

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING (NOTES omitted)

SHAPING

B21 MECHANICAL METAL-WORKING WITHOUT ESSENTIALLY REMOVING MATERIAL; PUNCHING METAL (NOTES omitted)

B21B ROLLING OF METAL (auxiliary operations used in connection with metal-working operations covered in [B21](#), see [B21C](#); bending by rolling [B21D](#); manufacture of particular objects, e.g. screws, wheels, rings, barrels, balls, by rolling [B21H](#); pressure welding by means of a rolling mill [B23K 20/04](#))

NOTE

In this subclass, the following terms or expressions are used with the meanings indicated:

- "rolling" means rolling operations in which plastic deformations occur;
- "continuous process" means a process employing a mill train designed to have the workpiece enter one pair of rolls before leaving the preceding pair.

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.

1/00	Metal-rolling methods or mills for making semi-finished products of solid or profiled cross-section (B21B 17/00 - B21B 23/00 take precedence; with respect to composition of material to be rolled B21B 3/00 ; extending closed shapes of metal bands by simultaneous rolling at two or more zones B21B 5/00 ; metal-rolling stands as units B21B 13/00 ; continuous casting into moulds having walls formed by moving rolls B22D 11/06); Sequence of operations in milling trains; Layout of rolling-mill plant, e.g. grouping of stands; Succession of passes or of sectional pass alternations	1/0815	. . {from flat-rolled products, e.g. by longitudinal shearing}
		1/082	. . Piling sections having lateral edges specially adapted for interlocking with each other in order to build a wall
		1/085	. . Rail sections
		1/0855	. . . {Rerolling or processing worn or discarded rail sections}
		1/088	. . H- or I-sections
		1/0883	. . . {using forging or pressing devices}
		1/0886	. . . {using variable-width rolls}
		1/09	. . L-sections
		1/092	. . T-sections
		1/095	. . U-or channel sections
		1/098	. . Z-sections
		1/10	. . in a single two-high or universal rolling mill {stand (B21B 1/085 - B21B 1/098 take precedence)}
		1/12	. . in a continuous process {, i.e. without reversing stands (B21B 1/085 - B21B 1/098 take precedence)}
		1/14	. . in a non-continuous process {, i.e. at least one reversing stand (B21B 1/085 - B21B 1/098 take precedence)}
		1/16	. . for rolling {wire rods, bars, merchant bars, rounds} wire or material of like small cross-section
		1/163	. . {Rolling or cold-forming of concrete reinforcement bars or wire (reinforcement bars per se E04C 5/03); Rolls therefor}
		1/166	. . {Rolling wire into sections or flat ribbons}
		1/18	. . in a continuous process
		1/20	. . in a non-continuous process, (e.g. skew rolling, i.e. planetary cross rolling)
1/02	. for rolling heavy work, e.g. ingots, slabs, {blooms, or} billets, in which the cross-sectional form is unimportant {; Rolling combined with forging or pressing}		
2001/022	. . {Blooms or billets}		
1/024	. . {Forging or pressing (forging or pressing devices as units B21B 15/0035)}		
1/026	. . {Rolling}		
2001/028	. . {Slabs}		
1/04	. . in a continuous process		
1/06	. . in a non-continuous process {, e.g. triplet mill, reversing mill}		
1/08	. for rolling {structural sections, i.e.} work of special cross-section, e.g. angle steel (rolling metal of indefinite length in repetitive shapes specially designed for the manufacture of particular objects B21H 8/00)		
1/0805	. . {Flat bars, i.e. having a substantially rectangular cross-section}		
2001/081	. . {Roughening or texturing surfaces of structural sections, bars, rounds, wire rods}		

1/22	• for rolling {plates, strips,} bands or sheets of indefinite length (B21B 1/42 takes precedence)	9/00	Measures for carrying out rolling operations under special conditions, e.g. in vacuum or inert atmosphere to prevent oxidation of work; Special measures for removing fumes from rolling mills
2001/221	• • {by cold-rolling}	11/00	Subsidising the rolling process by subjecting rollers or work to vibrations, {e.g. ultrasonic vibrations}
1/222	• • {in a rolling-drawing process; in a multi-pass mill}	13/00	Metal-rolling stands, i.e. an assembly composed of a stand frame, rolls, and accessories (B21B 17/00 - B21B 23/00 take precedence)
1/224	• • {Edge rolling of flat products}	13/001	• {Convertible or tiltable stands, e.g. from duo to universal stands, from horizontal to vertical stands}
2001/225	• • {by hot-rolling}	2013/003	• {Inactive rolling stands}
1/227	• • {Surface roughening or texturing}	13/005	• {Cantilevered roll stands}
2001/228	• • {skin pass rolling or temper rolling}	2013/006	• {Multiple strand rolling mills; Mill stands with multiple caliber rolls}
1/24	• • in a continuous {or semi-continuous} process {(B21B 1/224 takes precedence)}	13/008	• {Skew rolling stands, e.g. for rolling rounds}
1/26	• • • by hot-rolling {, e.g. Steckel hot mill}	13/02	• with axes of rolls arranged horizontally
1/265	• • • {and by compressing or pushing the material in rolling direction}	2013/021	• • {Twin mills}
1/28	• • • by cold-rolling {, e.g. Steckel cold mill}	13/023	• • {the axis of the rolls being other than perpendicular to the direction of movement of the product, e.g. cross-rolling}
1/30	• • in a non-continuous process {(B21B 1/224 takes precedence)}	2013/025	• • {Quarto, four-high stands}
1/32	• • • in reversing {single stand} mills, e.g. with intermediate storage reels for accumulating work	2013/026	• • {Quinto, five high-stands}
1/34	• • • • by hot-rolling	2013/028	• • {Sixto, six-high stands}
1/36	• • • • by cold-rolling	13/04	• • Three-high arrangement
1/38	• for rolling sheets of limited length, e.g. folded sheets, superimposed sheets, {pack rolling} (B21B 1/40 takes precedence; folding sheets before, or separating layers after, rolling B21B 47/00)	13/06	• with axes of rolls arranged vertically {, e.g. edgers}
2001/383	• • {Cladded or coated products}	13/08	• with differently-directed roll axes, e.g. for the so-called "universal" rolling process
2001/386	• • {Plates}	13/10	• • all axes being arranged in one plane
1/40	• for rolling foils which present special problems, e.g. because of thinness	13/103	• • • {for rolling bars, rods or wire}
1/42	• for step-by-step or planetary rolling (making tubes by pilgrim-step rolling B21B 21/00)	2013/106	• • • {for sections, e.g. beams, rails}
1/46	• for rolling metal immediately subsequent to continuous casting (metal-rolling stands B21B 13/22 ; continuous casting B22D 11/00 , e.g. into moulds with rolls B22D 11/06)	13/12	• • axes being arranged in different planes
1/463	• • {in a continuous process, i.e. the cast not being cut before rolling}	13/14	• having counter-pressure devices acting on rolls to inhibit deflection of same under load; {Back-up rolls} (counter-pressure devices as such B21B 29/00)
1/466	• • {in a non-continuous process, i.e. the cast being cut before rolling}	13/142	• • {by axially shifting the rolls, e.g. rolls with tapered ends or with a curved contour for continuously-variable crown CVC}
3/00	Rolling materials of special alloys so far as the composition of the alloy requires or permits special rolling methods or sequences {; Rolling of aluminium, copper, zinc or other non-ferrous metals} (altering special metallurgical properties of alloys, other than structure consolidation or mechanical properties resulting therefrom C21D, C22F)	13/145	• • {Lateral support devices for rolls acting mainly in a direction parallel to the movement of the product}
2003/001	• {Aluminium or its alloys}	13/147	• • {Cluster mills, e.g. Sendzimir mills, Rohn mills, i.e. each work roll being supported by two rolls only arranged symmetrically with respect to the plane passing through the working rolls}
3/003	• {Rolling non-ferrous metals immediately subsequent to continuous casting, i.e. in-line rolling}	13/16	• with alternatively operative rolls {, e.g. revolver stands, turret mills}
2003/005	• {Copper or its alloys}	13/18	• for step-by-step or planetary rolling; {pendulum mills} (methods B21B 1/42 ; making tubes by pilgrim-step rolling B21B 21/00)
2003/006	• {Powder metal alloys}	13/20	• • for planetary rolling
2003/008	• {Zinc or its alloys}	13/22	• for rolling metal immediately subsequent to continuous casting, {i.e. in-line rolling of steel} (methods therefor B21B 1/46 ; continuous casting B22D 11/00 , e.g. into moulds with rolls B22D 11/06)
3/02	• Rolling special iron alloys {, e.g. stainless steel}	15/00	Arrangements for performing additional metal-working operations specially combined with or arranged in, or specially adapted for use in connection with, metal-rolling mills
5/00	Extending closed shapes of metal bands by rolling (manufacture of circular shapes, e.g. wheel rims, B21H 1/06)		

- 15/0007 . {Cutting or shearing the product}
- 2015/0014 . . {transversely to the rolling direction}
- 2015/0021 . . {in the rolling direction}
- 2015/0028 . {Drawing the rolled product}
- 15/0035 . {Forging or pressing devices as units}
- 15/0042 . . {Tool changers}
- 15/005 . . {Lubricating, cooling or heating means}
- 2015/0057 . {Coiling the rolled product}
- 2015/0064 . {Uncoiling the rolled product}
- 2015/0071 . {Levelling the rolled product}
- 2015/0078 . {Extruding the rolled product}
- 15/0085 . {Joining ends of material to continuous strip, bar or sheet}
- 2015/0092 . {Welding in the rolling direction}
- 15/02 . in which work is subjected to permanent internal twisting, e.g. for producing reinforcement bars for concrete

Rolling methods or mills specially designed for making or processing tubes (control of tube rolling B21B 37/78)

- 17/00 Tube-rolling by rollers of which the axes are arranged essentially perpendicular to the axis of the work, e.g. "axial" tube-rolling**
- 17/02 . with mandrel, {i.e. the mandrel rod contacts the rolled tube over the rod length} (B21B 17/08 takes precedence)
- 17/04 . . in a continuous process
- 17/06 . . in a discontinuous process
- 17/08 . with mandrel having one or more protrusions {, i.e. only the mandrel plugs contact the rolled tube; Press-piercing mills}
- 17/10 . . in a continuous process
- 17/12 . . in a discontinuous process {, e.g. plug-rolling mills}
- 17/14 . without mandrel {, e.g. stretch-reducing mills}
- 19/00 Tube-rolling by rollers arranged outside the work and having their axes not perpendicular to the axis of the work (straightening by rollers B21D)**
- 19/02 . the axes of the rollers being arranged essentially diagonally to the axis of the work, e.g. "cross" tube-rolling {; Diescher mills, Stiefel disc piercers or Stiefel rotary piercers}
- 19/04 . . Rolling basic material of solid, i.e. non-hollow, structure; Piercing {, e.g. rotary piercing mills}
- 19/06 . . Rolling hollow basic material, {e.g. Assel mills} (B21B 19/04 takes precedence; separating work from mandrel B21C 45/00)
- 19/08 . . . Enlarging tube diameter
- 19/10 . . . Finishing, e.g. smoothing, sizing {, reeling}
- 19/12 . the axes of the rollers being arranged essentially parallel to the axis of the work
- 19/14 . . Rolling tubes by means of additional rollers arranged inside the tubes
- 19/16 . . Rolling tubes without additional rollers arranged inside the tubes
- 21/00 Pilgrim-step tube-rolling {, i.e. pilger mills}**
- 21/005 . {with reciprocating stand, e.g. driving the stand}
- 21/02 . Rollers therefor
- 21/04 . Pilgrim-step feeding mechanisms (B21B 21/06 takes precedence)
- 21/045 . . {for reciprocating stands}
- 21/06 . Devices for revolving work between the steps

- 21/065 . . {for reciprocating stands}
- 23/00 Tube-rolling not restricted to methods provided for in only one of groups B21B 17/00, B21B 19/00, B21B 21/00, e.g. combined processes {planetary tube rolling, auxiliary arrangements, e.g. lubricating, special tube blanks, continuous casting combined with tube rolling} (B21B 25/00 takes precedence)**
- 2023/005 . {Roughening or texturing surfaces of tubes}
- 25/00 Mandrels for metal tube rolling mills, e.g. mandrels of the types used in the methods covered by group B21B 17/00; Accessories or auxiliary means therefor {; Construction of, or alloys for, mandrels or plugs}**
- 25/02 . Guides, supports, or abutments for mandrels, e.g. carriages {or steadiers}; Adjusting devices for mandrels
- 25/04 . Cooling or lubricating mandrels during operation
- 25/06 . Interchanging mandrels {, fixing plugs on mandrel rods or cooling during interchanging mandrels (separating tubes from mandrels B21C 45/00)}
- 27/00 Rolls, {roll alloys or roll fabrication} (shape of working surfaces required by special processes B21B 1/00); Lubricating, cooling or heating rolls while in use**
- 27/005 . {Rolls with a roughened or textured surface; Methods for making same}
- 27/02 . Shape or construction of rolls (for rolling metal of indefinite length in repetitive shapes specially designed for the manufacture of particular objects B21H 8/02 {; B21B 27/005 takes precedence})
- 27/021 . . {Rolls for sheets or strips}
- 2027/022 . . . {Rolls having tapered ends}
- 27/024 . . {Rolls for bars, rods, rounds, tubes, wire or the like}
- 27/025 . . . {Skew rolls}
- 27/027 . . {Vertical rolls}
- 27/028 . . {Variable-width rolls}
- 27/03 . . Sleeved rolls { (B21B 27/028 takes precedence)}
- 27/032 . . . {Rolls for sheets or strips}
- 27/035 . . . {Rolls for bars, rods, rounds, tubes, wire or the like}
- 27/037 {Skew rolls}
- 27/05 . . . with deflectable sleeves
- 27/055 {with sleeves radially deflectable on a stationary beam by means of hydraulic supports (in general F16C 13/00; for paper-making machines D21G 1/00; regulating devices therefor B21B 37/36)}
- 27/06 . Lubricating, cooling or heating rolls
- 27/08 . . internally
- 2027/083 . . . {cooling internally}
- 2027/086 . . . {heating internally}
- 27/10 . . externally
- 2027/103 . . . {cooling externally}
- 27/106 . . . {Heating the rolls}
- 28/00 Maintaining rolls or rolling equipment in effective condition (lubricating, cooling or heating rolls while in use B21B 27/06)**
- 28/02 . Maintaining rolls in effective condition, e.g. reconditioning

28/04	. . while in use, e.g. polishing {or grinding while the rolls are in their stands}	33/02	. Preventing fracture of rolls
29/00	Counter-pressure devices acting on rolls to inhibit deflection of same under load, e.g. backing rolls {; Roll bending devices, e.g. hydraulic actuators acting on roll shaft ends (control devices responsive to roll bending B21B 37/38)}	35/00	Drives for metal-rolling mills {, e.g. hydraulic drives}
		2035/005	. {Hydraulic drive motors}
		35/02	. for continuously-operating mills (B21B 35/10 , B21B 35/12 take precedence)
		35/025	. . {for stretch-reducing of tubes}
31/00	Rolling stand structures; Mounting, adjusting, or interchanging rolls, roll mountings, or stand frames	35/04	. . each stand having its own motor or motors
31/02	. Rolling stand frames {or housings}; Roll mountings {; Roll chocks}	35/06	. for non-continuously-operating mills or for single stands (B21B 35/10 , B21B 35/12 take precedence)
2031/021	. . {Integral tandem mill housings}	35/08	. . for reversing rolling mills
2031/023	. . {Transverse shifting one housing}	35/10	. Driving arrangements for rolls which have only a low-power drive; Driving arrangements for rolls which receive power from the shaft of another roll
2031/025	. . {Shifting the stand in or against the rolling direction}	2035/103	. . {Fluid-driven rolls or rollers}
2031/026	. . {Transverse shifting the stand}	2035/106	. . {Non-driven or idler rolls or rollers}
31/028	. . {Prestressing of rolls or roll mountings in stand frames}	35/12	. Toothed-wheel gearings specially adapted for metal-rolling mills; Housings or mountings therefor
31/04	. . with tie rods {in frameless stands}, e.g. prestressed tie rods	35/14	. Couplings, driving spindles, or spindle carriers specially adapted for, or specially arranged in, metal-rolling mills (couplings or shafts in general F16)
31/06	. . Fastening stands or frames to foundation, e.g. to the sole plate (in general F16M)	35/141	. . {Rigid spindle couplings, e.g. coupling boxes placed on roll necks (rigid couplings in general F16D 1/00)}
31/07	. Adaptation of roll {neck} bearings (bearings in general F16C)	35/142	. . {Yielding spindle couplings; Universal joints for spindles (yielding couplings in general F16D 3/00)}
2031/072	. . {Bearing materials}	35/143	. . . {having slidably-interengaging teeth, e.g. gear-type couplings (universal joints with the coupling parts having slidably-interengaging teeth, in general, F16D 3/18)}
31/074	. . {Oil film bearings, e.g. "Morgoil" bearings}	35/144 {Wobbler couplings}
31/076	. . {Cooling; Lubricating roller bearings}	35/145	. . . {Hooke's joints or the like with each coupling part pivoted with respect to an intermediate member (Hooke's joints in general F16D 3/26)}
31/078	. . {Sealing devices (sealings in general F16J 15/00)}	35/146 {Tongue and slipper joints (tongue and slipper joints in general F16D 3/265)}
31/08	. Interchanging rolls, roll mountings, or stand frames {, e.g. using C-hooks; Replacing roll chocks on roll shafts}	35/147	. . {Lubrication of spindle couplings}
31/10	. . by horizontally displacing {, i.e. horizontal roll changing}	35/148	. . {Spindle carriers or balancers}
31/103	. . . {Manipulators or carriages therefor}	2035/149	. . {Measuring devices for spindles or couplings}
31/106	. . . {Vertical displacement of rolls or roll chocks during horizontal roll changing}	37/00	Control devices or methods specially adapted for metal-rolling mills or the work produced thereby (methods or devices for measuring specially adapted for metal-rolling mills B21B 38/00)
31/12	. . by vertically displacing	2037/002	. {Mass flow control}
31/14	. . by pivotally displacing	37/005	. {Control of time interval or spacing between workpieces}
31/16	. Adjusting {or positioning} rolls (control devices B21B 37/00)	37/007	. {Control for preventing or reducing vibration, chatter or chatter marks (B21B 37/66 takes precedence)}
31/18	. . by moving rolls axially	37/16	. Control of thickness, width, diameter or other transverse dimensions (B21B 37/58 takes precedence)
31/185	. . . {and by crossing rolls}	37/165	. . {responsive mainly to the measured thickness of the product}
31/20	. . by moving rolls perpendicularly to roll axis	37/18	. . Automatic gauge control
31/203	. . . {Balancing rolls}	37/20	. . . in tandem mills
2031/206	. . . {Horizontal offset of work rolls}	37/22	. . Lateral spread control; Width control, e.g. by edge rolling
31/22	. . . mechanically {, e.g. by thrust blocks, inserts for removal}	37/24	. . Automatic variation of thickness according to a predetermined programme
31/24 by screws		
31/26 Adjusting eccentrically-mounted roll bearings		
31/28 by toggle-lever mechanisms		
31/30 by wedges or their equivalent		
31/32	. . . by liquid pressure {, e.g. hydromechanical adjusting}		
33/00	Safety devices not otherwise provided for (safety devices in general F16P); Breaker blocks; Devices for freeing jammed rolls {for handling cobbles; Overload safety devices}		
2033/005	. {Cobble-freeing}		

37/26	. . . for obtaining one strip having successive lengths of different constant thickness	39/00	Arrangements for moving, supporting, or positioning work, or controlling its movement, combined with or arranged in, or specially adapted for use in connection with, metal-rolling mills (guiding, conveying, or accumulating easily-flexible work in loops or curves B21B 41/00 ; specially associated with cooling-beds B21B 43/00 ; conveying or transporting in general B65G)
37/28	. Control of flatness or profile during rolling of strip, sheets or plates	39/002	. {Piling, unpling, unscrambling}
37/30	. . using roll camber control	39/004	. {Transverse moving}
37/32	. . . by cooling, heating or lubricating the rolls	39/006	. {Pinch roll sets}
37/34	. . . by hydraulic expansion of the rolls	39/008	. {Rollers for roller conveyors (roller-ways in general B65G 13/00 , B21B 39/00)}
37/36	. . . by radial displacement of the roll sleeve on a stationary roll beam by means of hydraulic supports	39/02	. Feeding or supporting work; Braking or tensioning arrangements {, e.g. threading arrangements }
37/38	. . using roll bending (B21B 37/42 takes precedence)	39/04	. . Lifting or lowering work for conveying purposes, e.g. tilting tables arranged immediately in front of or behind the pass (turn-over or like manipulating means as such B21B 39/20)
37/40	. . using axial shifting of the rolls (B21B 37/42 takes precedence)	39/06	. . Pushing or forcing work into pass
37/42	. . using a combination of roll bending and axial shifting of the rolls	39/08	. . Braking or tensioning arrangements
37/44	. . using heating, lubricating or water-spray cooling of the product	39/082	. . . {Bridle devices}
37/46	. Roll speed or drive motor control (B21B 37/52 , B21B 37/60 take precedence)	39/084	. . . {Looper devices}
37/48	. Tension control; Compression control	39/086	. . . {Braking devices}
37/50	. . by looper control	39/088	. . . {Bumpers, stopping devices}
37/52	. . by drive motor control	39/10	. . Arrangement or installation of feeding rollers in rolling stands
37/54	. . . including coiler drive control, e.g. reversing mills	39/12	. . Arrangement or installation of roller tables in relation to a roll stand
37/56	. Elongation control	39/14	. Guiding, positioning or aligning work (B21B 43/12 takes precedence ; guides in which work is subjected to permanent internal twisting B21B 15/02)
37/58	. Roll-force control; Roll-gap control {(B21B 38/105 takes precedence)}	39/16	. . immediately before entering or after leaving the pass
37/60	. . by control of a motor which drives an adjusting screw	39/165	. . . {Guides or guide rollers for rods, bars, rounds, tubes (B21B 39/28 takes precedence); Aligning guides}
37/62	. . by control of a hydraulic adjusting device	39/18	. . Switches for directing work in metal-rolling mills or trains
37/64	. . Mill spring or roll spring compensation systems, e.g. control of prestressed mill stands	39/20	. Revolving, turning-over, or like manipulation of work, {e.g. revolving in trio stands } (guides in which work is subjected to permanent internal twisting B21B 15/02)
37/66	. . Roll eccentricity compensation systems	39/22	. . by tipping, e.g. by lifting one side by levers or wedges (B21B 39/26 , B21B 39/28 take precedence)
37/68	. Camber or steering control for strip, sheets or plates, e.g. preventing meandering	39/223	. . . {Side-guard manipulators}
37/70	. Length control (B21B 37/56 takes precedence)	39/226	. . . {Tilttable ingot chairs}
37/72	. Rear end control; Front end control	39/24	. . by tongs or grippers
37/74	. Temperature control, e.g. by cooling or heating the rolls or the product (B21B 37/32 , B21B 37/44 take precedence)	39/26	. . by members, e.g. grooved, engaging opposite sides of the work and moved relatively to each other to revolve the work
37/76	. . Cooling control on the run-out table	39/28	. . by means of guide members shaped to revolve the work during its passage
37/78	. Control of tube rolling	39/30	. . by lodging it in a rotating ring manipulator or ring segment manipulator
38/00	Methods or devices for measuring, {detecting or monitoring} specially adapted for metal-rolling mills, e.g. position detection, inspection of the product {(control devices or methods B21B 37/00)}	39/32	. . Devices specially adapted for turning sheets
2038/002	. {Measuring axial forces of rolls}	39/34	. Arrangements or constructional combinations specifically designed to perform functions covered by more than one of groups B21B 39/02 , B21B 39/14 , B21B 39/20
2038/004	. {Measuring scale thickness}	41/00	Guiding, conveying, or accumulating easily-flexible work, e.g. wire, sheet metal bands, in loops or curves; Loop lifters
38/006	. {for measuring temperature}		
38/008	. {Monitoring or detecting vibration, chatter or chatter marks}		
38/02	. for measuring flatness or profile of strips		
38/04	. for measuring thickness, width, diameter or other transverse dimensions of the product		
38/06	. for measuring tension or compression		
38/08	. for measuring roll-force		
38/10	. for measuring roll-gap, e.g. pass indicators		
38/105	. . {Calibrating or presetting roll-gap}		
38/12	. for measuring roll camber		

41/02	• Returning work to repeat the pass or passes {within the same stand}	2045/0236	• • {Laying heads for overlapping rings on cooling conveyor}
41/04	• • above or underneath the rolling stand or rolls	45/0239	• • {Lubricating}
41/06	• in which the direction of movement of the work is turned through approximately 180 degrees, {e.g. repeaters, i.e. from one stand to another}	45/0242	• • • {Lubricants}
41/08	• without overall change in the general direction of movement of the work	45/0245	• • • {Lubricating devices}
41/10	• • Loop deflectors {(B21B 39/084 takes precedence)}	45/0248	• • • • {using liquid lubricants, e.g. for sections, for tubes}
41/12	• Arrangements of interest only with respect to provision for indicating or controlling operations	45/0251	• • • • • {for strips, sheets, or plates}
43/00	Cooling beds, whether stationary or moving; Means specially associated with cooling beds, e.g. for braking work or for transferring it to or from the bed (conveying means in general B65G)	2045/0254	• • • • • {for structural sections, e.g. H-beams}
43/003	• {Transfer to bed}	45/0257	• • • • • {for wire, rods, rounds, bars}
43/006	• {Transfer from bed}	2045/026	• • • • • {for tubes}
43/02	• Cooling beds comprising rakes {racks, walking beams} or bars (B21B 43/10 takes precedence)	45/0263	• • • • • {using solid lubricants}
43/04	• Cooling beds comprising rolls or worms	45/0266	• • {Measuring or controlling thickness of liquid films}
43/06	• Cooling beds comprising carriages (B21B 43/08 takes precedence)	45/0269	• • {Cleaning}
43/08	• Cooling beds comprising revolving drums or recycling chains {or discs}	45/0272	• • • {Cleaning compositions}
43/10	• Cooling beds with other work-shifting elements projecting through the bed	45/0275	• • • {Cleaning devices}
43/12	• Devices for positioning workpieces "flushed", i.e. with all their axial ends arranged in line on cooling beds or on co-operating conveyors {, e.g. before cutting}	45/0278	• • • • {removing liquids}
45/00	Devices for surface {or other} treatment of work, specially combined with or arranged in, or specially adapted for use in connection with, metal-rolling mills (B21B 15/00, {B21B 1/227 and B21B 27/005} take precedence; technical features of scaling-off devices B21C 43/00)	45/0281	• • • • • {removing coolants}
45/002	• {Increasing friction between work and working rolls by using friction increasing substance}	45/0284	• • • • • {removing lubricants}
45/004	• {Heating the product}	45/0287	• • • • • {removing solid particles, e.g. dust, rust}
2045/006	• • {in vacuum or in inert atmosphere}	45/029	• • • {Liquid recovering devices}
45/008	• {Heat shields}	45/0293	• • • • {Recovering coolants}
45/02	• for lubricating, cooling, or cleaning {(in particular in combination with forging or pressing devices B21B 15/005, control of flatness or profile using lubricating or cooling B21B 37/44)}	45/0296	• • • • {Recovering lubricants}
45/0203	• • {Cooling}	45/04	• for de-scaling {, e.g. by brushing (descaling of rod or wire B21C 43/04)}
45/0206	• • • {Coolants}	45/06	• • of strip material (B21B 45/08 takes precedence)
45/0209	• • • {Cooling devices, e.g. using gaseous coolants}	45/08	• • hydraulically
2045/0212	• • • • {using gaseous coolants}	47/00	Auxiliary arrangements, devices or methods in connection with rolling of multi-layer sheets of metal (soaking pits C21D 9/70)
45/0215	• • • • • {using liquid coolants, e.g. for sections, for tubes}	47/02	• for folding sheets before rolling
45/0218	• • • • • {for strips, sheets, or plates (B21B 45/023, B21B 45/0233 take precedence)}	47/04	• for separating layers after rolling
2045/0221	• • • • • {for structural sections, e.g. H-beams}	99/00	Subject matter not provided for in other groups of this subclass
45/0224	• • • • • {for wire, rods, rounds, bars (B21B 45/023, B21B 45/0233 take precedence)}		
2045/0227	• • • • • {for tubes}		
45/023	• • • • • {by immersion in a bath}		
45/0233	• • • • • {Spray nozzles, Nozzle headers; Spray systems}		
		2201/00	Special rolling modes
		2201/02	• Austenitic rolling
		2201/04	• Ferritic rolling
		2201/06	• Thermomechanical rolling
		2201/08	• Batch rolling
		2201/10	• Endless rolling
		2201/12	• Isothermic rolling
		2201/14	• Soft reduction
		2201/16	• Two-phase or mixed-phase rolling
		2201/18	• Vertical rolling pass lines
		Equipment codes	
		2203/00	Auxiliary arrangements, devices or methods in combination with rolling mills or rolling methods
		2203/02	• Backlash elimination
		2203/04	• Brakes
		2203/06	• Cassettes
		2203/08	• Clutches
		2203/10	• Counterweights
		2203/12	• Covers or shieldings
		2203/14	• Dummy bars or slabs
		2203/16	• Eccentrics
		2203/18	• Rolls or rollers

2203/182	. . Fluid driven rolls or rollers	2265/22	. Pass schedule
2203/185	. . Reversible rolls for changing grooves	2265/24	. asymmetric rolling
2203/187	. . Tilting rolls	2267/00	Roll parameters
2203/20	. Flywheels	2267/02	. Roll dimensions
2203/22	. Hinged chocks	2267/06	. . Roll diameter
2203/24	. Hydrostatic bearings or guides	2267/065	. . . Top and bottom roll have different diameters; Asymmetrical rolling
2203/26	. Motors, drives	2267/08	. . Roll eccentricity
2203/28	. Mounting or dismounting bearing and chock as a unit	2267/10	. Roughness of roll surface
2203/30	. Quick or bayonet couplings	2267/12	. Roll temperature
2203/32	. Roll changing stools	2267/18	. Roll crown; roll profile
2203/34	. Rotational position or alignment	2267/19	. . Thermal crown
2203/36	. Spacers	2267/20	. . Ground camber or profile
2203/38	. Strain gauges	2267/22	. . Hydraulic expansion of rolls
2203/40	. Torsion bars or shafts	2267/24	. Roll wear
2203/42	. Turntables	2267/26	. Hardness of the roll surface
2203/44	. Vibration dampers	2267/28	. Elastic moduli of rolls
2205/00	Particular shaped rolled products	2269/00	Roll bending or shifting
2205/02	. Tailored blanks	2269/02	. Roll bending; vertical bending of rolls
2205/04	. Taper- or wedge-shaped profiles	2269/04	. . Work roll bending
2261/00	Product parameters	2269/06	. . Intermediate roll bending
2261/02	. Transverse dimensions	2269/08	. . Back-up roll bending
2261/04	. . Thickness, gauge	2269/10	. Horizontal bending of rolls
2261/043	. . . Blanks with variable thickness in the rolling direction	2269/12	. Axial shifting the rolls
2261/046	. . . Different thickness in width direction	2269/14	. . Work rolls
2261/05	. . . Different constant thicknesses in one rolled product	2269/16	. . Intermediate rolls
2261/06	. . Width	2269/18	. . Back-up rolls
2261/065	. . . Blanks with variable width	2271/00	Mill stand parameters
2261/08	. . Diameter	2271/02	. Roll gap, screw-down position, draft position
2261/10	. . Cross-sectional area	2271/025	. . Tapered roll gap
2261/12	. Length	2271/04	. . Screw-down speed, draft speed
2261/14	. Roughness	2271/06	. Mill spring
2261/18	. Weight	2273/00	Path parameters
2261/20	. Temperature	2273/02	. Vertical deviation, e.g. slack, looper height
2261/21	. . Temperature profile	2273/04	. Lateral deviation, meandering, camber of product
2261/22	. Hardness	2273/06	. Threading
2263/00	Shape of product	2273/08	. . Threading-in or before threading-in
2263/02	. Profile, e.g. of plate, hot strip, sections	2273/10	. . Threading-out or after threading-out
2263/04	. Flatness	2273/12	. End of product
2263/06	. . Edge waves	2273/14	. . Front end or leading end
2263/08	. . Centre buckles	2273/16	. . Tail or rear end
2263/10	. Lateral spread defects	2273/18	. Presence of product
2263/12	. . Dog bone	2273/20	. Track of product
2263/16	. Alligatoring	2273/22	. Aligning on rolling axis, e.g. of roll calibers
2263/20	. End shape; fish tail; tongue	2273/24	. Web positioning
2263/30	. Shape in top view	2275/00	Mill drive parameters
2265/00	Forming parameters	2275/02	. Speed
2265/02	. Tension	2275/04	. . Roll speed
2265/04	. . Front or inlet tension	2275/05	. . . Speed difference between top and bottom rolls
2265/06	. . Interstand tension	2275/06	. . Product speed
2265/08	. . Back or outlet tension	2275/08	. . Coiler speed
2265/10	. Compression, e.g. longitudinal compression	2275/10	. Motor power; motor current
2265/12	. Rolling load or rolling pressure; roll force	2275/12	. . Roll torque
2265/14	. Reduction rate		
2265/16	. . Extension		
2265/18	. Elongation		
2265/20	. Slip		