

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, PROFILES OR LIKE SEMI-MANUFACTURED PRODUCTS OTHERWISE THAN BY ROLLING; AUXILIARY OPERATIONS USED IN CONNECTION WITH METAL-WORKING WITHOUT ESSENTIALLY REMOVING MATERIAL

Metal drawing

		1/305	. . . . {Linear motor pulling devices}
		1/32	. . Feeding or discharging the material or mandrels
		1/34	. . Guiding or supporting the material or mandrels
1/00	Manufacture of metal sheets, wire, rods, tubes or like semi-manufactured products by drawing	3/00	Profiling tools for metal drawing; Combinations of dies and mandrels for metal drawing
1/003	. {Drawing materials of special alloys so far as the composition of the alloy requires or permits special drawing methods or sequences}	3/02	. Dies; Selection of material therefor; Cleaning thereof
1/006	. {using vibratory energy}	3/025	. . {comprising diamond parts}
1/02	. Drawing metal wire or like flexible metallic material by drawing machines or apparatus in which the drawing action is effected by drums	3/04	. . with non-adjustable section (B21C 3/08 takes precedence)
1/04	. . with two or more dies operating in series	3/06	. . with adjustable section (B21C 3/08 takes precedence)
1/06	. . . in which the material slips on the drums	3/08	. . with section defined by rollers, balls, or the like
1/08	. . . in which the material does not slip on the drums	3/10	. . with hydraulic forces acting immediately on work
1/10	. . . . with accumulation of material between consecutively-arranged dies	3/12	. . Die holders; Rotating dies
1/12	. . Regulating or controlling speed of drawing drums, e.g. to influence tension; Drives; Stop or relief mechanisms	3/14	. . . Die holders combined with devices for guiding the drawing material or combined with devices for cooling, heating, or lubricating
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	3/16	. Mandrels; Mounting or adjusting same
1/16	. Metal drawing by machines or apparatus in which the drawing action is effected by means other than drums, e.g. by a longitudinally-moved carriage pulling or pushing the work or stock for making metal sheets, rods or tubes	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}
1/22	. . specially adapted for making tubular articles (bending sheet metal into tubular form by drawing B21D 5/10)	5/006	. {of solid material, e.g. wire or profiles}
1/24	. . . by means of mandrels	9/00	Cooling, heating or lubricating drawing material (B21C 3/14 takes precedence)
1/26	. . . . Push-bench drawing	9/02	. Selection of compositions therefor
1/27	. . Carriages; Drives	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
1/28	. . . Carriages; Connections of grippers thereto; Grippers	Metal extruding	
1/30	. . . Drives, e.g. carriage-traversing mechanisms; Driving elements, e.g. drawing chains; Controlling the drive	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)}	26/00	Rams or plungers for metal extruding; Discs therefor
23/007	. {Hydrostatic extrusion}	27/00	Containers for metal to be extruded (B21C 29/02 takes precedence)
23/008	. . {Continuous extrusion}	27/02	. for making coated work
23/009	. {Gas treatment of work (for heating or cooling only B21C 29/003)}	27/04	. Venting metal-container chamber
23/01	. starting from material of particular form or shape, e.g. mechanically pre-treated (B21C 23/22 takes precedence)	29/00	Cooling or heating extruded work or parts of the extrusion press
23/02	. Making uncoated products	29/003	. {Cooling or heating of work}
23/03	. . by both direct and backward extrusion	29/02	. of containers for metal to be extruded
23/035	. . . {Making products of generally elongated shape}	29/04	. of press heads, dies, or mandrels
23/04	. . by direct extrusion	31/00	Control devices for metal extruding, 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
23/06	. . . Making sheets	33/00	Feeding extrusion presses with metal to be extruded {; Loading the dummy block}
23/08	. . . Making wire, rods or tubes	33/002	. {Encapsulated billet}
23/085	. . . . {Making tubes (B21C 23/10 take precedence)}	33/004	. {Composite billet}
23/10	. . . . Making finned tubes	33/006	. {Consecutive billets, e.g. billet profiles allowing air expulsion or bonding of billets}
23/12	. . . . Extruding bent tubes or rods	33/008	. {Scalping billets, e.g. for removing oxide layers prior or during extrusion}
23/14	. . . Making other products	33/02	. the metal being in liquid form
23/142	. . . . {Making profiles}	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 for metal extruding
23/145	. . . . . {Interlocking profiles}	35/02	. Removing or drawing-off work
23/147	. . . . . {Making drill blanks}	35/023	. . {Work treatment directly following extrusion, e.g. further deformation or surface treatment (B21C 35/03 takes precedence; gas treatment B21C 23/009)}
23/16	. . . . Making turbo blades or propellers	35/026	. . . {Removing sections from the extruded work, e.g. removing a strip to create an open profile}
23/18	. . by impact extrusion	35/03	. . Straightening the work
23/183	. . . {by forward extrusion}	35/04	. Cutting-off or removing waste
23/186	. . . {by backward extrusion}	35/06	. Cleaning dies, ducts, containers or mandrels
23/20	. . by backward extrusion	37/00	Manufacture of metal sheets, rods, wire, tubes, profiles or like semi-manufactured products, not otherwise provided for; Manufacture of tubes of special shape
23/205	. . . {Making products of generally elongated shape}	37/02	. of sheets
23/21	. Presses specially adapted for extruding metal	37/04	. of rods or wire
23/211	. . {Press driving devices}	37/042	. . {Manufacture of coated wire or rods}
23/212	. . {Details (B21C 23/217 , B21C 23/218 take precedence)}	37/045	. . {Manufacture of wire or rods with particular section or properties}
23/214	. . . {Devices for changing die or container}	37/047	. . {of fine wires}
23/215	. . . {Devices for positioning or centering press components, e.g. die or container}	37/06	. of tubes or metal hoses; Combined procedures for making tubes, e.g. for making multi-wall tubes
23/217	. . {Tube extrusion presses (B21C 23/218 takes precedence)}	37/065	. . {starting from a specific blank, e.g. tailored blank}
23/218	. . {Indirect extrusion presses}	37/08	. . Making tubes with welded or soldered seams (with helically arranged seams B21C 37/122)
23/22	. Making metal-coated products; Making products from two or more metals	37/0803	. . . {the tubes having a special shape, e.g. polygonal tubes}
23/24	. . Covering indefinite lengths of metal or non-metal material with a metal coating		
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		
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		

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}	37/158	. . . . {Protrusions, e.g. dimples}
37/0811	. . . . {removing or treating the weld bead}	37/16	. . . Making tubes with varying diameter in longitudinal direction
37/0815	. . . {without continuous longitudinal movement of the sheet during the bending operation}	37/18	. . . . conical tubes
37/0818	. . . {Manufacture of tubes by drawing of strip material through dies}	37/185	. . . . . {starting from sheet material}
37/0822	. . . {Guiding or aligning the edges of the bent sheet}	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 or tubes with decorated walls}
37/0826	. . . {Preparing the edges of the metal sheet with the aim of having some effect on the weld}	37/202	. . . . {with guides parallel to the tube axis}
37/083	. . . Supply, or operations combined with supply, of strip material	37/205	. . . . {with annular guides}
37/087	. . . using rods or strips of soldering material	37/207	. . . . {with helical guides}
37/09	. . . of coated strip material {; Making multi-wall tubes}	37/22	. . . Making finned or ribbed tubes by fixing strip or like material to tubes
37/10	. . Making tubes with {seams being neither welded nor soldered, e.g.} riveted seams {(with helically arranged seams B21C 37/121)}	37/225	. . . . {longitudinally-ribbed tubes}
37/101	. . . {Making of the seams}	37/24	. . . . annularly-ribbed tubes
37/102	. . . {of coated strip material; Making multi-wall tubes}	37/26	. . . . helically-ribbed tubes
37/104	. . . {the tubes having a special shape, e.g. polygonal tubes}	37/28	. . . Making tube fittings for connecting pipes, e.g. U-pieces
37/105	. . . {Supply, or operations combined with supply, of strip material}	37/283	. . . . {Making U-pieces (B21C 37/286 takes precedence)}
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}	37/286	. . . . {starting from sheet material}
37/108	. . . {without continuous longitudinal movement of the sheet during the bending operation}	37/29	. . . . Making branched pieces, e.g. T-pieces
37/12	. . Making tubes or metal hoses with helically arranged seams	37/292	. . . . . {Forming collars by drawing or pushing a rigid forming tool through an opening in the tube wall}
37/121	. . . {with seams being neither welded nor soldered}	37/294	. . . . . {Forming collars by compressing a fluid or a yieldable or resilient mass in the tube}
37/122	. . . {with welded or soldered seams}	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}
37/123	. . . {of coated strip material; Making multi-wall tubes}	37/298	. . . . . {Forming collars by flow-drilling}
37/124	. . . {the tubes having a special shape, e.g. with corrugated wall, flexible tubes}	37/30	. . Finishing tubes, e.g. sizing, burnishing
37/125	. . . . {curved section, e.g. elbow}	43/00	Devices for cleaning metal products combined with or specially adapted for use with machines or apparatus provided for in this subclass
37/126	. . . {Supply, or operations combined with supply, of strip material}	43/02	. combined with or specially adapted for use in connection with drawing or winding machines or apparatus
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}	43/04	. . Devices for de-scaling wire or like flexible work
37/128	. . . {Control or regulating devices}		
37/14	. . Making tubes from doubled 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 or gun barrels}		
37/153	. . . . {Making tubes with inner 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}		
		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 forms B21F 3/00)
		47/003	. {Regulation of tension or speed; Braking}
		47/006	. {winding-up or winding-off several parallel metal bands}
		47/02	. Winding-up or coiling
		47/04	. . on or in reels or drums, without using a moving guide
		47/045	. . . {in rotating drums}
		47/06	. . . with loaded rollers, bolts, or equivalent means holding the material on the reel or drum
		47/063	. . . . {with pressure rollers only}
		47/066	. . . . {with belt wrappers only}

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 forms [B21F 3/00](#))

- . {Regulation of tension or speed; Braking}
- . {winding-up or winding-off several parallel metal bands}
- . Winding-up or coiling
- . . on or in reels or drums, without using a moving guide
- . . . {in rotating drums}
- . . . with loaded rollers, bolts, or equivalent means holding the material on the reel or drum
- {with pressure rollers only}
- {with belt wrappers only}

47/08	. . without making use of a reel or drum, the first turn being formed by a stationary 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
47/10	. . by means of a moving guide		
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		
47/30	. . expansible 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}		
47/3425	. . . {without lateral edge contact}		
47/3433	. . {for guiding the leading end of the material, e.g. from or to a coiler}		
47/3441	. . . {Diverting the leading end, e.g. from main flow to a coiling device}		
47/345	. . {for monitoring the tension or advance of the material}		
47/3458	. . . {Endlessly revolving chain systems}		
47/3466	. . {by using specific means}		
47/3475	. . . {Fluid pressure or vacuum}		
47/3483	. . . {Magnetic field}		
47/3491	. . . {Brushes}		
49/00	Devices for temporarily accumulating material		