

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

SHAPING

B21 MECHANICAL METAL-WORKING WITHOUT ESSENTIALLY REMOVING MATERIAL; PUNCHING METAL

(NOTES omitted)

B21D WORKING OR PROCESSING OF SHEET METAL OR METAL TUBES, RODS OR PROFILES WITHOUT ESSENTIALLY REMOVING MATERIAL; PUNCHING METAL ([working or processing of wire B21F](#))

NOTES

1. This subclass covers cutting or perforating of sheet metal or other stock material
2. This subclass does not cover the working of metal foils in a manner analogous to the working of paper, which is covered by classes [B26](#), [B31](#)

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.

Straightening; Restoring form; Bending; Corrugating; Flanging

- | | | |
|-------------|--|---|
| | 3/06 | . . arranged inclined to a revolving flier rolling frame |
| 1/00 | Straightening, restoring form or removing local distortions of sheet metal or specific articles made therefrom (B21D 3/00 takes precedence); Stretching sheet metal combined with rolling (working sheet metal of limited length by stretching B21D 25/00; by localised hammering B21D 31/06) | 3/08 . . which move in an orbit without rotating round the work |
| | 3/10 | . between rams and anvils or abutments |
| | 3/12 | . by stretching with or without twisting (by twisting only B21D 11/14) |
| 1/02 | . by rollers (B21D 1/06 takes precedence) | 3/14 . Recontouring |
| 1/05 | . Stretching combined with rolling | 3/16 . of specific articles made from metal rods, tubes, or profiles, e.g. crankshafts, by specially adapted methods or means |
| 1/06 | . Removing local distortions | |
| 1/065 | . . { by hammering } | |
| 1/08 | . . of hollow bodies made from sheet metal (of substantially open bodies B21D 1/10 {; flattening hollow objects for transport and reforming B21D 51/14 }) | 5/00 |
| | | Bending sheet metal along straight lines, e.g. to form simple curves (B21D 11/06 - B21D 11/18 take precedence; corrugating sheet metal B21D 13/00; as edge treatment B21D 19/00) |
| 1/10 | . . of specific articles made from sheet metal, e.g. mudguards | 5/002 . { Positioning devices } |
| 1/12 | . Straightening vehicle body parts or bodies (B21D 1/14 takes precedence) | 5/004 . { with program control } |
| 1/14 | . Straightening frame structures | 5/006 . { combined with measuring of bends } |
| 1/145 | . . { Clamps therefor } | 5/008 . { combined with heating or cooling of the bends } |
| 3/00 | Straightening or restoring form of metal rods, metal tubes, metal profiles, or specific articles made therefrom, whether or not in combination with sheet metal parts (straightening of well casings in situ E21B; {straightening rails or rail joints E01B 31/08}) | 5/01 . between rams and anvils or abutments |
| | | 5/015 . . { for making tubes } |
| 3/005 | . { by eccentric turning members } | 5/02 . on press brakes without making use of clamping means |
| 3/02 | . by rollers | 5/0209 . . { Tools therefor } |
| 3/04 | . . arranged on axes skew to the path of the work | 5/0218 . . . { Length adjustment of the punch } |
| 3/045 | . . . { Workpiece feed channels therefor } | 5/0227 . . . { Length adjustment of the die } |
| 3/05 | . . arranged on axes rectangular to the path of the work | 5/0236 . . . { Tool clamping } |
| | | 5/0245 { Fluid operated } |
| | | 5/0254 . . . { Tool exchanging } |
| | | 5/0263 . . . { Die with two oscillating halves } |
| | | 5/0272 . . { Deflection compensating means } |
| | | 5/0281 . . { Workpiece supporting devices } |
| | | 5/029 . . { with shearing devices } |

- 5/04 . . on brakes making use of clamping means on one side of the work
- 5/042 . . {With a rotational movement of the bending blade}
- 5/045 . . {With a wiping movement of the bending blade}
- 5/047 . . {Length adjustment of the clamping means}
- 5/06 . . by drawing procedure making use of dies or forming-rollers, e.g. making profiles
- 5/08 . . making use of forming-rollers ([B21D 5/12](#) takes precedence)
- 5/083 . . . {for obtaining profiles with changing cross-sectional configuration}
- 5/086 . . . {for obtaining closed hollow profiles}
- 5/10 . . for making tubes
- 5/12 . . . making use of forming-rollers
- 5/14 . . by passing between rollers ([B21D 5/06](#) takes precedence)
- 5/143 . . {making use of a mandrel}
- 5/146 . . {one roll being covered with deformable material}
- 5/16 . . Folding; Pleating
- 7/00 Bending rods, profiles, or tubes**
([B21D 11/02](#) - [B21D 11/18](#) take precedence; using mandrels or the like [B21D 9/00](#))
- 7/02 . . over a stationary forming member; by use of a swinging forming member or abutment
- 7/021 . . {Construction of forming members having more than one groove}
- 7/022 . . over a stationary forming member only
- 7/0225 . . . {using pulling members}
- 7/024 . . by a swinging forming member
- 7/025 . . . and pulling or pushing the ends of the work
- 7/028 . . . and altering the profile at the same time, e.g. forming bumpers
- 7/03 . . Apparatus with means to keep the profile in shape
- 7/04 . . over a movably-arranged forming member ([B21D 7/02](#) takes precedence)
- 7/06 . . in press brakes or between rams and anvils or abutments; Pliers with forming dies
- 7/063 . . {Pliers with forming dies}
- 7/066 . . {combined with oscillating members}
- 7/08 . . by passing between rollers or through a curved die
- 7/085 . . {by passing through a curved die}
- 7/10 . . by abutting members and flexible bending means, e.g. with chains, ropes
- 7/12 . . with programme control
- 7/14 . . combined with measuring of bends or lengths
- 7/16 . . Auxiliary equipment, e.g. for heating or cooling of bends
- 7/162 . . {Heating equipment}
- 7/165 . . {Cooling equipment}
- 7/167 . . {Greasing}
- 9/00 Bending tubes using mandrels or the like**
([B21D 11/02](#) - [B21D 11/18](#) take precedence)
- 9/01 . . the mandrel being flexible and engaging the entire tube length
- 9/03 . . and built-up from loose elements, e.g. series of balls
- 9/04 . . the mandrel being rigid
- 9/05 . . co-operating with forming members
- 9/055 . . {Construction of forming members having more than one groove}
- 9/07 . . with one or more swinging forming members engaging tube ends only
- 9/073 . . . {with one swinging forming member}
- 9/076 . . . {with more swinging forming members}
- 9/08 . . in press brakes or between rams and anvils or abutments; Pliers with forming dies
- 9/085 . . {Pliers with forming dies}
- 9/10 . . by passing between rollers
- 9/12 . . by pushing over a curved mandrel; by pushing through a curved die
- 9/125 . . {by pushing through a curved die}
- 9/14 . . Wrinkle-bending, i.e. bending by corrugating
- 9/15 . . using filling material of indefinite shape, e.g. sand, plastic material (filling of tubes with such material [B21D 9/16](#))
- 9/16 . . Auxiliary equipment, e.g. machines for filling tubes with sand
- 9/165 . . {Machines for filling tubes with sand}
- 9/18 . . for heating or cooling of bends
- 11/00 Bending not restricted to forms of material mentioned in only one of groups [B21D 5/00](#), [B21D 7/00](#), [B21D 9/00](#); Bending not provided for in groups [B21D 5/00](#) - [B21D 9/00](#) (corrugating or bending into wave form [B21D 13/00](#), [B21D 15/00](#); flanging [B21D 19/00](#)); Twisting**
- 11/02 . . Bending by stretching or pulling over a die (working sheet metal of limited length by stretching [B21D 25/00](#))
- 11/06 . . Bending into helical or spiral form; Forming a succession of return bends, e.g. serpentine form (making helically seamed tubing [B21C 37/12](#))
- 11/07 . . Making serpentine-shaped articles by bending essentially in one plane
- 11/08 . . Bending by altering the thickness of part of the cross-section of the work ([B21D 11/06](#) takes precedence)
- 11/085 . . {by locally stretching or upsetting}
- 11/10 . . Bending specially adapted to produce specific articles, e.g. leaf springs {(making or bending leaf springs [B21D 53/886](#))}
- 11/12 . . the articles being reinforcements for concrete
- 11/125 . . . {Bending wire nets}
- 11/14 . . Twisting
- 11/15 . . Reinforcing rods for concrete
- 11/16 . . Crankshafts
- 11/18 . . Juggling
- 11/20 . . Bending sheet metal, not otherwise provided for
- 11/203 . . {Round bending}
- 11/206 . . {Curving corrugated sheets}
- 11/22 . . Auxiliary equipment, e.g. positioning devices
- 13/00 Corrugating sheet metal, rods or profiles; Bending sheet metal, rods or profiles into wave form (tubes [B21D 15/00](#))**
- 13/02 . . by pressing
- 13/04 . . by rolling
- 13/045 . . {the corrugations being parallel to the feeding movement}
- 13/06 . . by drawing
- 13/08 . . by combined methods
- 13/10 . . into a peculiar profiling shape
- 15/00 Corrugating tubes (wrinkle-bending using mandrels or the like [B21D 9/14](#))**

15/02	. longitudinally	22/201	. . {Work-pieces; preparation of the work-pieces, e.g. lubricating, coating}
15/03	. . by applying fluid pressure		
15/04	. transversely, e.g. helically	22/203	. . {of compound articles}
15/06	. . annularly {(with thinning B21C 37/205)}	22/205	. . {Hydro-mechanical deep-drawing}
15/10	. . by applying fluid pressure	22/206	. . {articles from a strip in several steps, the articles being coherent with the strip during the operation}
15/105	. . . {by applying elastic material}		
15/12	. Bending tubes into wave form		
17/00	Forming single grooves in sheet metal or tubular or hollow articles	22/208	. . {by heating the blank or deep-drawing associated with heat treatment (C21D takes precedence)}
17/02	. by pressing (grooving or notching of bolts, studs, or the like B21K 1/54)	22/21	. . without fixing the border of the blank
17/025	. . {by pressing tubes axially}	22/22	. . with devices for holding the edge of the blanks (B21D 22/24 - B21D 22/30 take precedence; shaping over a die without external former B21D 11/02)
17/04	. by rolling		
19/00	Flanging or other edge treatment, e.g. of tubes (connecting by making use of folds B21D 39/00; flaring-out tube ends B21D 41/02)	22/225	. . . {with members for radially pushing the blanks}
19/005	. {Edge deburring or smoothing}	22/24	. . involving two drawing operations having effects in opposite directions with respect to the blank
19/02	. by continuously-acting tools moving along the edge (edge-curling B21D 19/12)	22/26	. . for making peculiarly, e.g. irregularly, shaped articles
19/04	. . shaped as rollers	22/28	. . of cylindrical articles using consecutive dies
19/043	. . . {for flanging edges of plates}	22/283	. . . {with ram and dies aligning means}
19/046	. . . {for flanging edges of tubular products}	22/286	. . . {with lubricating or cooling means}
19/06	. . . working inwardly	22/30	. . to finish articles formed by deep-drawing
19/08	. by single or successive action of pressing tools, e.g. vice jaws	24/00	Special deep-drawing arrangements in, or in connection with, presses
19/082	. . {for making negative angles}	24/005	. {Multi-stage presses}
19/084	. . . {with linear cams, e.g. aerial cams}	24/02	. Die-cushions
19/086	. . . {with rotary cams}	24/04	. Blank holders; Mounting means therefor
19/088	. . {for flanging holes}	24/06	. . Mechanically spring-loaded blank holders
19/10	. . working inwardly	24/08	. . Pneumatically or hydraulically loaded blank holders
19/12	. Edge-curling	24/10	. Devices controlling or operating blank holders independently, or in conjunction with dies
19/14	. . Reinforcing edges, e.g. armouring same	24/12	. . mechanically
19/16	. Reverse flanging of tube ends	24/14	. . pneumatically or hydraulically
21/00	Combined processes according to methods covered by groups B21D 1/00 - B21D 19/00	24/16	. Additional equipment in association with the tools, e.g. for shearing, for trimming
<u>Stamping, Spinning, Deep-drawing; Working sheet metal of limited length by stretching; Punching</u>		25/00	Working sheet metal of limited length by stretching, e.g. for straightening
22/00	Shaping without cutting, by stamping, spinning, or deep-drawing (otherwise than using rigid devices or tools or yieldable or resilient pads B21D 26/00)	25/02	. by pulling over a die
22/02	. Stamping using rigid devices or tools	25/04	. Clamping arrangements
22/022	. . {by heating the blank or stamping associated with heat treatment (C21D takes precedence)}	26/00	Shaping without cutting otherwise than using rigid devices or tools or yieldable or resilient pads, i.e. applying fluid pressure or magnetic forces (stamping using resilient pads B21D 22/10)
22/025	. . {for tubular articles}	26/02	. by applying fluid pressure
22/027	. . {for flattening the ends of corrugated sheets}	26/021	. . Deforming sheet bodies
22/04	. . for dimpling (combined with perforating B21D 28/24)	26/023	. . . including an additional treatment performed by fluid pressure, e.g. perforating
22/06	. . having relatively-movable die parts	26/025	. . . Means for controlling the clamping or opening of the moulds
22/08	. . with die parts on rotating carriers	26/027	. . . Means for controlling fluid parameters, e.g. pressure or temperature
22/10	. Stamping using yieldable or resilient pads	26/029	. . . Closing or sealing means
22/105	. . {of tubular products}	26/031	. . . Mould construction (B21D 26/025 - B21D 26/029 take precedence)
22/12	. . using enclosed flexible chambers	26/033	. . Deforming tubular bodies (corrugating tubes by applying fluid pressure B21D 15/03 , B21D 15/10)
22/125	. . . {of tubular products}	26/035	. . . including an additional treatment performed by fluid pressure, e.g. perforating
22/14	. Spinning	26/037	. . . Forming branched tubes
22/16	. . over shaping mandrels or formers		
22/18	. . using tools guided to produce the required profile		
22/185	. . . {making domed objects}		
22/20	. Deep-drawing (special deep-drawing arrangements in, or in connection with, presses B21D 24/00)		

26/039	. . . Means for controlling the clamping or opening of the moulds	28/343	. . . {Draw punches}
26/041	. . . Means for controlling fluid parameters, e.g. pressure or temperature	28/346	. . . {length adjustable perforating tools}
26/043	. . . Means for controlling the axial pusher	28/36	. . using rotatable work or tool holders
26/045	. . . Closing or sealing means	31/00	Other methods for working sheet metal, metal tubes, metal profiles (deforming one surface of tubes helically by rolling B21H 3/00 ; upsetting B21J 5/08 ; working metal by removing material therefrom B23 ; embossing B44B)
26/047	. . . Mould construction (B21D 26/037 - B21D 26/045 take precedence)	31/005	. {Incremental shaping or bending, e.g. stepwise moving a shaping tool along the surface of the workpiece (B21D 22/14 takes precedence)}
26/049	. . . Deforming bodies having a closed end	31/02	. Stabbing or piercing, e.g. for making sieves (dimpling B21D 22/04 ; perforating by punching B21D 28/24)
26/051	. . . Deforming double-walled bodies	31/04	. Expanding other than provided for in groups B21D 1/00 - B21D 28/00 , e.g. for making expanded metal (B21D 47/00 takes precedence; enlarging tube ends B21D 41/02)
26/053	. . characterised by the material of the blanks	31/043	. . {Making use of slitting discs or punch cutters}
26/055	. . . Blanks having super-plastic properties	31/046	. . {making use of rotating cutters}
26/057	. . . Tailored blanks	31/06	. Deforming sheet metal, tubes or profiles by sequential impacts, e.g. hammering, beating, peen forming (forging hammers B21J 7/00)
26/059	. . . Layered blanks	33/00	Special measures in connection with working metal foils, e.g. gold foils (cutting or perforating of metal foil analogous to paper B26)
26/06	. . by shock waves	35/00	Combined processes according to {or processes combined with} methods covered by groups B21D 1/00 - B21D 31/00 (B21D 21/00 takes precedence)
26/08	. . . generated by explosives, e.g. chemical explosives	35/001	. {Shaping combined with punching, e.g. stamping and perforating}
26/10	. . . generated by evaporation, e.g. of wire, of liquids	35/002	. {Processes combined with methods covered by groups B21D 1/00 - B21D 31/00 }
26/12	. . . initiated by spark discharge	35/003	. . {Simultaneous forming, e.g. making more than one part per stroke (B21D 26/06 takes precedence)}
26/14	. applying magnetic forces	35/005	. . {characterized by the material of the blank or the workpiece (B21D 26/053 takes precedence)}
28/00	Shaping by press-cutting; Perforating	35/006	. . . {Blanks having varying thickness, e.g. tailored blanks}
28/002	. {Drive of the tools (B21D 28/007 and B21D 28/20 take precedence)}	35/007	. . . {Layered blanks (B21D 22/203 takes precedence; joining superposed plates B21D 39/031 , B21D 39/034 , B21D 39/035)}
28/005	. . {Adjustment of the punch stroke for compensating wear}	35/008	. . {involving vibration, e.g. ultrasonic}
28/007	. {Explosive cutting or perforating}	37/00	Tools as parts of machines covered by this subclass (forms or constructions of tools uniquely adapted for particular operations, see the relevant groups for the operations)
28/02	. Punching blanks or articles with or without obtaining scrap (cutting nails or pins from strips or sheet material B21G 3/26); Notching	37/01	. Selection of materials
28/04	. . Centering the work; Positioning the tools	37/02	. Die constructions enabling assembly of the die parts in different ways (B21D 37/06 takes precedence)
28/06	. . Making more than one part out of the same blank; Scrapless working	37/04	. Movable or exchangeable mountings for tools
28/08	. . . Zig-zag sequence working	37/06	. . Pivotaly-arranged tools, e.g. disengageable (die sets with dies pivoted to one another B21D 37/12)
28/10	. . Incompletely punching in such a manner that the parts are still coherent with the work	37/08	. Dies with different parts for several steps in a process
28/12	. . Punching using rotatable carriers	37/10	. Die sets; Pillar guides
28/125	. . . {with multi-tools}	37/12	. . Particular guiding equipment, {e.g. pliers}; Special arrangements for interconnection or cooperation of dies
28/14	. . Dies (ejecting or stripping-off devices arranged in punching machines or tools B21D 45/00)		
28/145	. . . {with means for slug retention, e.g. a groove}		
28/16	. . Shoulder or burr prevention {, e.g. fine-blanking}		
28/18	. . Yieldable, e.g. rubber, punching pads		
28/20	. . Applications of drives {for reducing noise or wear}		
28/22	. . Notching the peripheries of circular blanks, e.g. laminations for dynamo-electric machines		
28/24	. Perforating, i.e. punching holes		
28/243	. . {in profiles}		
28/246	. . {Selection of punches}		
28/26	. . in sheets or flat parts		
28/265	. . . {with relative movement of sheet and tools enabling the punching of holes in predetermined locations of the sheet, e.g. holes punching with template}		
28/28	. . in tubes or other hollow bodies		
28/285	. . . {punching outwards}		
28/30	. . in annular parts, e.g. rims		
28/32	. . in other articles of special shape		
28/325	. . . {using cam or wedge mechanisms, e.g. aerial cams}		
28/34	. . Perforating tools; Die holders		

37/14	• Particular arrangements for handling and holding in place complete dies	41/00	Application of procedures in order to alter the diameter of tube ends (B21D 39/00 takes precedence ; plastic tubes B29C 57/08)
37/142	• • {Spotting presses}	41/02	• Enlarging
37/145	• • {Die storage magazines}	41/021	• • {by means of tube-flaring hand tools}
37/147	• • {Tool exchange carts}	41/023	• • • {comprising rolling elements}
37/16	• Heating or cooling	41/025	• • {by means of impact-type swaging hand tools}
37/18	• Lubricating {, e.g. lubricating tool and workpiece simultaneously (lubricating workpieces for deep-drawing B21D 22/201)}	41/026	• • {by means of mandrels}
37/20	• Making tools by operations not covered by a single other subclass	41/028	• • • {expandable mandrels}
37/205	• • {Making cutting tools}	41/04	• Reducing; Closing
39/00	Application of procedures in order to connect objects or parts, e.g. coating with sheet metal otherwise than by plating ({joining mitred profiles B21D 53/745 ; } riveting B21J ; uniting components by forging or pressing to form integral members B21K 25/00 ; welding B23K ; press-fitting, force-fitting, or shrinking in general B23P 11/00 , B21D 19/00 ; by adhesives F16B 11/00 {; Connections as such F16L , F16B }); Tube expanders	41/045	• • {Closing}
39/02	• of sheet metal by folding, e.g. connecting edges of a sheet to form a cylinder	43/00	Feeding, positioning or storing devices combined with, or arranged in, or specially adapted for use in connection with, apparatus for working or processing sheet metal, metal tubes or metal profiles; Associations therewith of cutting devices (cutting devices associated with the tool, see the relevant group for the tool)
39/021	• • {for panels, e.g. vehicle doors}	43/003	• {Positioning devices (B21D 28/04 and B21D 28/265 take precedence; stops B21D 43/26 ; centering moving strips B21D 43/023)}
39/023	• • • {using rollers}	43/006	• {Feeding elongated articles, such as tubes, bars, or profiles}
39/025	• • {Hand tools}	43/02	• Advancing work in relation to the stroke of the die or tool
39/026	• • {Reinforcing the connection by locally deforming}	43/021	• • {Control or correction devices in association with moving strips}
39/028	• • {Reinforcing the connection otherwise than by deforming, e.g. welding}	43/022	• • • {Loop-control}
39/03	• of sheet metal otherwise than by folding	43/023	• • • {Centering devices, e.g. edge guiding}
39/031	• • {Joining superposed plates by locally deforming without slitting or piercing}	43/025	• • {Fault detection, e.g. misfeed detection}
39/032	• • • {by fitting a projecting part integral with one plate in a hole of the other plate}	43/026	• • {Combination of two or more feeding devices provided for in B21D 43/04 - B21D 43/18 }
39/034	• • {Joining superposed plates by piercing}	43/027	• • {Combined feeding and ejecting devices}
39/035	• • {Joining superposed plates by slitting}	43/028	• • {Tools travelling with material, e.g. flying punching machines}
39/037	• • {Interlocking butt joints}	43/04	• • by means in mechanical engagement with the work
39/038	• • {Perpendicular plate connections}	43/05	• • • specially adapted for multi-stage presses {(B21D 43/145 takes precedence)}
39/04	• of tubes with tubes; of tubes with rods {(crimped pipe joints as such F16L 13/14)}	43/052	• • • • {Devices having a cross bar}
39/042	• • {using explosives (by explosive welding B23K 20/08)}	43/055	• • • • {Devices comprising a pair of longitudinally and laterally movable parallel transfer bars}
39/044	• • {perpendicular}	43/057	• • • • {Devices for exchanging transfer bars or grippers; Idle stages, e.g. exchangeable}
39/046	• • {Connecting tubes to tube-like fittings}	43/06	• • • by positive or negative engaging parts cooperating with corresponding parts of the sheet or the like to be processed, e.g. carrier bolts or grooved section in the carriers
39/048	• • {using presses for radially crimping tubular elements}	43/08	• • • by rollers {(B21D 43/145 takes precedence)}
39/06	• of tubes in openings, e.g. rolling-in	43/09	• • • • by one or more pairs of rollers for feeding sheet or strip material
39/063	• • {for assembling ladders}	43/10	• • • by grippers {(B21D 43/055 , B21D 43/057 , B21D 43/145 take precedence)}
39/066	• • {using explosives}	43/105	• • • • {Manipulators, i.e. mechanical arms carrying a gripper element having several degrees of freedom}
39/08	• Tube expanders	43/11	• • • • for feeding sheet or strip material
39/10	• • with rollers for expanding only	43/12	• • • by chains or belts {(B21D 43/145 takes precedence)}
39/12	• • with rollers for expanding and flanging	43/13	• • • by linearly moving tables
39/14	• • with balls	43/14	• • • by turning devices, e.g. turn-tables
39/16	• • with torque limiting devices	43/145	• • • • {Turnover devices, i.e. by turning about a substantially horizontal axis}
39/18	• • Rollers of special shape		
39/20	• • with mandrels, e.g. expandable		
39/203	• • • {expandable by fluid or elastic material}		
39/206	• • • • {by axially compressing the elastic material}		

43/16	. . by gravity, e.g. chutes	51/18	. . vessels, e.g. tubs, vats, tanks, sinks, or the like
43/18	. . by means in pneumatic or magnetic engagement with the work	51/20	. . . barrels
43/20	. Storage arrangements; Piling or unpling (in general B65G , {B65H})	51/22	. . . pots, e.g. for cooking
43/22	. . Devices for piling sheets	51/24	. . high-pressure containers, e.g. boilers, bottles
43/24	. . Devices for removing sheets from a stack	51/26	. . cans or tins; Closing same in a permanent manner (making outlet arrangements B21D 51/38 ; welding or soldering B23K)
43/26	. Stops	51/2607	. . . {Locally embossing the walls of formed can bodies (B44B 5/00 , B44C 1/24 , B44C 3/085 take precedence; bulging B21D 51/2646)}
43/28	. Associations of cutting devices therewith	51/2615	. . . {Edge treatment of cans or tins}
43/282	. . {Discharging crop ends or the like}	51/2623	. . . . {Curling}
43/285	. . {Devices for handling elongated articles, e.g. bars, tubes or profiles (B21D 43/282 , B21D 43/287 take precedence)}	51/263	. . . . {Flanging}
43/287	. . {Devices for handling sheet or strip material (B21D 43/282 takes precedence)}	51/2638	. . . . {Necking}
45/00	Ejecting or stripping-off devices arranged in machines or tools dealt with in this subclass	51/2646	. . . {Of particular non cylindrical shape, e.g. conical, rectangular, polygonal, bulged}
45/003	. {in punching machines or punching tools}	51/2653	. . . {Methods or machines for closing cans by applying caps or bottoms}
45/006	. . {Stripping-off devices}	51/2661	. . . . {Sealing or closing means therefor}
45/02	. Ejecting devices	51/2669	. . . {Transforming the shape of formed can bodies; Forming can bodies from flattened tubular blanks; Flattening can bodies}
45/04	. . interrelated with motion of tool	51/2676	. . . {Cans or tins having longitudinal or helical seams}
45/06	. Stripping-off devices	51/2684	. . . {Cans or tins having circumferential side seams}
45/065	. . {for deep-drawn cans, e.g. using stripping fingers}	51/2692	. . . {Manipulating, e.g. feeding and positioning devices; Control systems}
45/08	. . interrelated with motion of tool	51/28	. . . Folding the longitudinal seam
45/10	. Combined ejecting and stripping-off devices	51/30	. . . Folding the circumferential seam
<u>Processing sheet metal or metal tubes, or processing metal profiles according to any of groups B21D 1/00 - B21D 45/00, in the manufacture of finished or semi-finished articles</u>		51/32	. . . . by rolling
47/00	Making rigid structural elements or units, e.g. honeycomb structures	51/34	. . . . by pressing
47/005	. {Making gratings}	51/36	. . collapsible or like thin-walled tubes, e.g. for toothpaste
47/01	. beams or pillars	51/365	. . . {involving fixing closure members to the tubes, e.g. nozzles}
47/02	. . by expanding	51/38	. . Making inlet or outlet arrangements of cans, tins, baths, bottles, or other vessels; Making can ends; Making closures
47/04	. composite sheet metal profiles	51/383	. . . {scoring lines, tear strips or pulling tabs}
49/00	Sheathing or stiffening objects (by winding wire or tape thereon B65H 54/00, B65H 81/00; specially adapted for manufacturing conductors or cables H01B 13/26)	51/386	. . . . {on the side-wall of containers}
49/005	. {Hollow objects}	51/40	. . . Making outlet openings, e.g. bung holes
51/00	Making hollow objects (from thick-walled or non uniform tubes B21K 21/00)	51/42	. . . . Making or attaching spouts
51/02	. characterised by the structure of the objects ({B21D 51/26 takes precedence)}	51/44	. . . Making closures, e.g. caps (folded of thin metal foils in the way of making paper caps B31D 5/00 ; making closures in conjunction with applying same B67B)
	<u>NOTE</u>	51/443	. . . . {easily removable closures, e.g. by means of tear strips}
	Making hollow objects characterised both by their structure and by their use is classified only in group B21D 51/16	51/446	. . . . {Feeding or removal of material}
51/04	. . built-up objects, e.g. objects with rigidly-attached bottom or cover	51/46	. . . . Placing sealings or sealing material ({moulding plastic sealing material into closure members B29C 70/80})
51/06	. . folded objects	51/48	. . . . Making crown caps
51/08	. . ball-shaped objects	51/50	. . . . Making screw caps
51/10	. . conically or cylindrically shaped objects	51/52	. . boxes, cigarette cases, or the like
51/12	. . objects with corrugated walls	51/54	. . cartridge cases, e.g. for ammunition, for letter carriers in pneumatic-tube plants
51/14	. . Flattening hollow objects for transport or storage; Re-forming same (making tubes from doubled flat material B21C 37/14)	53/00	Making other particular articles (making wire fabrics B21F; making chains or chain parts B21L)
51/16	. characterised by the use of the objects (making heat exchangers B21D 53/02)		

- | | |
|---|---|
| <p>53/02 . . heat exchangers {or parts thereof}, e.g. radiators, condensers {fins, headers}(making finned or ribbed tubes by fixing strip material or the like to tubes B21C 37/22)</p> <p>53/022 . . . {Making the fins}</p> <p>53/025 . . . {Louvered fins}</p> <p>53/027 . . {by helically or spirally winding elongated elements}</p> <p>53/04 . . of sheet metal</p> <p>53/045 . . . {by inflating partially united plates}</p> <p>53/06 . . of metal tubes</p> <p>53/08 . . of both metal tubes and sheet metal (connecting tubes in openings B21D 39/06)</p> <p>53/085 . . . {with fins places on zig-zag tubes or parallel tubes}</p> <p>53/10 . . parts of bearings; sleeves; valve seats or the like</p> <p>53/12 . . cages for bearings</p> <p>53/14 . . belts, e.g. machine-gun belts</p> <p>53/16 . . rings, e.g. barrel hoops</p> <p>53/18 . . of hollow or C-shaped cross-section, e.g. for curtains, for eyelets</p> <p>53/20 . . washers, e.g. for sealing</p> <p>53/22 . . . with means for preventing rotation</p> <p>53/24 . . nuts or like thread-engaging members</p> <p>53/26 . . wheels or the like</p> <p>53/261 . . {pulleys}</p> <p>53/262 . . {with inscriptions or the like, e.g. printing wheels}</p> <p>53/264 . . {wheels out of a single piece (B21D 53/261 takes precedence)}</p> <p>53/265 . . {parts of wheels (B21D 53/28, B21D 53/30 take precedence)}</p> <p>53/267 . . {blower wheels, i.e. wheels provided with fan elements}</p> <p>53/268 . . {wheels having spokes}</p> <p>53/28 . . gear wheels</p> <p>53/30 . . wheel rims</p> <p>53/32 . . wheel covers</p> <p>53/34 . . brake drums</p> <p>53/36 . . clips, clamps, or like fastening or attaching devices, e.g. for electric installation</p> <p>53/38 . . locksmith's goods, e.g. handles</p> <p>53/40 . . hinges, e.g. door hinge plates</p> <p>53/42 . . keys {(making keys by combined operations B23P 15/005)}</p> <p>53/44 . . fancy goods, e.g. jewellery products</p> <p>53/46 . . haberdashery, e.g. buckles, combs; pronged fasteners, e.g. staples</p> <p>53/48 . . buttons, e.g. press-buttons, snap fasteners</p> <p>53/50 . . metal slide-fastener parts</p> <p>53/52 . . . fastener elements; Attaching such elements so far as this procedure is combined with the process for making the elements</p> <p>53/54 . . . slides</p> <p>53/56 . . . stops</p> <p>53/58 . . end-pieces for laces or ropes</p> <p>53/60 . . cutlery wares; garden tools or the like</p> <p>53/62 . . spoons; table forks</p> <p>53/64 . . knives; scissors; cutting blades (B21D 53/72 takes precedence; handle portions B21D 53/70)</p> <p>53/642 . . . {scissors}</p> <p>53/645 . . . {safety razor blades}</p> <p>53/647 . . . {mower blades}</p> | <p>53/66 . . spades; shovels (handle portions B21D 53/70)</p> <p>53/68 . . rakes, garden forks, or the like (handle portions B21D 53/70)</p> <p>53/70 . . handle portions (B21D 53/72 takes precedence)</p> <p>53/72 . . sickles; scythes</p> <p>53/74 . . frames for openings, e.g. for windows, doors, handbags</p> <p>53/745 . . {Joining mitred profiles comprising punching the profiles on a corner-angle connecting piece}</p> <p>53/76 . . writing or drawing instruments, e.g. writing pens, erasing pens</p> <p>53/78 . . propeller blades; turbine blades</p> <p>53/80 . . dustproof covers; safety covers</p> <p>53/82 . . perforated music sheets; pattern sheets, e.g. for control purposes, stencils</p> <p>53/84 . . other parts for engines, e.g. connecting-rods</p> <p>53/845 . . {Making camshafts}</p> <p>53/86 . . other parts for bicycles or motorcycles</p> <p>53/88 . . other parts for vehicles, e.g. cowlings, mudguards</p> <p>53/883 . . {reflectors}</p> <p>53/886 . . {leaf springs}</p> <p>53/90 . . axle-housings</p> <p>53/92 . . other parts for aircraft</p> <p>55/00 Safety devices protecting the machine or the operator, specially adapted for apparatus or machines dealt with in this subclass (for presses in general B30B; safety devices in general F16P)</p> |
|---|---|