

CPC COOPERATIVE PATENT CLASSIFICATION

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.

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	1/10	. . in a single two-high or universal rolling mill {stand (B21B 1/085 - B21B 1/098 take precedence)}
1/02	. for rolling heavy work, e.g. ingots, slabs, {blooms} billets, in which the cross-sectional form is unimportant {Rolling combined with forging or pressing}	1/12	. . in a continuous process, {i.e. without reversing stands (B21B 1/085 - B21B 1/098 take precedence)}
2001/022	. . {Blooms or billets}	1/14	. . in a non-continuous process, {i.e. at least one reversing stand (B21B 1/085 - B21B 1/098 take precedence)}
1/024	. . {Forging or pressing (forging or pressing devices as units B21B 15/0035)}	1/16	. for rolling {wire rods, bars, merchant bars, rounds} wire or material of like small cross-section
1/026	. . {Rolling}	1/163	. . {Rolling or cold-forming of concrete reinforcement bars or wire (reinforcement bars per se E04C 5/03); Rolls therefor}
2001/028	. . {Slabs}	1/166	. . {Rolling wire into sections or flat ribbons}
1/04	. . in a continuous process	1/18	. . in a continuous process
1/06	. . in a non-continuous process, {e.g. triplet mill, reversing mill}	1/20	. . in a non-continuous process, {e.g. skew rolling, i.e. planetary cross rolling}
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)	1/22	. for rolling {plates, strips,} bands or sheets of indefinite length (B21B 1/42 takes precedence)
1/0805	. . {Flat bars, i.e. having a substantially rectangular cross-section}	2001/221	. . {by cold-rolling}
2001/081	. . {Roughening or texturing surfaces of structural sections, bars, rounds, wire rods}	1/222	. . {in a rolling-drawing process; in a multi-pass mill}
1/0815	. . {from flat-rolled products, e.g. by longitudinal shearing}	1/224	. . {Edge rolling of flat products}
1/082	. . Piling sections having lateral edges specially adapted for interlocking with each other in order to build a wall	2001/225	. . {by hot-rolling}
1/085	. . Rail sections	1/227	. . {Surface roughening or texturing}
1/0855	. . . {Rerolling or processing worn or discarded rail sections}	2001/228	. . {skin pass rolling or temper rolling}
1/088	. . H- or I-sections	1/24	. . in a continuous {or semi-continuous} process {(B21B 1/224 takes precedence)}
1/0883	. . . {using forging or pressing devices}	1/26	. . . by hot-rolling, {e.g. Steckel hot mill}
1/0886	. . . {using variable-width rolls}	1/265	. . . . {and by compressing or pushing the material in rolling direction}
1/09	. . L-sections	1/28	. . . by cold-rolling, {e.g. Steckel cold mill}
1/092	. . T-sections	1/30	. . in a non-continuous process {(B21B 1/224 takes precedence)}
1/095	. . U-or channel sections	1/32	. . . in reversing {single stand} mills, e.g. with intermediate storage reels for accumulating work
1/098	. . Z-sections	1/34	. . . . by hot-rolling
		1/36	. . . . by cold-rolling
		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)
		2001/383	. . {Cladded or coated products}
		2001/386	. . {Plates}
		1/40	. for rolling foils which present special problems, e.g. because of thinness

1/42	• for step-by-step or planetary rolling (making tubes by pilgrim-step rolling B21B 21/00)	13/10	• • all axes being arranged in one plane
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)	13/103	• • • {for rolling bars, rods or wire}
1/463	• • {in a continuous process, i.e. the cast not being cut before rolling}	2013/106	• • • {for sections, e.g. beams, rails}
1/466	• • {in a non-continuous process, i.e. the cast being cut before rolling}	13/12	• • axes being arranged in different planes
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)	13/14	• 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)
2003/001	• {Aluminium or its alloys}	13/142	• • {by axially shifting the rolls, e.g. rolls with tapered ends or with a curved contour for continuously-variable crown CVC}
3/003	• {Rolling non-ferrous metals immediately subsequent to continuous casting, i.e. in-line rolling}	13/145	• • {Lateral support devices for rolls acting mainly in a direction parallel to the movement of the product}
2003/005	• {Copper 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}
2003/006	• {Powder metal alloys}	13/16	• with alternatively operative rolls, {e.g. revolver stands, turret mills}
2003/008	• {Zinc 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)
3/02	• Rolling special iron alloys, {e.g. stainless steel}	13/20	• • for planetary rolling
5/00	Extending closed shapes of metal bands by rolling (manufacture of circular shapes, e.g. wheel rims, B21H 1/06)	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)
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	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
11/00	Subsidising the rolling process by subjecting rollers or work to vibrations, {e.g. ultrasonic vibrations}	15/0007	• {Cutting or shearing the product}
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; details, component parts, accessories, auxiliary means, procedures in connection with metal rolling, see the relevant groups)	2015/0014	• • {transversely to the rolling direction}
13/001	• {Convertible or tiltable stands, e.g. from duo to universal stands, from horizontal to vertical stands}	2015/0021	• • {in the rolling direction}
2013/003	• {Inactive rolling stands}	2015/0028	• {Drawing the rolled product}
13/005	• {Cantilevered roll stands}	15/0035	• {Forging or pressing devices as units}
2013/006	• {Multiple strand rolling mills; Mill stands with multiple caliber rolls}	15/0042	• • {Tool changers}
13/008	• {Skew rolling stands, e.g. for rolling rounds}	15/005	• • {Lubricating, cooling or heating means}
13/02	• with axes of rolls arranged horizontally	2015/0057	• {Coiling the rolled product}
2013/021	• • {Twin mills}	2015/0064	• {Uncoiling the rolled product}
13/023	• • {the axis of the rolls being other than perpendicular to the direction of movement of the product, e.g. cross-rolling}	2015/0071	• {Levelling the rolled product}
2013/025	• • {Quarto, four-high stands}	2015/0078	• {Extruding the rolled product}
2013/026	• • {Quinto, five high-stands}	15/0085	• {Joining ends of material to continuous strip, bar or sheet}
2013/028	• • {Sixto, six-high stands}	2015/0092	• {Welding in the rolling direction}
13/04	• • Three-high arrangement	15/02	• in which work is subjected to permanent internal twisting, e.g. for producing reinforcement bars for concrete
13/06	• with axes of rolls arranged vertically, {e.g. edgers }		
13/08	• with differently-directed roll axes, e.g. for the so-called "universal" rolling process		
		<u>Rolling methods or mills specially designed for making or processing tubes (control of tube rolling B21B 37/78)</u>	
		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	<ul style="list-style-type: none"> with mandrel having one or more protrusions, {i.e. only the mandrel plugs contact the rolled tube; Press-piercing mills} 	27/02	<ul style="list-style-type: none"> 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)
17/10	<ul style="list-style-type: none"> in a continuous process 	27/021	<ul style="list-style-type: none"> {Rolls for sheets or strips}
17/12	<ul style="list-style-type: none"> in a discontinuous process, {e.g. plug-rolling mills} 	2027/022	<ul style="list-style-type: none"> {Rolls having tapered ends}
17/14	<ul style="list-style-type: none"> without mandrel, {e.g. stretch-reducing mills} 	27/024	<ul style="list-style-type: none"> {Rolls for bars, rods, rounds, tubes, wire or the like}
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)	27/025	<ul style="list-style-type: none"> {Skew rolls}
19/02	<ul style="list-style-type: none"> 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, Stiefel rotary piercers} 	27/027	<ul style="list-style-type: none"> {Vertical rolls}
19/04	<ul style="list-style-type: none"> Rolling basic material of solid, i.e. non-hollow, structure; Piercing, {e.g. rotary piercing mills} 	27/028	<ul style="list-style-type: none"> {Variable-width rolls}
19/06	<ul style="list-style-type: none"> Rolling hollow basic material, {e.g. Assel mills} (B21B 19/04 takes precedence; separating work from mandrel B21C 45/00) 	27/03	<ul style="list-style-type: none"> Sleeved rolls {(B21B 27/028 takes precedence)}
19/08	<ul style="list-style-type: none"> Enlarging tube diameter 	27/032	<ul style="list-style-type: none"> {Rolls for sheets or strips}
19/10	<ul style="list-style-type: none"> Finishing, e.g. smoothing, sizing, {reeling} 	27/035	<ul style="list-style-type: none"> {Rolls for bars, rods, rounds, tubes, wire or the like}
19/12	<ul style="list-style-type: none"> the axes of the rollers being arranged essentially parallel to the axis of the work 	27/037	<ul style="list-style-type: none"> {Skew rolls}
19/14	<ul style="list-style-type: none"> Rolling tubes by means of additional rollers arranged inside the tubes 	27/05	<ul style="list-style-type: none"> with deflectable sleeves
19/16	<ul style="list-style-type: none"> Rolling tubes without additional rollers arranged inside the tubes 	27/055	<ul style="list-style-type: none"> {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)}
21/00	Pilgrim-step tube-rolling, {i.e. pilger mills}	27/06	<ul style="list-style-type: none"> Lubricating, cooling or heating rolls
21/005	<ul style="list-style-type: none"> {with reciprocating stand, e.g. driving the stand} 	27/08	<ul style="list-style-type: none"> internally
21/02	<ul style="list-style-type: none"> Rollers therefor 	2027/083	<ul style="list-style-type: none"> {cooling internally}
21/04	<ul style="list-style-type: none"> Pilgrim-step feeding mechanisms (B21B 21/06 takes precedence) 	2027/086	<ul style="list-style-type: none"> {heating internally}
21/045	<ul style="list-style-type: none"> {for reciprocating stands} 	27/10	<ul style="list-style-type: none"> externally
21/06	<ul style="list-style-type: none"> Devices for revolving work between the steps 	2027/103	<ul style="list-style-type: none"> {cooling externally}
21/065	<ul style="list-style-type: none"> {for reciprocating stands} 	27/106	<ul style="list-style-type: none"> {Heating the rolls}
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)	28/00	Maintaining rolls or rolling equipment in effective condition (lubricating, cooling or heating rolls while in use B21B 27/06)
2023/005	<ul style="list-style-type: none"> {Roughening or texturing surfaces of tubes} 	28/02	<ul style="list-style-type: none"> Maintaining rolls in effective condition, e.g. reconditioning
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}	28/04	<ul style="list-style-type: none"> while in use, e.g. polishing {or grinding while the rolls are in their stands}
25/02	<ul style="list-style-type: none"> Guides, supports, or abutments for mandrels, e.g. carriages {or steadiers}; Adjusting devices for mandrels 	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)}
25/04	<ul style="list-style-type: none"> Cooling or lubricating mandrels during operation 	31/00	Rolling stand structures; Mounting, adjusting, or interchanging rolls, roll mountings, or stand frames
25/06	<ul style="list-style-type: none"> Interchanging mandrels, {fixing plugs on mandrel rods or cooling during interchanging mandrels (separating tubes from mandrels B21C 45/00)} 	31/02	<ul style="list-style-type: none"> Rolling stand frames {or housings}; Roll mountings; {Roll chocks}
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	2031/021	<ul style="list-style-type: none"> {Integral tandem mill housings}
27/005	<ul style="list-style-type: none"> {Rolls with a roughened or textured surface; Methods for making same} 	2031/023	<ul style="list-style-type: none"> {Transverse shifting one housing}
		2031/025	<ul style="list-style-type: none"> {Shifting the stand in or against the rolling direction}
		2031/026	<ul style="list-style-type: none"> {Transverse shifting the stand}
		31/028	<ul style="list-style-type: none"> {Prestressing of rolls or roll mountings in stand frames}
		31/04	<ul style="list-style-type: none"> with tie rods {in frameless stands}, e.g. prestressed tie rods
		31/06	<ul style="list-style-type: none"> Fastening stands or frames to foundation, e.g. to the sole plate (in general F16M)
		31/07	<ul style="list-style-type: none"> Adaptation of roll {neck} bearings (bearings in general F16C)
		2031/072	<ul style="list-style-type: none"> {Bearing materials}
		31/074	<ul style="list-style-type: none"> {Oil film bearings, e.g. "Morgoil" bearings}
		31/076	<ul style="list-style-type: none"> {Cooling; Lubricating roller bearings}

31/078	. . {Sealing devices (Sealings in general F16J 15/00)}	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)}
31/08	. Interchanging rolls, roll mountings, or stand frames, {e.g. using C-hooks; Replacing roll chocks on roll shafts}	35/144	. . . . {Wobbler couplings}
31/10	. . by horizontally displacing, {i.e. horizontal roll changing}	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)}
31/103	. . . {Manipulators or carriages therefor}	35/146	. . . . {Tongue and slipper joints (tongue and slipper joints in general F16D 3/265)}
31/106	. . . {Vertical displacement of rolls or roll chocks during horizontal roll changing}	35/147	. . {Lubrication of spindle couplings}
31/12	. . by vertically displacing	35/148	. . {Spindle carriers or balancers}
31/14	. . by pivotally displacing	2035/149	. . {Measuring devices for spindles or couplings}
31/16	. Adjusting {or positioning} rolls (control devices B21B 37/00)	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)
31/18	. . by moving rolls axially	2037/002	. {Mass flow control}
31/185	. . . {and by crossing rolls}	37/005	. {Control of time interval or spacing between workpieces}
31/20	. . by moving rolls perpendicularly to roll axis	37/007	. {Control for preventing or reducing vibration, chatter or chatter marks (B21B 37/66 takes precedence)}
31/203	. . . {Balancing rolls}	37/16	. Control of thickness, width, diameter or other transverse dimensions (B21B 37/58 takes precedence)
2031/206	. . . {Horizontal offset of work rolls}	37/165	. . {responsive mainly to the measured thickness of the product}
31/22	. . . mechanically, {e.g. by thrust blocks, inserts for removal}	37/18	. . Automatic gauge control
31/24	. . . . by screws	37/20	. . . in tandem mills
31/26	. . . . Adjusting eccentrically-mounted roll bearings	37/22	. . Lateral spread control; Width control, e.g. by edge rolling
31/28	. . . . by toggle-lever mechanisms	37/24	. . Automatic variation of thickness according to a predetermined programme
31/30	. . . . by wedges or their equivalent	37/26	. . . for obtaining one strip having successive lengths of different constant thickness
31/32	. . . by liquid pressure, {e.g. hydromechanical adjusting}	37/28	. Control of flatness or profile during rolling of strip, sheets or plates
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}	37/30	. . using roll camber control
2033/005	. {Cobble-freeing}	37/32	. . . by cooling, heating or lubricating the rolls
33/02	. Preventing fracture of rolls	37/34	. . . by hydraulic expansion of the rolls
35/00	Drives for metal-rolling mills, {e.g. hydraulic drives}	37/36	. . . by radial displacement of the roll sleeve on a stationary roll beam by means of hydraulic supports
2035/005	. {Hydraulic drive motors}	37/38	. . using roll bending (B21B 37/42 takes precedence)
35/02	. for continuously-operating mills (B21B 35/10 , B21B 35/12 take precedence)	37/40	. . using axial shifting of the rolls (B21B 37/42 takes precedence)
35/025	. . {for stretch-reducing of tubes}	37/42	. . using a combination of roll bending and axial shifting of the rolls
35/04	. . each stand having its own motor or motors	37/44	. . using heating, lubricating or water-spray cooling of the product
35/06	. for non-continuously-operating mills or for single stands (B21B 35/10 , B21B 35/12 take precedence)	37/46	. Roll speed or drive motor control (B21B 37/52 , B21B 37/60 take precedence)
35/08	. . for reversing rolling mills	37/48	. Tension control; Compression control
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	37/50	. . by looper control
2035/103	. . {Fluid-driven rolls or rollers}	37/52	. . by drive motor control
2035/106	. . {Non-driven or idler rolls or rollers}	37/54	. . . including coiler drive control, e.g. reversing mills
35/12	. Toothed-wheel gearings specially adapted for metal-rolling mills; Housings or mountings therefor	37/56	. Elongation control
35/14	. Couplings, driving spindles, or spindle carriers specially adapted for, or specially arranged in, metal-rolling mills (couplings or shafts in general F16)	37/58	. Roll-force control; Roll-gap control {(B21B 38/105 takes precedence)}
35/141	. . {Rigid spindle couplings, e.g. coupling boxes placed on roll necks (rigid couplings in general F16D 1/00)}	37/60	. . by control of a motor which drives an adjusting screw
35/142	. . {Yielding spindle couplings; Universal joints for spindles (yielding couplings in general F16D 3/00)}		

37/62	. . by control of a hydraulic adjusting device	39/16	. . immediately before entering or after leaving the pass
37/64	. . Mill spring or roll spring compensation systems, e.g. control of prestressed mill stands	39/165	. . . {Guides or guide rollers for rods, bars, rounds, tubes (B21B 39/28 takes precedence); Aligning guides}
37/66	. . Roll eccentricity compensation systems	39/18	. . Switches for directing work in metal-rolling mills or trains
37/68	. Camber or steering control for strip, sheets or plates, e.g. preventing meandering	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)
37/70	. Length control (B21B 37/56 takes precedence)	39/22	. . by tipping, e.g. by lifting one side by levers or wedges (B21B 39/26, B21B 39/28 take precedence)
37/72	. Rear end control; Front end control	39/223	. . . {Side-guard manipulators}
37/74	. Temperature control, e.g. by cooling or heating the rolls or the product (B21B 37/32, B21B 37/44 take precedence)	39/226	. . . {Tiltable ingot chairs}
37/76	. . Cooling control on the run-out table	39/24	. . by tongs or grippers
37/78	. Control of tube rolling	39/26	. . by members, e.g. grooved, engaging opposite sides of the work and moved relatively to each other to revolve the work
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)}	39/28	. . by means of guide members shaped to revolve the work during its passage
2038/002	. {Measuring axial forces of rolls}	39/30	. . by lodging it in a rotating ring manipulator or ring segment manipulator
2038/004	. {Measuring scale thickness}	39/32	. . Devices specially adapted for turning sheets
38/006	. {for measuring temperature}	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
38/008	. {Monitoring or detecting vibration, chatter or chatter marks}	41/00	Guiding, conveying, or accumulating easily-flexible work, e.g. wire, sheet metal bands, in loops or curves; Loop lifters
38/02	. for measuring flatness or profile of strips	41/02	. Returning work to repeat the pass or passes {within the same stand}
38/04	. for measuring thickness, width, diameter or other transverse dimensions of the product	41/04	. . above or underneath the rolling stand or rolls
38/06	. for measuring tension or compression	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}
38/08	. for measuring roll-force	41/08	. without overall change in the general direction of movement of the work
38/10	. for measuring roll-gap, e.g. pass indicators	41/10	. . Loop deflectors {(B21B 39/084 takes precedence)}
38/105	. . {Calibrating or presetting roll-gap}	41/12	. Arrangements of interest only with respect to provision for indicating or controlling operations
38/12	. for measuring roll camber	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)
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)	43/003	. {Transfer to bed}
39/002	. {Piling, unpling, unscrambling}	43/006	. {Transfer from bed}
39/004	. {Transverse moving}	43/02	. Cooling beds comprising rakes {racks, walking beams} or bars (B21B 43/10 takes precedence)
39/006	. {Pinch roll sets}	43/04	. Cooling beds comprising rolls or worms
39/008	. {Rollers for roller conveyors (roller-ways in general B65G 13/00, B21B 39/00)}	43/06	. Cooling beds comprising carriages (B21B 43/08 takes precedence)
39/02	. Feeding or supporting work; Braking or tensioning arrangements, {e.g. threading arrangements}	43/08	. Cooling beds comprising revolving drums or recycling chains {or discs}
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)	43/10	. Cooling beds with other work-shifting elements projecting through the bed
39/06	. . Pushing or forcing work into pass	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}
39/08	. . Braking or tensioning arrangements		
39/082	. . . {Bridle devices}		
39/084	. . . {Looper devices}		
39/086	. . . {Braking devices}		
39/088	. . . {Bumpers, stopping devices}		
39/10	. . Arrangement or installation of feeding rollers in rolling stands		
39/12	. . Arrangement or installation of roller tables in relation to a roll stand		
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)		

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)	47/02	. for folding sheets before rolling
		47/04	. for separating layers after rolling
		99/00	Subject matter not provided for in other groups of this subclass
45/002	. {Increasing friction between work and working rolls by using friction increasing substance}		
45/004	. {Heating the product}		
2045/006	. . {in vacuum or in inert atmosphere}		
45/008	. {Heat shields}		
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)}		
45/0203	. . {Cooling}		
45/0206	. . . {Coolants}		
45/0209	. . . {Cooling devices, e.g. using gaseous coolants}		
2045/0212	. . . . {using gaseous coolants}		
45/0215	. . . . {using liquid coolants, e.g. for sections, for tubes}		
45/0218	. . . . {for strips, sheets, or plates (B21B 45/023 , B21B 45/0233 take precedence)}		
2045/0221	. . . . . {for structural sections, e.g. H-beams}		
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}		
2045/0236	. . {Laying heads for overlapping rings on cooling conveyor}		
45/0239	. . {Lubricating}		
45/0242	. . . {Lubricants}		
45/0245	. . . {Lubricating devices}		
45/0248	. . . . {using liquid lubricants, e.g. for sections, for tubes}		
45/0251	. . . . . {for strips, sheets, or plates}		
2045/0254	. . . . . {for structural sections, e.g. H-beams}		
45/0257	. . . . . {for wire, rods, rounds, bars}		
2045/026	. . . . . {for tubes}		
45/0263	. . . . {using solid lubricants}		
45/0266	. . {Measuring or controlling thickness of liquid films}		
45/0269	. . {Cleaning}		
45/0272	. . . {Cleaning compositions}		
45/0275	. . . {Cleaning devices}		
45/0278	. . . . {removing liquids}		
45/0281	. . . . . {removing coolants}		
45/0284	. . . . . {removing lubricants}		
45/0287	. . . . {removing solid particles, e.g. dust, rust}		
45/029	. . . {Liquid recovering devices}		
45/0293	. . . . {Recovering coolants}		
45/0296	. . . . {Recovering lubricants}		
45/04	. for de-scaling, {e.g. by brushing (descaling of rod or wire B21C 43/04)}		
45/06	. . of strip material (B21B 45/08 takes precedence)		
45/08	. . hydraulically		
47/00	Auxiliary arrangements, devices or methods in connection with rolling of multi-layer sheets of metal (soaking pits C21D 9/70)		
		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
		2203/185	. . Reversible rolls for changing grooves
		2203/187	. . Tilting rolls
		2203/20	. Flywheels
		2203/22	. Hinged chocks
		2203/24	. Hydrostatic bearings or guides
		2203/26	. Motors, drives
		2203/28	. Mounting or dismounting bearing and chock as a unit
		2203/30	. Quick or bayonet couplings
		2203/32	. Roll changing stools
		2203/34	. Rotational position or alignment
		2203/36	. Spacers
		2203/38	. Strain gauges
		2203/40	. Torsion bars or shafts
		2203/42	. Turntables
		2203/44	. Vibration dampers
		2205/00	Particular shaped rolled products
		2205/02	. Tailored blanks
		2205/04	. Taper- or wedge-shaped profiles
		2261/00	Product parameters
		2261/02	. Transverse dimensions
		2261/04	. . Thickness, gauge
		2261/043	. . . Blanks with variable thickness in the rolling direction
		2261/046	. . . Different thickness in width direction
		2261/05	. . . Different constant thicknesses in one rolled product
		2261/06	. . Width
		2261/065	. . . Blanks with variable width

2261/08	. . Diameter	2271/04	. . Screw-down speed, draft speed
2261/10	. . Cross-sectional area	2271/06	. Mill spring
2261/12	. Length		
2261/14	. Roughness	2273/00	Path parameters
2261/18	. Weight	2273/02	. Vertical deviation, e.g. slack, looper height
2261/20	. Temperature	2273/04	. Lateral deviation, meandering, camber of product
2261/21	. . Temperature profile	2273/06	. Threading
2261/22	. Hardness	2273/08	. . Threading-in or before threading-in
		2273/10	. . Threading-out or after threading-out
2263/00	Shape of product	2273/12	. End of product
2263/02	. Profile, e.g. of plate, hot strip, sections	2273/14	. . Front end or leading end
2263/04	. Flatness	2273/16	. . Tail or rear end
2263/06	. . Edge waves	2273/18	. Presence of product
2263/08	. . Centre buckles	2273/20	. Track of product
2263/10	. Lateral spread defects	2273/22	. Aligning on rolling axis, e.g. of roll calibers
2263/12	. . Dog bone	2273/24	. Web positioning
2263/16	. Alligatoring		
2263/20	. End shape; fish tail; tongue	2275/00	Mill drive parameters
2263/30	. Shape in top view	2275/02	. Speed
		2275/04	. . Roll speed
2265/00	Forming parameters	2275/05	. . . Speed difference between top and bottom rolls
2265/02	. Tension	2275/06	. . Product speed
2265/04	. . Front or inlet tension	2275/08	. . Coiler speed
2265/06	. . Interstand tension	2275/10	. Motor power; motor current
2265/08	. . Back or outlet tension	2275/12	. . Roll torque
2265/10	. Compression, e.g. longitudinal compression		
2265/12	. Rolling load or rolling pressure; roll force		
2265/14	. Reduction rate		
2265/16	. . Extension		
2265/18	. Elongation		
2265/20	. Slip		
2265/22	. Pass schedule		
2265/24	. asymmetric rolling		
2267/00	Roll parameters		
2267/02	. Roll dimensions		
2267/06	. . Roll diameter		
2267/065	. . . Top and bottom roll have different diameters; Asymmetrical rolling		
2267/08	. . Roll eccentricity		
2267/10	. Roughness of roll surface		
2267/12	. Roll temperature		
2267/18	. Roll crown; roll profile		
2267/19	. . Thermal crown		
2267/20	. . Ground camber or profile		
2267/22	. . Hydraulic expansion of rolls		
2267/24	. Roll wear		
2267/26	. Hardness of the roll surface		
2267/28	. Elastic moduli of rolls		
2269/00	Roll bending or shifting		
2269/02	. Roll bending; vertical bending of rolls		
2269/04	. . Work roll bending		
2269/06	. . Intermediate roll bending		
2269/08	. . Back-up roll bending		
2269/10	. Horizontal bending of rolls		
2269/12	. Axial shifting the rolls		
2269/14	. . Work rolls		
2269/16	. . Intermediate rolls		
2269/18	. . Back-up rolls		
2271/00	Mill stand parameters		
2271/02	. Roll gap, screw-down position, draft position		
2271/025	. . Tapered roll gap		