 . {Cooling or heating of work}</p> <p>29/006 . {Gas treatment of work, e.g. to prevent oxidation or to create surface effects}</p> <p>29/02 . {Cooling or heating} of containers for metal to be extruded</p> <p>29/04 . {Cooling or heating} of press heads, dies or mandrels</p> <p>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</p> <p>33/00 Feeding extrusion presses with metal to be extruded {; Loading the dummy block}</p> <p>33/002 . {Encapsulated billet (manufacturing wires or fine wires B21C 37/045, B21C 37/047)}</p> <p>33/004 . {Composite billet}</p> <p>33/006 . {Consecutive billets, e.g. billet profiles allowing air expulsion or bonding of billets}</p> <p>33/008 . {Scalping billets, e.g. for removing oxide layers prior or during extrusion}</p> <p>33/02 . the metal being in liquid form</p> <p>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</p> <p>35/02 . Removing or drawing-off work {(linear motor pulling devices B21C 1/305)}</p> <p>35/023 . . {Work treatment directly following extrusion, e.g. further deformation or surface treatment (B21C 35/03 takes precedence; gas treatment B21C 29/006)}</p> <p>35/026 . . . {Removing sections from the extruded work, e.g. removing a strip to create an open profile}</p> <p>35/03 . . Straightening the work</p> <p>35/04 . Cutting-off or removing waste</p> <p>35/06 . Cleaning dies, ducts, containers or mandrels</p>
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37/00	Manufacture of metal sheets, bars, wire, tubes or like semi-manufactured products, not otherwise provided for; Manufacture of tubes of special shape	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}
37/02	. of sheets	37/128	. . . {Control or regulating devices}
37/04	. of bars or wire {(wire-like electrical connectors in or for semiconductor devices H01L 24/42)}	37/14	. . Making tubes from double flat material
37/042	. . {Manufacture of coated wire or bars}	37/15	. . Making tubes of special shape; Making tube fittings {(B21C 37/0803, B21C 37/104, B21C 37/124, take precedence)}
37/045	. . {Manufacture of wire or bars with particular section or properties}	37/151	. . . {Making tubes with multiple passages}
37/047	. . {of fine wires}	37/152	. . . {Making rifle and gunbarrels}
37/06	. of tubes or metal hoses; Combined procedures for making tubes, e.g. for making multi-wall tubes	37/153	. . . . {Making tubes with inner- and/or outer guides}
37/065	. . {starting from a specific blank, e.g. tailored blank}	37/154	. . . {Making multi-wall tubes}
37/08	. . Making tubes with welded or soldered seams {(with helically arranged seams B21C 37/122)}	37/155	. . . {Making tubes with non circular section (B21C 37/151, B21C 37/154 take precedence)}
37/0803	. . . {the tubes having a special shape, e.g. polygonal tubes}	37/156	. . . {Making tubes with wall irregularities (B21C 37/20, B21C 37/22 take precedence)}
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}	37/157	. . . . {Perforations}
37/0811	. . . . {removing or treating the weld bead}	37/158	. . . . {Protrusions, e.g. dimples}
37/0815	. . . {without continuous longitudinal movement of the sheet during the bending operation}	37/16	. . . Making tubes with varying diameter in longitudinal direction
37/0818	. . . {Manufacture of tubes by drawing of strip material through dies}	37/18	. . . . conical tubes
37/0822	. . . {Guiding or aligning the edges of the bent sheet}	37/185	. . . . {starting from sheet material}
37/0826	. . . {Preparing the edges of the metal sheet with the aim of having some effect on the weld}	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}
37/083	. . . Supply, or operations combined with supply, of strip material	37/202	. . . . {with guides parallel to the tube axis}
37/087	. . . using rods or strips of soldering material	37/205	. . . . {with annular guides}
37/09	. . . of coated strip material {; Making multi-wall tubes}	37/207	. . . . {with helical guides}
37/10	. . Making tubes with riveted seams {or with non-welded and non-soldered seams}	37/22	. . . Making finned or ribbed tubes by fixing strip or like material to tubes
37/101	. . . {Making of the seams}	37/225	. . . . {longitudinally-ribbed tubes}
37/102	. . . {of coated strip material (making multi-wall tubes)}	37/24	. . . . annularly-ribbed tubes
37/104	. . . {the tubes having a special shape, e.g. polygonal tubes}	37/26	. . . . helically-ribbed tubes
37/105	. . . {Supply, or operations combined with supply, of strip material}	37/28	. . . Making tube fittings for connecting pipes, e.g. U-pieces
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}	37/283	. . . . {Making U-pieces (B21C 37/286 takes precedence)}
37/108	. . . {without continuous longitudinal movement of the sheet during the bending operation}	37/286	. . . . {starting from sheet material}
37/12	. . Making tubes or metal hoses with helically arranged seams	37/29	. . . . Making branched pieces, e.g. T-pieces
37/121	. . . {with non-welded and non-soldered seams}	37/292	. . . . . {Forming collars by drawing or pushing a rigid forming tool through an opening in the tube wall}
37/122	. . . {with welded or soldered seams}	37/294	. . . . . {Forming collars by compressing a fluid or a yieldable or resilient mass in the tube}
37/123	. . . {of coated strip material; Making multi-wall tubes}	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}
37/124	. . . {the tubes having a special shape, e.g. with corrugated wall, flexible tubes}	37/298	. . . . . {Forming collars by flow-drilling (flow drilling B21J 5/066)}
37/125	. . . . {curved section, e.g. elbow}	37/30	. . Finishing tubes, e.g. sizing, burnishing
37/126	. . . {Supply, or operations combined with supply, of strip material}	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

		47/3408	. . {for monitoring the lateral position of the material}
		47/3416	. . . {with lateral edge contact}
		47/3425	. . . {without lateral edge contact}
45/00	Separating mandrels from work or vice versa	47/3433	. . {for guiding the leading end of the material, e.g. from or to a coiler}
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)	47/3441	. . . {Diverting the leading end, e.g. from main flow to a coiling device}
47/003	. {Regulation of tension or speed; Braking}	47/345	. . {for monitoring the tension or advance of the material}
47/006	. {winding-up or winding-off several parallel metal bands}	47/3458	. . . {Endlessly revolving chain systems (metal drawing B21C 1/30)}
47/02	. Winding-up or coiling	47/3466	. . {by using specific means}
47/04	. . on or in reels or drums, without using a moving guide	47/3475	. . . {Fluid pressure or vacuum}
47/045	. . . {in rotating drums}	47/3483	. . . {Magnetic field}
47/06	. . . with loaded rollers, bolts, or equivalent means holding the material on the reel or drum	47/3491	. . . {Brushes}
47/063	. . . . {with pressure rollers only}	49/00	Devices for temporarily accumulating material
47/066	. . . . {with belt wrappers only}	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
47/08	. . without making use of a reel or drum, the first turn being formed by a stationary guide	51/005	. {Marking devices}
47/10	. . by means of a moving guide	99/00	Subject matter not provided for in other groups of this subclass
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		
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 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		
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		