**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.

<table>
<thead>
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<th>Subclass</th>
<th>Description</th>
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</table>
| 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)

1/02 . . . for rolling heavy work, e.g. ingots, slabs {[ blooms] billets, in which the cross-sectional form is unimportant} (Rolling combined with forging or pressing)

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)

1/0815 . . . [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 thereof)
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}

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for rolling {plates, strips,} bands or sheets of indefinite length (B21B 1/42 takes precedence)

2001/221 . . . by cold-rolling

1/222 . . . in a rolling-drawing process; in a multi-pass mill

1/224 . . . (Edge rolling of flat products)

2001/225 . . . by hot-rolling

1/227 . . . (Surface roughening or texturing)

2001/228 . . . (skin pass rolling or temper rolling)

1/24 . . . in a continuous {or semi-continuous} process

1/26 . . . by hot-rolling, [e.g. Steckel hot mill]

1/265 . . . [and by compressing or pushing the material in rolling direction]

1/28 . . . by cold-rolling, [e.g. Steckel cold mill]

1/30 . . . in a non-continuous process

1/32 . . . in reversing {single stand} mills, e.g. with intermediate storage reels for accumulating work

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}

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

11/00 Subsidising the rolling process by subjecting rollers or work to vibrations, {e.g. ultrasonic vibrations}

13/00 Metal-rolling stands, i.e. an assembly composed of a stand frame, rolls, and accessories

2013/001 . . . (Convertable or tiltable stands, e.g. from duo to universal stands, from horizontal to vertical stands)

2013/003 . . . (Inactive rolling stands)

2013/005 . . . (Cantilevered roll stands)

2013/006 . . . (Multiple strand rolling mills; Mill stands with multiple caliber rolls)

13/008 . . . (Skew rolling stands, e.g. for rolling rounds)

13/02 . . . with axes of rolls arranged horizontally

13/021 . . . (Twin mills)

13/023 . . . (the axis of the rolls being other than perpendicular to the direction of movement of the product, e.g. cross-rolling)

2013/025 . . . (Quarto, four-high stands)

2013/026 . . . (Quinto, five high-stands)

2013/028 . . . (Sixto, six-high stands)

13/04 . . . Three-high arrangement

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

13/10 . . . all axes being arranged in one plane

13/103 . . . {for rolling bars, rods or wire}

13/106 . . . {for sections, e.g. beams, rails}

13/12 . . . axes being arranged in different planes

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}

13/142 . . . {by axially shifting the rolls, e.g. rolls with tapered ends or with a curved contour for continuously-variable crown CVC}

13/145 . . . {Lateral support devices for rolls acting mainly in a direction parallel to the movement of the product}

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}

13/16 . . . with alternatively operative rolls, [e.g. revolver stands, turret mills]

13/18 . . . for step-by-step or planetary rolling; {pendulum mills} {methods B21B 1/42; making tubes by pilgrim-step rolling B21B 21/00}

13/20 . . . for planetary rolling

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)
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

15/0007 . (Cutting or shearing the product)
15/0014 . (Transversely to the rolling direction)
15/0021 . (In the rolling direction)
15/0028 . (Drawing the rolled product)
15/0035 . (Forging or pressing devices as units)
15/0042 . (Tool changers)
15/005 . (Lubricating, cooling or heating means)
15/0057 . (Coiling the rolled product)
15/0064 . (Uncoiling the rolled product)
15/0071 . (Levelling the rolled product)
15/0077 . (Extruding the rolled product)
15/0085 . (Joining ends of material to continuous strip, bar or sheet)
15/0092 . (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
17/04 . 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, 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 {e.g. 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)

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
27/022 . 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
27/083 . Cooling internally
27/086 . Heating internally
27/10 . Externally
27/103 . Cooling externally
27/106 . Heating the rolls

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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]
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)]
31/00 Rolling stand structures; Mounting, adjusting, or interchanging rolls, roll mountings, or stand frames
31/02 . . Rolling stand frames [or housings]; Roll mountings [; Roll chocks]
2031/021 . . [Integral tandem mill housings]
2031/023 . . [Transverse shifting one housing]
2031/025 . . [Shifting the stand in or against the rolling direction]
2031/026 . . [Transverse shifting the stand]
31/028 . . [Prestressing of rolls or roll mountings in stand frames]
31/04 . . with tie rods [in frameless stands], e.g. prestressed tie rods
31/06 . . Fastening stands or frames to foundation, e.g. to the sole plate [in general F16M]
31/07 . . Adaptation of roll (neck) bearings (bearings in general F16C)
2031/072 . . [Bearing materials]
31/074 . . [Oil film bearings, e.g. "Morgoil" bearings]
31/076 . . [Cooling; Lubricating roller bearings]
31/078 . . [Sealing devices (sealings in general F16J 15/00)]
31/08 . . Interchanging rolls, roll mountings, or stand frames [; e.g. using C-hooks; Replacing roll chocks on roll shafts]
31/10 . . by horizontally displacing [; i.e. horizontal roll changing]
31/103 . . [Manipulators or carriages therefor]
31/106 . . [Vertical displacement of rolls or roll chocks during horizontal roll changing]
31/12 . . by vertically displacing
31/14 . . by pivotally displacing
31/16 . . Adjusting [or positioning] rolls (control devices B21B 37/00)
31/18 . . by moving rolls axially
31/185 . . [and by crossing rolls]
31/20 . . by moving rolls perpendicularly to roll axis
31/203 . . [Balancing rolls]
2031/206 . . [Horizontal offset of work rolls]
31/22 . . . mechanically [; e.g. by thrust blocks, inserts for removal]
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]
33/02 . . Preventing fracture of rolls
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]
35/04 . . [each stand having its own motor or motors]
35/06 . . for non-continuously-operating mills or for single stands (B21B 35/10, B21B 35/12 take precedence)
35/08 . . . for reversing rolling mills
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
2035/103 . . . [Fluid-driven rolls or rollers]
2035/106 . . . [Non-driven or idle rollers or rollers]
35/12 . . Toothed-wheel gearings specially adapted for metal-rolling mills; Housings or mountings therefor
35/14 . . Couplings, driving spindles, or spindle carriers specially adapted for, or specially arranged in, metal-rolling mills (couplings or shafts in general F16)
35/141 . . . [Rigid spindle couplings, e.g. coupling boxes placed on roll necks (rigid couplings in general F16D 1/00)]
35/142 . . . [Yielding spindle couplings; Universal joints for spindles (yielding couplings in general F16D 3/00)]
35/143 . . . . [having slidable-interengaging teeth, e.g. gear-type couplings (universal joints with the coupling parts having slidable-interengaging teeth, in general, F16D 3/18)]
35/144 . . . . . [Wobbler couplings]
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)]
35/146 . . . . . . [Tongue and slipper joints (tongue and slipper joints in general F16D 3/265)]
35/147 . . . . [Lubrication of spindle couplings]
35/148 . . . . . [Spindle carriers or balancers]
2035/149 . . . . [Measuring devices for spindles or couplings]
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)
2037/002 . . . . [Mass flow control]
37/005 . . . [Control of time interval or spacing between workpieces]
37/007 . . . [Control for preventing or reducing vibration, chatter or chatter marks (B21B 37/66 takes precedence)]
37/16 . . Control of thickness, width, diameter or other transverse dimensions (B21B 37/58 takes precedence)
37/165 . . . . [Responsive mainly to the measured thickness of the product]
37/18 . . Automatic gauge control
37/20 . . . . . in tandem mills
Rolling methods or mills specially designed for making or processing tubes

37/22 . Lateral spread control; Width control, e.g. by edge rolling
37/24 . Automatic variation of thickness according to a predetermined programme
37/26 . for obtaining one strip having successive lengths of different constant thickness
37/28 . Control of flatness or profile during rolling of strip, sheets or plates
37/30 . using roll camber control
37/32 . by cooling, heating or lubricating the rolls
37/34 . by hydraulic expansion of the rolls
37/36 . by radial displacement of the roll sleeve on a stationary roll beam by means of hydraulic supports
37/38 . using roll bending (B21B 37/42 takes precedence)
37/40 . using axial shifting of the rolls (B21B 37/42 takes precedence)
37/42 . using a combination of roll bending and axial shifting of the rolls
37/44 . using heating, lubricating or water-spray cooling of the product
37/46 . Roll speed or drive motor control (B21B 37/52, B21B 37/60 take precedence)
37/48 . Tension control; Compression control
37/50 . by looper control
37/52 . by drive motor control
37/54 . including coiler drive control, e.g. reversing mills
37/56 . Elongation control
37/58 . Roll-force control; Roll-gap control (B21B 38/105 takes precedence)
37/60 . by control of a motor which drives an adjusting screw
37/62 . by control of a hydraulic adjusting device
37/64 . Mill spring or roll spring compensation systems, e.g. control of prestressed mill stands
37/66 . Roll eccentricity compensation systems
37/68 . Camber or steering control for strip, sheets or plates, e.g. preventing meandering
37/70 . Length control (B21B 37/56 takes precedence)
37/72 . Rear end control; Front end control
37/74 . Temperature control, e.g. by cooling or heating the rolls or the product (B21B 37/32, B21B 37/44 take precedence)
37/76 . Cooling control on the run-out table
37/78 . Control of tube rolling

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)

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

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)

39/002 . [Piling, unpiling, unscrambling]
39/004 . [Transverse moving]
39/006 . [Pinch roll sets]
39/008 . [Rollers for roller conveyors (roller-ways in general B65G 13/00, B21B 39/00)]
39/02 . Feeding or supporting work; Braking or tensioning arrangements, e.g. threading arrangements
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)
39/06 . Pushing or forcing work into pass
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)
39/16 . immediately before entering or after leaving the pass
39/165 . [Guides or guide rollers for rods, bars, rounds, tubes (B21B 39/28 takes precedence); Aligning guides]
39/18 . Switches for directing work in metal-rolling mills or trains
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)
39/22 . by tipping, e.g. by lifting one side by levers or wedges (B21B 39/26, B21B 39/28 take precedence)
39/223 . [Side-guard manipulators]
39/226 . [Tiltable ingot chairs]
39/24 . by tongs or grippers
39/26 . by members, e.g. grooved, engaging opposite sides of the work and moved relatively to each other to revolve the work
39/28 . by means of guide members shaped to revolve the work during its passage
39/30 . by lodging it in a rotating ring manipulator or ring segment manipulator
39/32 . Devices specially adapted for turning sheets
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
Rolling methods or mills specially designed for making or processing tubes

41/00 Guiding, conveying, or accumulating easily-flexible work, e.g. wire, sheet metal bands, in loops or curves; Loop lifters

41/02 . Returning work to repeat the pass or passes (within the same stand)

41/04 . above or underneath the rolling stand or rolls

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

41/08 . without overall change in the general direction of movement of the work

41/10 . Loop deflectors (B21B 39/084 takes precedence)

41/12 . Arrangements of interest only with respect to provision for indicating or controlling operations

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)

43/003 . Transfer to bed

43/006 . Transfer from bed

43/02 . Cooling beds comprising rakes (racks, walking beams) or bars (B21B 43/10 takes precedence)

43/04 . Cooling beds comprising rolls or worms

43/06 . Cooling beds comprising carriages (B21B 43/08 takes precedence)

43/08 . Cooling beds comprising revolving drums or recycling chains (or discs)

43/10 . Cooling beds with other work-shifting elements projecting through the bed

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

45/00 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)

45/002 . Increasing friction between work and working rolls by using friction increasing substance

45/004 . Heat shields

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

45/0289 . Liquid recovering devices

45/0293 . Recovering coolants

45/0296 . Recovering lubricants

45/04 . for de-scaling, e.g. by brushing (de-scaling 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)

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

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  2265/18  Elongation
2203/18  Rolls or rollers  2265/20  Slip
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;
2203/26  Motors, drives  Asymmetrical rolling
2203/28  Mounting or dismounting bearing and chock as a unit  2267/08  Roll eccentricity
2203/30  Quick or bayonet couplings  2267/10  Roughness of roll surface
2203/32  Roll changing stools  2267/12  Roll temperature
2203/34  Rotational position or alignment  2267/18  Roll crown; roll profile
2203/36  Spacers  2267/19  Thermal crown
2203/38  Strain gauges  2267/20  Ground camber or profile
2203/40  Torsion bars or shafts  2267/22  Hydraulic expansion of rolls
2203/42  Turntables  2267/24  Roll wear
2203/44  Vibration dampers  2267/26  Hardness of the roll surface
2203/46  . . .  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