

SECTION B — PERFORMING OPERATIONS; TRANSPORTING

B23 MACHINE TOOLS; METAL-WORKING NOT OTHERWISE PROVIDED FOR

B23D PLANING; SLOTTING; SHEARING; BROACHING; SAWING; FILING; SCRAPING; LIKE OPERATIONS FOR WORKING METAL BY REMOVING MATERIAL, NOT OTHERWISE PROVIDED FOR (making toothed gears or the like B23F; cutting metal by applying heat locally B23K; arrangements for copying or controlling B23Q)

Note(s)

This subclass covers machines for shearing sheet metal or other stock material except metal foils workable in a manner analogous to paper, which is covered by class B26.

Subclass index

PLANING; SLOTTING

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|--|------------------|
| Working method of the machine..... | 1/00, 3/00, 5/00 |
| Machines characterised by constructional features of a part..... | 7/00 |
| Hand-operated devices; portable apparatus..... | 9/00 |
| Devices for attachment to any machine tool..... | 11/00 |
| Tools, tool holders..... | 13/00 |

SHEARING

| | |
|--|-----------------------------------|
| Working method of machines or apparatus..... | 15/00, 17/00, 19/00, 27/00, 31/00 |
| Hand-held devices..... | 21/06, 27/02, 29/00 |
| Tools, holders, chucks..... | 35/00 |
| Accessories..... | 33/00 |
| Machines for particular work..... | 21/00, 23/00, 25/00 |
| Control arrangements..... | 36/00 |

BROACHING; REAMING

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|---|--------------|
| Working method of machines or apparatus..... | 37/00 |
| Machines or devices characterised by constructional features of a part..... | 41/00 |
| Tools..... | 43/00, 77/00 |
| Accessories..... | 39/00 |
| Machines or devices for reaming bored holes..... | 75/00 |

SAWING

| | |
|---|----------------------------|
| Working method of machines or apparatus | |
| using saw discs..... | 45/00, 47/00 |
| using straight saw blades..... | 49/00, 51/00 |
| using endless saw blades..... | 53/00, 55/00 |
| other working methods..... | 57/00 |
| Machines or devices characterised by constructional features of a part..... | 47/00, 51/00, 55/00 |
| Tools and attachment thereof; dressing thereof; making thereof..... | 51/00, 61/00, 63/00, 65/00 |
| Accessories..... | 59/00 |
| Control arrangements..... | 36/00 |

FILING; RASPING

| | |
|---|--------------|
| Working method of machines or apparatus..... | 67/00 |
| Machines or devices characterised by constructional features of a part..... | 69/00 |
| Tools; making thereof..... | 71/00, 73/00 |

OTHER METHODS, MACHINES, OR DEVICES; COMBINATIONS.....79/00, 81/00

Planing; Slotting

1/00 Planing or slotting machines cutting by relative movement of the tool and workpiece in a horizontal straight line only

- 1/02 • by movement of the work-support
- 1/04 • • with the tool supported only on one side of the bed
- 1/06 • • with the tool supported on both sides of the bed

- 1/08 • by movement of the tool
- 1/10 • • with means for adjusting the tool-guide vertically
- 1/12 • • • with the tool supported only on one side of the bed
- 1/14 • • • with the tool supported on both sides of the bed
- 1/16 • • without means for adjusting the tool-guide vertically

B23D

- 1/18 • cutting on both the forward and the return stroke
- 1/20 • with tool-supports or work-supports specially mounted or guided for working in different directions or at different angles; Special purpose machines
- 1/22 • • for planing ingots or the like (scrubbing or peeling ingots by milling B23C 3/14)
- 1/24 • • for planing inner surfaces, e.g. of moulds
- 1/26 • • for planing edges or ridges or cutting grooves (cutting helical grooves B23D 5/02)
- 1/28 • • in which the tool or workpiece is fed otherwise than in a straight line, e.g. for planing profiled stock
- 1/30 • • • in which the direction of feed is controlled by a copying device, e.g. by a pattern (features of copying devices B23Q 35/00)

3/00 Planing or slotting machines cutting by relative movement of the tool and workpiece in a vertical or inclined straight line

- 3/02 • for cutting grooves (cutting helical grooves B23D 5/02)
- 3/04 • in which the tool or workpiece is fed otherwise than in a straight line
- 3/06 • • in which the direction of feed is controlled by a copying device, e.g. by a pattern (features of copying devices B23Q 35/00)

5/00 Planing or slotting machines cutting otherwise than by relative movement of the tool and workpiece in a straight line

- 5/02 • involving rotary and straight-line movements only, e.g. for cutting helical grooves
- 5/04 • controlled by a copying device, e.g. by a pattern (features of copying devices B23Q 35/00)

7/00 Planing or slotting machines characterised only by constructional features of particular parts (constructional features of these parts per se B23Q)

- 7/02 • of frames, of work-table beds
- 7/04 • of pillars, of cross-beams
- 7/06 • of tool-carrying arrangements
- 7/08 • of work-tables
- 7/10 • of drives for reciprocating parts
- 7/12 • of arrangements for impact damping or regenerating energy

9/00 Hand-operated planing devices; Portable planing apparatus (details or components, e.g. casings, bodies, of portable power-driven tools not particularly related to the operation performed B25F 5/00) [4]

11/00 Planing or slotting devices able to be attached to a machine tool, whether or not replacing an operative portion of the machine tool

13/00 Tools or tool holders specially designed for planing or slotting machines (features applicable also to turning-machines B23B 27/00, B23B 29/00; for cutting gear teeth B23F 21/04)

- 13/02 • Pivotaly-mounted holders
- 13/04 • Holders for tool sets
- 13/06 • Devices for lifting or lowering the tool

Shearing; Similar cutting

15/00 Shearing machines or shearing devices cutting by blades which move parallel to each other

- 15/02 • having both upper and lower moving blades

- 15/04 • having only one moving blade
- 15/06 • Sheet shears
- 15/08 • • with a blade moved in one plane, e.g. perpendicular to the surface of the sheet
- 15/10 • • with a blade moved in a curved surface, e.g. for producing an edge with a curved cross-section
- 15/12 • characterised by drives or gearings therefor
- 15/14 • • actuated by fluid or gas pressure

17/00 Shearing machines or shearing devices cutting by blades pivoted on a single axis (on an axis parallel to the blade B23D 15/10; hand-held devices B23D 29/00)

- 17/02 • characterised by drives or gearings therefor
- 17/04 • • actuated by a rotary shaft
- 17/06 • • actuated by fluid or gas pressure
- 17/08 • • actuated by hand or foot operated lever mechanism

19/00 Shearing machines or shearing devices cutting by rotary discs (by friction saw discs B23D 45/00)

- 19/02 • having both a fixed shearing blade and a rotary shearing disc
- 19/04 • having rotary shearing discs arranged in co-operating pairs
- 19/06 • • with several spaced pairs of shearing discs working simultaneously, e.g. for trimming or making strips
- 19/08 • for special use, e.g. for cutting curves, for chamfering edges

21/00 Machines or devices for shearing or cutting tubes (as additional equipment for deep-drawing presses B21D 24/16; by sawing, see the relevant groups for sawing machines or sawing devices)

- 21/02 • otherwise than in a plane perpendicular to the axis of the tube, e.g. for making mitred cuts, for making bicycle frames
- 21/04 • Tube-severing machines with rotating tool-carrier
- 21/06 • Hand-operated tube cutters
- 21/08 • • with cutting wheels
- 21/10 • • with other cutting blades or tools
- 21/12 • • • with provision for hammering on the tool
- 21/14 • cutting inside the tube

23/00 Machines or devices for shearing or cutting profiled stock (hand-held devices B23D 29/00)

- 23/02 • otherwise than in a plane perpendicular to the axis of the stock
- 23/04 • by means of holding-dies, arranged side by side, subjecting the stock to torsional stress

25/00 Machines or arrangements for shearing stock while the latter is travelling otherwise than in the direction of the cut (control arrangements specially adapted for machines for shearing stock while the latter is travelling otherwise than in the direction of the cut B23D 36/00; controlling slack in travelling flexible stock B21C 47/10) [2]

- 25/02 • Flying shearing machines (B23D 25/12 takes precedence; flying shears for cutting in general B26D 1/56)
- 25/04 • • in which a cutting unit moves bodily with the work while cutting (B23D 25/06 takes precedence)
- 25/06 • • having a cutting device mounted on an oscillating lever
- 25/08 • • having two coacting shearing blades mounted independently

- 25/10 • • • on co-operating beams moving parallel to each other and attached to lever mechanisms
- 25/12 • Shearing machines with blades on coacting rotating drums
- 25/14 • without regard to the exact dimensions of the resulting material, e.g. for cutting-up scrap
- 27/00 Machines or devices for cutting by a nibbling action**
- 27/02 • Hand-held devices (details or components, e.g. casings, bodies, of portable power-driven tools not particularly related to the operation performed B25F 5/00) [4]
- 27/04 • • actuated by electric power
- 27/06 • • actuated by fluid or gas pressure
- 29/00 Hand-held metal-shearing or metal-cutting devices** (with nibbling action B23D 27/02; hand-operated devices for metal-cutting otherwise than by shearing B26B)
- 29/02 • Hand-operated metal-shearing devices
- 31/00 Shearing machines or shearing devices covered by none or more than one of the groups B23D 15/00-B23D 29/00; Combinations of shearing machines**
- 31/02 • for performing different cutting operations on travelling stock, e.g. slitting and severing simultaneously
- 31/04 • for trimming stock combined with devices for shredding scrap
- 33/00 Accessories for shearing machines or shearing devices** (feeding stock to machines or removing stock B21D 43/00)
- 33/02 • Arrangements for holding, guiding, or feeding work during the operation
- 33/04 • • for making circular cuts
- 33/06 • • in which the direction of feed is controlled by a copying device, e.g. by a pattern (features of copying devices B23Q 35/00)
- 33/08 • Press-pads; Counter-bases; Hold-down devices
- 33/10 • Stops for positioning work
- 33/12 • Equipment for indicating where to cut
- 35/00 Tools for shearing machines or shearing devices; Holders or chucks for shearing tools**

- 36/00 Control arrangements specially adapted for machines for shearing or similar cutting, or for sawing, stock while the latter is travelling otherwise than in the direction of the cut [2]**

Broaching

- 37/00 Broaching machines or broaching devices**
- 37/02 • Broaching machines with horizontally-arranged working tools
- 37/04 • • for broaching inner surfaces
- 37/06 • • for broaching outer surfaces
- 37/08 • Broaching machines with vertically-arranged working tools
- 37/10 • • for broaching inner surfaces
- 37/12 • • for broaching outer surfaces
- 37/14 • Broaching machines with rotatably-arranged working tools
- 37/16 • • for broaching helical grooves

- 37/18 • Broaching machines with working tools mounted on an endless chain or belt
- 37/20 • Broaching machines with arrangements for working in opposite directions
- 37/22 • for special purposes (B23D 37/14 takes precedence)

39/00 Accessories for broaching machines or broaching devices

41/00 Broaching machines or broaching devices characterised only by constructional features of particular parts (constructional features of these parts per se B23Q)

- 41/02 • of frames; of work supports
- 41/04 • of tool-carrying arrangements
- 41/06 • of devices for feeding, clamping, or ejecting workpieces
- 41/08 • of drives; of control devices

43/00 Broaching tools (for cutting gear teeth B23F 21/26)

- 43/02 • for cutting by rectilinear movement (B23D 43/08 takes precedence)
- 43/04 • • having inserted cutting edges
- 43/06 • for cutting by rotational movement
- 43/08 • mounted on an endless chain or belt

Sawing

45/00 Sawing machines or sawing devices with circular saw blades or with friction saw discs (shearing machines with rotary discs B23D 19/00-B23D 25/00)

- 45/02 • with a circular saw blade or the stock mounted on a carriage
- 45/04 • with a circular saw blade or the stock carried by a pivoted lever
- 45/06 • with a circular saw blade arranged underneath a stationary work-table
- 45/08 • with a ring blade having inside saw teeth
- 45/10 • with a plurality of circular saw blades
- 45/12 • with a circular saw blade for cutting tubes
- 45/14 • for cutting otherwise than in a plane perpendicular to the axis of the stock, e.g. for making a mitred cut
- 45/16 • Hand-held sawing devices with circular saw blades
- 45/18 • Machines with circular saw blades for sawing stock while the latter is travelling otherwise than in the direction of the cut (control of such machines B23D 36/00) [2]
- 45/20 • • Flying sawing machines, the saw carrier of which is reciprocated in a guide and moves with the travelling stock during sawing
- 45/22 • • Flying sawing machines with lever-supported saw carrier which moves in a complete circular path
- 45/24 • • Flying sawing machines with lever-supported saw carrier which oscillates in an arc
- 45/26 • with high-speed cutting discs, performing the cut by frictional heat melting the material (grinders for cutting-off B24B 27/06)

47/00 Sawing machines or sawing devices working with circular saw blades, characterised only by constructional features of particular parts

- (constructional features of these parts per se B23Q; details or components, e.g. casings, bodies, of portable power-driven tools not particularly related to the operation performed B25F 5/00) [4]
- 47/02 • of frames; of guiding arrangements for work-table or saw-carrier

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- 47/04 • of devices for feeding, positioning, clamping, or rotating work
- 47/06 • • for stock of indefinite length
- 47/08 • of devices for bringing the circular saw blade to the workpiece or removing same therefrom
- 47/10 • • actuated by fluid or gas pressure
- 47/12 • of drives for circular saw blades
- 49/00 Machines or devices for sawing with straight reciprocating saw blades, e.g. hacksaws**
- 49/02 • Hacksaw machines with straight saw blades secured to a rectilinearly-guided frame, e.g. with the frame fed stepwise in the plane of the guide
- 49/04 • Hacksaw machines with straight saw blades secured to a pivotally-arranged frame
- 49/06 • Hacksaw machines with straight saw blades for special use
- 49/08 • Pad-saw machines, i.e. machines in which the blade is attached to a carrier at one end only
- 49/10 • Hand-held or hand-operated sawing devices with straight saw blades
- 49/11 • • for special purposes, e.g. offset-blade hand saws [5]
- 49/12 • • Hacksaws (B23D 49/11, B23D 49/16 take precedence; bows adjustable in length or height B23D 51/12) [5]
- 49/14 • • Pad saws (B23D 49/11, B23D 49/16 take precedence) [5]
- 49/16 • • actuated by electric or magnetic power or prime movers (B23D 49/11 takes precedence) [5]
- 51/00 Sawing machines or sawing devices working with straight blades, characterised only by constructional features of particular parts** (constructional features of these parts per se B23Q; details or components, e.g. casings, bodies, of portable power-driven tools not particularly related to the operation performed B25F 5/00); **Carrying or attaching means for tools, covered by this subclass, which are connected to a carrier at both ends** [4]
- 51/01 • characterised by the handle [5]
- 51/02 • of beds; of guiding arrangements for work-tables or saw carriers; of frames [5]
- 51/03 • • with extensible or collapsible frames [5]
- 51/04 • of devices for feeding, positioning, clamping, or rotating work
- 51/06 • • for stock of indefinite length
- 51/08 • of devices for mounting straight saw blades or other tools
- 51/10 • • for hand-held or hand-operated devices
- 51/12 • • for use with tools, dealt with in this subclass, which are connected to a carrier at both ends, e.g. bows adjustable in length or height
- 51/14 • • • Attachment of the tool
- 51/16 • of drives or feed mechanisms for straight tools, e.g. saw blades, or bows
- 51/18 • • actuated by fluid or gas pressure (B23D 51/20 takes precedence)
- 51/20 • • with controlled feed of the tool, or with special arrangements for relieving or lifting the tool on the return stroke
- 53/00 Machines or devices for sawing with strap saw blades which are effectively endless in use, e.g. for contour cutting**
- 53/02 • with stationarily-mounted wheels carrying the strap (B23D 53/06 takes precedence)
- 53/04 • with the wheels carrying the strap mounted shiftably or swingingly, other than merely for adjustment
- 53/06 • with shiftable or swinging work-table
- 53/08 • for cutting profiled stock
- 53/10 • Sawing devices working with strap saw blades able to be attached to a machine tool, whether or not replacing an operative portion of the machine tool
- 53/12 • Hand-held or hand-operated sawing devices working with strap saw blades
- 55/00 Sawing machines or sawing devices working with strap saw blades, characterised only by constructional features of particular parts** (constructional features of these parts per se B23Q)
- 55/02 • of frames; of tables
- 55/04 • of devices for feeding or clamping work
- 55/06 • of drives for strap saw blades; of wheel mountings
- 55/08 • of devices for guiding or feeding strap saw blades
- 55/10 • of devices for tensioning strap saw blades (B23D 55/06 takes precedence; incorporated in the strap B23D 61/12)
- 57/00 Sawing machines or sawing devices not covered by one of groups B23D 45/00-B23D 55/00**
- 57/02 • with chain saws
- 59/00 Accessories specially designed for sawing machines or sawing devices** (lubricating or cooling machine tools in general B23Q 11/12)
- 59/02 • Devices for lubricating or cooling circular saw blades
- 59/04 • Devices for lubricating or cooling straight or strap saw blades
- 61/00 Tools for sawing machines or sawing devices** (tools for trepanning B23B 51/04); **Clamping devices for these tools**
- 61/02 • Circular saw blades
- 61/04 • • with inserted saw teeth
- 61/06 • • • in exchangeable arrangement
- 61/08 • • Ring saw blades with internal saw teeth
- 61/10 • • clamped between hubs; Clamping or aligning devices therefor
- 61/12 • Straight saw blades; Strap saw blades
- 61/14 • • with inserted saw teeth
- 61/16 • • • in exchangeable arrangement
- 61/18 • Sawing tools of special type, e.g. wire saw strands, saw blades or saw wire equipped with diamonds or other abrasive particles in selected individual positions
- 63/00 Dressing the tools of sawing machines or sawing devices for use in cutting any kind of material, e.g. in the manufacture of sawing tools**
- 63/02 • Setting saw teeth by means of hand-operated devices
- 63/04 • Setting saw teeth of circular, straight, or strap saw blades by means of power-operated devices
- 63/06 • Upsetting the cutting edges of saw teeth, e.g. swaging
- 63/08 • Sharpening the cutting edges of saw teeth
- 63/10 • • by filing
- 63/12 • • by grinding
- 63/14 • • • Sharpening circular saw blades
- 63/16 • • of chain saws (of mortise chain cutters B24B 3/14)
- 63/18 • Straightening damaged saw blades; Reconditioning the side surface of saw blades, e.g. by grinding
- 63/20 • Combined processes for dressing saw teeth, e.g. both hardening and setting

65/00 Making tools for sawing machines or sawing devices for use in cutting any kind of material

- 65/02 • Making saw teeth by punching, cutting, or planing
- 65/04 • Making saw teeth by milling

Filing or rasping**67/00 Filing or rasping machines or devices** (securing arrangements for files or rasps B23D 71/00)

- 67/02 • with reciprocating tools, mounted on a yoke or the like
- 67/04 • with reciprocating tools, attached to a carrier at one end only
- 67/06 • with rotating tools
- 67/08 • with tools mounted on an endless chain or belt
- 67/10 • for special use, e.g. for filing keys; Accessories therefor
- 67/12 • Hand-held or hand-operated filing or rasping devices (hand files or rasps B23D 71/04)

69/00 Filing or rasping machines or devices, characterised only by constructional features of particular parts, e.g. guiding arrangements, drives (constructional features of these parts *per se* B23Q; details or components, e.g. casings, bodies, of portable power-driven tools not particularly related to the operation performed B25F 5/00); **Accessories for filing or rasping** (attached to the tool B23D 71/10) [4]

- 69/02 • Guiding arrangements for hand tools

71/00 Filing or rasping tools; Securing arrangements therefor (tool holders for machine tools B23Q 3/00; handles for hand implements B25G)

- 71/02 • for filing or rasping machines or devices
- 71/04 • Hand files or hand rasps (carrying or attaching means for tools which are connected to a carrier at both ends B23D 51/12; guiding arrangements B23D 69/02)
- 71/06 • • using a single interchangeable blade
- 71/08 • • using a plurality of interchangeable cutting elements
- 71/10 • Accessories for filing or rasping tools, e.g. for preventing scoring of workpieces by the edges of the tool

73/00 Making files or rasps

- 73/02 • Preliminary treatment of blanks, e.g. grinding, polishing, specially adapted for the manufacture of files or rasps
- 73/04 • Methods or machines for the manufacture of files or rasps (non-mechanical methods, *see* the relevant classes)
- 73/06 • • Cutting the working surfaces by means of chisels
- 73/08 • • Milling, planing, slotting, knurling, or broaching the working surfaces
- 73/10 • • Grinding the working surfaces

- 73/12 • • Peculiar procedures for sharpening or otherwise treating the working surfaces (special treatment by sand-blast B24C 1/02; sharpening files by etching C23F 1/06)

- 73/14 • Tools or accessories specially adapted for making files or rasps, e.g. chisels, supporting-frames

Reaming bored holes**75/00 Reaming machines or reaming devices** (tool holders for machine tools B23Q 3/00; handles for hand implements B25G)**77/00 Reaming tools**

- 77/02 • Reamers with inserted cutting edges
- 77/04 • • with cutting edges adjustable to different diameters along the whole cutting length
- 77/06 • Reamers with means for compensating wear (B23D 77/04 takes precedence)
- 77/08 • • by spreading slotted parts of the tool body
- 77/10 • • by expanding a tube-like non-slotted part of the tool body
- 77/12 • Reamers with cutting edges arranged in tapered form
- 77/14 • Reamers for special use, e.g. for working cylinder ridges

79/00 Methods, machines or devices not covered elsewhere, for working metal by removal of material (by combined operations B23D 81/00; working of metal by the action of a high concentration of electric current B23H; cutting by electron-beam B23K 15/00, by laser beam B23K 26/00; other working of metal B23P; tool holders for machine tools B23Q 3/00; handles for hand implements B25G)

- 79/02 • Machines or devices for scraping (turning machines for bevelling, chamfering, or deburring the ends of bars or tubes B23B 5/16; scrubbing or peeling ingots by milling B23C 3/14)
- 79/04 • • with rotating cutting-tool, e.g. for smoothing linings of bearings
- 79/06 • • with reciprocating cutting-tool
- 79/08 • • Hand scraping-implements
- 79/10 • • Accessories for holding scraping tools or work to be scraped
- 79/12 • Machines or devices for peeling bars or tubes by making use of cutting bits arranged around the workpiece, otherwise than by turning (by turning B23B 5/12) [2]

81/00 Methods, machines, or devices for working metal, covered by more than one main group in this subclass (in combination with other metal-working operations B23P 13/00, B23P 23/00)