### CPC Cooperative Patent Classification

**B** PERFORMING OPERATIONS; TRANSPORTING

(Boolean omitted)

### SHAPING

**B23** MACHINE TOOLS; METAL-WORKING NOT OTHERWISE PROVIDED FOR

(Boolean omitted)

**B23Q** DETAILS, COMPONENTS, OR ACCESSORIES FOR MACHINE TOOLS, e.g.
ARRANGEMENTS FOR COPYING OR CONTROLLING (tools of the kind used in lathes or boring machines B23B 27/00); MACHINE TOOLS IN GENERAL CHARACTERISED BY THE CONSTRUCTION OF PARTICULAR DETAILS OR COMPONENTS; COMBINATIONS OR ASSOCIATIONS OF METAL-WORKING MACHINES, NOT DIRECTED TO A PARTICULAR RESULT

#### NOTES

1. In this subclass, groups designating parts of machine tools cover machine tools characterised by constructional features of such parts.
2. In this subclass, the following terms or expressions are used with the meanings indicated:
   - “controlling” — means influencing a variable in any way, e.g. changing its direction or its value (including changing it to or from zero), maintaining it constant, limiting its range of variation;
   - “regulation” — means maintaining a variable automatically at a desired value or within a desired range of values. The desired value or range may be fixed, or manually varied, or may vary with time according to a predetermined “programme” or according to variation of another variable. Regulation is a form of control;
   - “automatic control” — is often used in the art as a synonym for regulation.
   - “Machine tool” — means a mechanical working machine that removes material from a workpiece with a mechanical cutting edge to perform a shaping operation, essentially through drilling, milling, turning or cutting, e.g. sawing. The workpiece is generally made of metal, wood or plastic and is not a human body, food or clothes.
3. Attention is drawn to the Notes following the title of class B23.

### 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>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/00</td>
<td>Members which are comprised in the general build-up of a form of machine, particularly relatively large fixed members (B23Q 37/00 takes precedence; positioning supports for measuring arrangements G01B 5/0004; motorised alignment for optical elements G02B 7/0005; handling of mask or wafer G03F 7/00691; adjusting or compensating devices for optical apparatuses G12B 5/00; piezoelectric or electrostrictive positioners H01L 41/09)</td>
</tr>
<tr>
<td>1/0063</td>
<td>(Energy-transferring means or control lines for movable machine parts; Control panels or boxes; Control parts (control handles for driving or feeding mechanisms B23Q 5/54))</td>
</tr>
<tr>
<td>1/0072</td>
<td>(Comprising hydraulic means)</td>
</tr>
<tr>
<td>1/0081</td>
<td>(between moving parts between which an uninterrupted energy-transfer connection is maintained)</td>
</tr>
<tr>
<td>1/009</td>
<td>(one of those parts being a tool)</td>
</tr>
<tr>
<td>1/01</td>
<td>(Means for adjusting the position of a machine tool with respect to its supporting surface (B23Q 1/262 takes precedence))</td>
</tr>
<tr>
<td>1/0106</td>
<td>(Control panels or boxes)</td>
</tr>
<tr>
<td>1/0117</td>
<td>(Arrangements of ways)</td>
</tr>
<tr>
<td>1/012</td>
<td>(Stationary work or tool supports (B23Q 1/70 takes precedence; auxiliary tables B23Q 1/74; tailstocks B23B 23/00))</td>
</tr>
<tr>
<td>1/0132</td>
<td>(characterised by properties of the support surface)</td>
</tr>
<tr>
<td>1/015</td>
<td>(with an array of longitudinally movable rods defining a reconfigurable support surface)</td>
</tr>
<tr>
<td>1/0137</td>
<td>(comprising series of support elements whose relative distance is adjustable)</td>
</tr>
<tr>
<td>1/025</td>
<td>(Movable or adjustable work or tool supports)</td>
</tr>
</tbody>
</table>
characterised by constructional features relating to the co-operation of relatively movable members; Means for preventing relative movement of such members (bearings for linearly moving parts F16C 29/00)

[1/262] [with means to adjust the distance between the relatively slidable members (if the adjusting means depends on the position of the slidable members B23Q 1/30)]

[1/265] [between rotating members]

[1/267] [with means to prevent skewness between the relatively slidable members]

[1/28] [Means for securing sliding members in any desired position]

[1/282] [co-operating with means to adjust the distance between the relatively slidable members]

[1/285] [for securing two or more members simultaneously or selectively]

[1/287] [using a hydraulically controlled membrane acting directly upon a sliding member]

[1/30] [controlled in conjunction with the feed mechanism]

[1/32] [Relative movement obtained by co-operating spherical surfaces, e.g. ball-and-socket joints]

[1/34] [Relative movement obtained by use of deformable elements, e.g. piezo-electric, magnetostrictive, elastic or thermally-dilatable elements (sensitive elements capable of producing movement or displacement for purposes not limited to measurement G12B 1/00)]

[1/36] [Springs]

[1/38] [using fluid bearings or fluid cushion supports]

[1/385] [in which the thickness of the fluid-layer is adjustable]

[1/40] [using T-, V-, dovetail-section or like guides (B23Q 1/40 takes precedence)]

[1/42] [using T-, V-, dovetail-section or like guides (B23Q 1/40 takes precedence)]

[1/445] [using a first carriage for a smaller workspace mounted on a second carriage for a larger workspace, both carriages moving on the same axes]

[1/46] [with screw pairs]

[1/48] [with sliding pairs and rotating pairs (B23Q 1/46 takes precedence)]

[1/4804] [a single rotating pair followed perpendicularly by a single sliding pair]

[1/4809] [followed perpendicularly by a single rotating pair]

[1/4814] [followed parallely by a single rotating pair]

[1/4819] [followed perpendicularly by a single sliding pair]

[1/4823] [followed parallely by a single sliding pair]

[1/4828] [a single rotating pair followed parallely by a single sliding pair]

[1/4833] [followed perpendicularly by a single rotating pair]

[1/4838] [followed parallely by a single rotating pair]

[1/4842] [followed perpendicularly by a single sliding pair]

[1/4847] [followed parallely by a single sliding pair]

[1/4852] [a single sliding pair followed perpendicularly by a single rotating pair]

[1/4857] [followed perpendicularly by a single rotating pair]

[1/4861] [followed parallely by a single rotating pair]

[1/4866] [followed perpendicularly by a single sliding pair]

[1/4871] [followed parallely by a single sliding pair]

[1/4876] [a single sliding pair followed parallely by a single rotating pair]

[1/488] [followed perpendicularly by a single rotating pair]

[1/4885] [followed parallely by a single rotating pair]

[1/489] [followed perpendicularly by a single sliding pair]

[1/4895] [followed parallely by a single sliding pair]

[1/50] [with rotating pairs only (the rotating pairs being the first two elements of the mechanism)]

[1/52] [a single rotating pair]

[1/522] [which is perpendicular to the working surface]

[1/525] [which is parallel to the working surface]

[1/527] [with a ring or tube in which a workpiece is fixed coaxially to the degree of freedom]

[1/54] [two rotating pairs only]

[1/5406] [a single rotating pair followed perpendicularly by a single rotating pair (B23Q 1/54 takes precedence)]

[1/5412] [followed perpendicularly by a single rotating pair]

[1/5418] [followed parallely by a single rotating pair]
B23Q

1/5425 . . . .  {followed perpendicularly by a single sliding pair}
1/5431 . . . .  {followed parallely by a single sliding pair}
1/5437 . . . .  {and in which the degree of freedom, which belongs to the working surface, is perpendicular to this surface}
1/5443 . . . .  {and in which the degree of freedom, which belongs to the working surface, is parallel to this surface}
1/545 . . . .  {comprising spherical surfaces}
1/5456 . . . .  {with one supplementary rotating pair}
1/5462 . . . .  {with one supplementary sliding pair}
1/5468 . . . .  {a single rotating pair followed parallely by a single rotating pair}
1/5475 . . . .  {followed perpendicularly by a single rotating pair}
1/5481 . . . .  {followed parallely by a single rotating pair}
1/5487 . . . .  {followed perpendicularly by a single sliding pair}
1/5493 . . . .  {followed parallely by a single sliding pair}
1/56 . . . .  {with sliding pairs only (the sliding pairs being the first two elements of the mechanism)}
1/58 . . . .  {a single sliding pair}
1/585 . . . .  {perpendicular to the working surface}
1/60 . . . .  {two sliding pairs only (the sliding pairs being the first two elements of the mechanism)}
1/601 . . . .  {a single sliding pair followed parallely by a single sliding pair}
1/603 . . . .  {followed perpendicularly by a single rotating pair}
1/605 . . . .  {followed parallely by a single rotating pair}
1/606 . . . .  {followed perpendicularly by a single sliding pair}
1/608 . . . .  {followed parallely by a single sliding pair}
1/62 . . . .  {with perpendicular axes, e.g. cross-slides}
1/621 . . . .  {a single sliding pair followed perpendicularly by a single sliding pair}
1/623 . . . .  {followed perpendicularly by a single rotating pair}
1/625 . . . .  {followed parallely by a single rotating pair}
1/626 . . . .  {followed perpendicularly by a single sliding pair}
1/628 . . . .  {followed parallely by a single sliding pair}
1/64 . . . .  {characterised by the purpose of the movement (indexing equipment B23Q 16/02)}
1/66 . . . .  Worktables interchangeably movable into operating positions
1/68 . . . .  for withdrawing tool or work during reverse movement
1/70 . . . .  Stationary or movable members for carrying working-spindles for attachment of tools or work (B23Q 1/01 takes precedence; designed to be moved by using particular mechanisms B23Q 1/44)
1/703 . . . .  {Spindle extensions}
1/706 . . . .  {Movable members, e.g. swinging arms}
B23Q

3/10 . . . Auxiliary devices, e.g. bolsters, extension members \(\{\text{devices for holding usually unilaterally-held tools at a second side, devices supporting a workpiece against cutting forces B23Q 1/76}\}\)

3/101 . . . \{for supporting a workpiece during its transport to or from a tool holder\}

3/102 . . . \{for fixing elements in slots\}

3/103 . . . \{Constructional elements used for constructing work holders\}

3/104 . . . \{V-blocks\}

3/105 . . . \{Auxiliary supporting devices independent of the machine tool\}

3/106 . . . \{extendable members, e.g. extension members\}

3/107 . . . \{with positive adjustment means\}

3/108 . . . \{with non-positive adjustment means\}

3/12 . . . \{for securing to a spindle in general (B23Q 3/152 takes precedence; chucks B23B 3/152)\}

3/14 . . . \{Mandrels in general (expansion mandrels B23B 3/153)\}

3/15 . . . \{for fixing elements in slots\}

3/151 . . . \{for supporting a workpiece during its transport to or from a tool holder\}

3/152 . . . \{for fixing elements in slots\}

3/153 . . . \{Constructional elements used for constructing work holders\}

3/154 . . . \{V-blocks\}

3/155 . . . \{Auxiliary supporting devices independent of the machine tool\}

3/156 . . . \{extendable members, e.g. extension members\}

3/157 . . . \{with positive adjustment means\}

3/158 . . . \{with non-positive adjustment means\}

3/12 . . . \{for securing to a spindle in general (B23Q 3/152 takes precedence; chucks B23B 3/152)\}

3/14 . . . \{Mandrels in general (expansion mandrels B23B 3/153)\}

3/15 . . . \{Devices for holding work using magnetic or electric force acting directly on the work\}

3/152 . . . \{Rotary devices\}

3/153 . . . \{Stationary devices\}

3/154 . . . \{using electromagnets\}

3/155 . . . \{using permanent magnets\}

3/156 . . . \{Arrangements for automatic insertion or removal of tools \(\{\text{e.g. combined with manual handling (B23Q 7/046 takes precedence)}\}\}\}

3/1503 . . . \{Processes characterized by special sequencing of operations or the like, e.g. for optimizing tool changing time or capacity in tool storage\}

3/1506 . . . \{the tool being inserted in a tool holder directly from a storage device (without transfer device)\}

3/1513 . . . \{the tool being taken from a storage device and transferred to a tool holder by means of transfer devices\}

3/152 . . . \{parts of devices for automatically inserting or removing tools\}

3/1526 . . . \{Storage devices; Drive mechanisms therefor\}

NOTE

When classifying in this group or one of its subgroups the usage of indexing codes B23Q 2003/15527 – B23Q 2003/15532, B23Q 2003/15537 is obligatory.

WARNING


All groups listed in this Warning should be considered in order to perform a complete search.

WARNING

Group B23Q 2003/15527 is incomplete pending reclassification of documents from group B23Q 3/15526.

Groups B23Q 3/15526 and B23Q 2003/15527 should be considered in order to perform a complete search.

2003/15528 . . . \{the storage device including means to project tools therefrom, e.g. for transferring them\}

WARNING

Group B23Q 2003/15528 is incomplete pending reclassification of documents from group B23Q 3/15526.

Groups B23Q 3/15526 and B23Q 2003/15528 should be considered in order to perform a complete search.

2003/1553 . . . \{by rectilinear projection\}

WARNING

Group B23Q 2003/1553 is incomplete pending reclassification of documents from group B23Q 3/15526.

Groups B23Q 3/15526 and B23Q 2003/1553 should be considered in order to perform a complete search.

2003/15531 . . . \{by pivoting projection movement\}

WARNING

Group B23Q 2003/15531 is incomplete pending reclassification of documents from group B23Q 3/15526.

Groups B23Q 3/15526 and B23Q 2003/15531 should be considered in order to perform a complete search.

2003/15532 . . . \{the storage device including tool pots, adaptors or the like\}

WARNING

Group B23Q 2003/15532 is incomplete pending reclassification of documents from group B23Q 3/15526.

Groups B23Q 3/15526 and B23Q 2003/15532 should be considered in order to perform a complete search.

3/1533 . . . \{combined with manual tool transfers\}

3/1534 . . . \{Magazines mounted on the spindle\}

WARNING

Group B23Q 3/15534 is incomplete pending reclassification of documents from group B23Q 3/15526.

Groups B23Q 3/15526 and B23Q 3/15534 should be considered in order to perform a complete search.
3/15536 . . . {Non-rotary fixed racks}

**WARNING**

Group B23Q 3/15536 is incomplete pending reclassification of documents from group B23Q 3/15526.

Groups B23Q 3/15526 and B23Q 3/15536 should be considered in order to perform a complete search.

---

2003/15537 . . . {Linearly moving storage devices}

**WARNING**

Group B23Q 2003/15537 is incomplete pending reclassification of documents from group B23Q 3/15526.

Groups B23Q 3/15526 and B23Q 2003/15537 should be considered in order to perform a complete search.

---

3/15539 . . . {Plural magazines, e.g. involving tool transfer from one magazine to another (involving manual operation B23Q 3/15533)}

**WARNING**

Group B23Q 3/15539 is incomplete pending reclassification of documents from group B23Q 3/15526.

Groups B23Q 3/15526 and B23Q 3/15539 should be considered in order to perform a complete search.

---

3/1554 . . . {Transfer mechanisms, e.g. tool gripping arms; Drive mechanisms therefore}

**NOTE**

When classifying in this group the usage of indexing codes B23Q 2003/155404 – B23Q 2003/155456 is obligatory.

**WARNING**


All groups listed in this Warning should be considered in order to perform a complete search.

---

2003/15540 . . . {the transfer mechanism comprising a single gripper}

**WARNING**

Group B23Q 2003/155404 is incomplete pending reclassification of documents from group B23Q 3/1554.

Groups B23Q 3/1554 and B23Q 2003/155404 should be considered in order to perform a complete search.

---

2003/155407 . . . {linearly movable}

**WARNING**

Group B23Q 2003/155407 is incomplete pending reclassification of documents from group B23Q 3/1554.

Groups B23Q 3/1554 and B23Q 2003/155407 should be considered in order to perform a complete search.

---

2003/155411 . . . {pivotable}

**WARNING**

Group B23Q 2003/155411 is incomplete pending reclassification of documents from group B23Q 3/1554.

Groups B23Q 3/1554 and B23Q 2003/155411 should be considered in order to perform a complete search.

---

2003/155414 . . . {the transfer mechanism comprising two or more grippers}

**WARNING**

Group B23Q 2003/155414 is incomplete pending reclassification of documents from group B23Q 3/1554.

Groups B23Q 3/1554 and B23Q 2003/155414 should be considered in order to perform a complete search.

---

2003/155418 . . . {the grippers moving together}

**WARNING**

Group B23Q 2003/155418 is incomplete pending reclassification of documents from group B23Q 3/1554.

Groups B23Q 3/1554 and B23Q 2003/155418 should be considered in order to perform a complete search.

---

2003/155421 . . . {the grippers moving independently from each other}

**WARNING**

Group B23Q 2003/155421 is incomplete pending reclassification of documents from group B23Q 3/1554.

Groups B23Q 3/1554 and B23Q 2003/155421 should be considered in order to perform a complete search.
Group B23Q 2003/155425 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155425 should be considered in order to perform a complete search.

Group B23Q 2003/155428 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155428 should be considered in order to perform a complete search.

Group B23Q 2003/155432 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155432 should be considered in order to perform a complete search.

Group B23Q 2003/155435 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155435 should be considered in order to perform a complete search.

Group B23Q 2003/155439 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155439 should be considered in order to perform a complete search.

Group B23Q 2003/155442 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155442 should be considered in order to perform a complete search.

Group B23Q 2003/155446 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155446 should be considered in order to perform a complete search.

Group B23Q 2003/155449 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155449 should be considered in order to perform a complete search.

Group B23Q 2003/155453 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155453 should be considered in order to perform a complete search.

Group B23Q 2003/155456 is incomplete pending reclassification of documents from group B23Q 3/1554. Groups B23Q 3/1554 and B23Q 2003/155456 should be considered in order to perform a complete search.

3/15546 . . . [Devices for recognizing tools in a storage device (coding devices)]

3/15553 . . . [Tensioning devices or tool holders, e.g. grippers (driving working-spindles and adjusting or stopping them in a predetermined angular position B23Q 5/20; securing milling cutters to the driving spindle in a given angular position B23C 5/26)]
3/1556 . . . (of non-rotary tools (in combination with rotary tools; B23Q 3/15506, B23Q 3/15513))
3/15566 . . . (the tool being inserted in a tool holder directly from a storage device, i.e. without using transfer devices)
3/15573 . . . (the tool being taken from a storage device and transferred to a tool holder by means of transfer devices)

2003/1558 . . . (involving insertion or removal of other machine components together with the removal or insertion of tools or tool holders)
2003/15586 . . . (of tools in turrets)
3/15706 . . . (a single tool being inserted in a spindle directly from a storage device, i.e. without using transfer devices (B23Q 3/15786 takes precedence))
3/15713 . . . (a transfer device taking a single tool from a storage device and inserting it in a spindle (B23Q 3/15792 takes precedence))
3/1572 . . . (the storage device comprising rotating or circulating storing means)

**WARNING**
Group B23Q 3/1572 is impacted by reclassification into groups B23Q 3/15722 and B23Q 3/15724.
All groups listed in this Warning should be considered in order to perform a complete search.

3/15722 . . . . (Rotary discs or drums)

**WARNING**
Group B23Q 3/15722 is incomplete pending reclassification of documents from group B23Q 3/1572.
Groups B23Q 3/1572 and B23Q 3/15722 should be considered in order to perform a complete search.

3/15724 . . . . (Chains or belts)

**WARNING**
Group B23Q 3/15724 is incomplete pending reclassification of documents from group B23Q 3/1572.
Groups B23Q 3/1572 and B23Q 3/15724 should be considered in order to perform a complete search.

3/15726 . . . . (the storage means rotating or circulating in a plane parallel to the axis of the spindle)
3/15733 . . . . (the axis of the stored tools being arranged in the rotating or circulating plane of the storage means)
3/1574 . . . . (the axis of the stored tools being arranged perpendicularly to the rotating or circulating plane of the storage means)
3/15746 . . . . (the storage means comprising pivotable tool storage elements)
3/15753 . . . . (the storage means rotating or circulating in a plane perpendicular or circulating in a plane perpendicular to the axis of the spindle)
3/1576 . . . . . . (the axis of the stored tools being arranged in the rotating or circulating plane of the storage means)
3/15766 . . . . . . (the axis of the stored tools being arranged perpendicularly to the rotating or circulating plane of the storage means)
3/15773 . . . . (a transfer device taking the tool from a storage device and passing it on to other transfer devices, which insert it in a spindle)
3/1578 . . . . (for tool transfer in a machine tool with a horizontal and a vertical spindle; for tool transfer in a machine tool with a spindle having variable orientation)
3/15786 . . . . . (a plurality of tools being inserted simultaneously in a plurality of spindles directly from a storage device, i.e. without using transfer devices)
3/15793 . . . . . (a transfer device simultaneously taking a plurality of tools and inserting them simultaneously in a plurality of spindles)
3/16 . . . (controlled in conjunction with the operation of the tool)
3/18 . . . for positioning only
3/183 . . . (Centering devices)
3/186 . . . (Aligning devices)

**5/00 Driving or feeding mechanisms; Control arrangements therefor** (automatic control B23Q 15/00; copying B23Q 33/00, B23Q 35/00; specially adapted for boring or drilling machines B23B 39/10, B23B 47/00; numerical programme-control of machine tools G05B 19/18)

2005/005 . . . (Driving or feeding mechanisms with a low and a high speed mode)
5/02 . . . Driving main working members
5/027 . . . reciprocating members
5/033 . . . (driven essentially by fluid pressure
5/04 . . . rotary shafts, e.g. working-spindles
5/041 . . . (Spindle-reversing devices)
5/043 . . . (Accessories for spindle drives)
5/045 . . . . . . (Angle drives)
5/046 . . . . . . (Offset spindle drives)
5/048 . . . . . . (Speed-changing devices)
5/06 . . . (driven essentially by fluid pressure or pneumatic power
5/08 . . . . . . (electrically essentially by fluid pressure or pneumatic power
5/10 . . . . . . (driven essentially by electrical means
5/12 . . . . . . (Mechanical drives with means for varying the speed ratio
5/14 . . . . . . . step-by-step
5/142 . . . . . . . (mechanically-operated)
5/145 . . . . . . . (fluid-operated)
5/147 . . . . . . . (electrically-operated)
5/16 . . . . . . . (infinitely-variable
5/162 . . . . . . . (mechanically-operated
5/165 . . . . . . . (fluid-operated
5/167 . . . . . . . (electrically-operated
5/18 . . . . . . . Devices for preselecting speed of working-spindle
5/20 . . . Adjusting or stopping working-spindles in a predetermined position
5/22 . . . Feeding members carrying tools or work
5/225 . . . [not mechanically connected to the main drive, e.g. with separate motors (connected to main drive through servomotors B23Q 5/36)]
5/26 . . . Fluid-pressure drives
5/261 . . . [for spindles]
5/263 . . . . . . . . . . . [with means to control the feed rate by controlling the fluid flow]
5/265 . . . . . . . . . . . . . . . . [this regulation depending upon the position of the tools or work]
5/266 . . . [with means to control the feed rate by controlling the fluid flow]
5/268 . . . . . . . . . . . . . . . . [depending upon the position of the tool or work]
5/28 . . . Electric drives
5/32 . . . Feeding working-spindles (feeding-working-spindle supports B23Q 5/34)
5/323 . . . [cam-operated]
5/326 . . . [screw-operated]
5/34 . . . Feeding other members supporting tools or work, e.g. saddles, tool-slides, through mechanical transmission
5/341 . . . [cam-operated]
5/342 . . . . . . . . . . . [Cam followers (see also B23Q 35/26)]
5/344 . . . . . . . . . . . [Cams (see also B23Q 35/42)]
5/345 . . . . . . . . . . . [Cam assembly (see also B23Q 35/46)]
5/347 . . . . . . . . . . . [controlled in conjunction with tool or work indexing means]
5/348 . . . . . . . . . . . [by means of clutches]
5/36 . . . in which a servomotor forms an essential element
5/38 . . . feeding continuously
5/385 . . . . . . . . . . . [using a gear and rack mechanism or a friction wheel co-operating with a rail]
5/40 . . . . . . . . . . . [by feed shaft, e.g. lead screw]
5/402 . . . . . . . . . . . . . . . . [in which screw or nut can both be driven]
5/404 . . . . . . . . . . . . . . . . [Screw bearings therefor]
5/406 . . . . . . . . . . . . . . . . [with means for meshing screw and nut]
5/408 . . . . . . . . . . . . . . . . [Nut bearings therefor]
5/42 . . . . . . . . . . . [Mechanism associated with headstock]
5/44 . . . . . . . . . . . [Mechanism associated with the moving member]
5/46 . . . . . . . . . . . [with variable speed ratio]
5/48 . . . . . . . . . . . [by use of toothed gears]
5/50 . . . . . . . . . . . [feeding step-by-step]
5/52 . . . . . . . . . . . [Limiting feed movement (B23Q 11/04 takes precedence)]
5/54 . . . Arrangements or details not restricted to group B23Q 5/02 or group B23Q 5/22 respectively [e.g. control handles]
5/56 . . . Preventing backlash
5/58 . . . Safety devices [protecting the operator B23Q 11/0089]
5/585 . . . . . . . . . . . [Preventing the misuse of accessories, e.g. chuck keys]
7/00 Arrangements for handling work specially combined with or arranged in, or specially adapted for use in connection with, machine tools, e.g. for conveying, loading, positioning, discharging, sorting (incorporated in working-spindles B23B 13/00)
Arrangements for supporting or guiding portable metal-working machines or apparatus (turning machine for reconditioning wheel sets without removing same from vehicle B23B 5/32; for tapping pipes B23B 41/00, F16L 41/04; specially designed for drilling B23B 45/00, B25H 1/0021)

Portable machines comprising means for their guidance or support directly on the workpiece

[the tool being guided in a circular path]
[the guide means being fixed only on the machine]
[and being capable of guiding the tool in a circular path]
[angularly adjustable]
[and being capable of guiding the tool in a circular path]
[Portable machines cooperating with guide means not supported by the workpiece during action]
[the guide means being fixed to the machine]
[the guide means being fixed to a support]
[Angularly adjustable]
[Workpieces angularly adjustable relative to the support]

for securing machines or apparatus to workpieces, or other parts, of particular shape, e.g. to beams of particular cross-section

Accessories

Accessories fitted to machine tools for keeping tools or parts of the machine in good working condition or for cooling work (accessories specially designed for sawing machines or sawing devices B23D 5/80); Safety devices specially combined with or arranged in, or specially adapted for use in connection with, machine tools (in respect of boring or drilling machines B23B 47/32 takes precedence; safety devices in general F16P)

Arrangements for preventing undesired thermal effects on tools or parts of the machine (B23Q 11/10, B23Q 11/12 and B23Q 11/14 take precedence)

(by compensating occurring thermal dilations B23Q 15/18 takes precedence)

Arrangements compensating weight or flexion on parts of the machine (adjustment of the fluid layer in fluid bearings or cushions depending upon the position of a weight B23Q 1/385)

...
11/0875 . . . [Wipers for clearing foreign matter from slideways or slidable coverings]
11/0883 . . . (for spindles, e.g. for their bearings or casings)
11/0891 . . . [between the working area and the operator]
11/10   . Arrangements for cooling or lubricating tools or work (incorporated in tools, see the relevant subclass for the tool [, e.g. B23B 27/10, B23B 51/06, B23C 5/28, B23D 7/006; for circular saw blades B23D 59/02, for cooling grinding surfaces B24B 55/02)]
11/1007 . . . [by submerging the tools or work partially or entirely in a liquid]
11/1015 . . . [by supplying a cutting liquid through the spindle]
11/1023 . . . [Tool holders, or tools in general specially adapted for receiving the cutting liquid from the spindle]
11/103 . . . [Rotary joints specially adapted for feeding the cutting liquid to the spindle]
11/1038 . . . [using cutting liquids with special characteristics, e.g. flow rate, quality]
11/1046 . . . [using a minimal quantity of lubricant (spraying apparatus using a carrying fluid B05B 7/00)]
11/1053 . . . [using the cutting liquid at specially selected temperatures (controlling the temperature of the cutting liquid for maintaining machine parts at a constant temperature B23Q 11/146)]
11/1061 . . . [using cutting liquids with specially selected composition or state of aggregation]
11/1069 . . . [Filtration systems specially adapted for cutting liquids (filtration in general B01D 24/00 - B01D 41/00)]
11/1076 . . . [with a cutting liquid nozzle specially adaptable to different kinds of machining operations]
11/1084 . . . [specially adapted for being fitted to different kinds of machines]
11/1092 . . . [specially adapted for portable power-driven tools]
11/12   . Arrangements for cooling or lubricating parts of the machine (B23Q 11/14 takes precedence; movable work or tool supports using fluid bearings or fluid cushion supports B23Q 1/38; cooling or lubricating means used in the working area B23Q 11/10)]
11/121 . . . [with lubricating effect for reducing friction (F16C 33/66 and F16H 57/04 take precedence)]
11/122 . . . [Lubricant supply devices (F16N 7/00 takes precedence)]
11/123 . . . [for lubricating spindle bearings (F16C 33/66 takes precedence)]
11/124 . . . [for lubricating linear guiding systems (F16C 29/005 takes precedence)]
11/125 . . . [for lubricating ball screw systems]
11/126 . . . [for cooling only]
11/127 . . . [for cooling motors or spindles]
11/128 . . . [for cooling frame parts]
11/14   . Methods or arrangements for maintaining a constant temperature in parts of machine tools
11/141 . . . [using a constant temperature B23Q 17/22]
11/143 . . . [comprising heating means]
11/145 . . . [using a jet of gas or cutting liquid]
11/146 . . . [by controlling the temperature of a cutting liquid]
11/148 . . . [by controlling the air temperature]
13/00   . Equipment for use with tools or cutters when not in operation, e.g. protectors for storage (B26B 29/00 takes precedence)

Measuring; Indicating; Controlling

15/00   Automatic control or regulation of feed movement, cutting velocity or position of tool or work (programme-control G05B 19/00; e.g. numerical programme-control G05B 19/18)
15/007 . . . while the tool acts upon the workpiece
15/0075 . . . [Controlling reciprocating movement, e.g. for planing-machine]
15/013 . . . Control or regulation of feed movement (B23Q 15/12 takes precedence)
15/02 . . . [according to the instantaneous size and the required size of the workpiece acted upon (B23Q 15/06 takes precedence)]
15/04 . . . [according to the final size of the previously-machined workpiece (B23Q 15/06 takes precedence)]
15/06 . . . [according to measuring results produced by two or more gauging methods using different measuring principles, e.g. by both optical and mechanical gauging]
15/08 . . . Control or regulation of cutting velocity (B23Q 15/12 takes precedence)
15/10 . . . to maintain constant cutting velocity between tool and workpiece
15/12 . . . Adaptive control, i.e. adjusting itself to have a performance which is optimum according to a preassigned criterion
15/14 . . . Control or regulation of the orientation of the tool with respect to the work
15/16 . . . Compensation for wear of the tool
15/18 . . . Compensation of tool-deflection due to temperature or force
15/20 . . . before or after the tool acts upon the workpiece
15/22 . . . Control or regulation of position of tool or workpiece
15/225 . . . [in feed control, i.e. approaching of tool or work in successive decreasing velocity steps]
15/24 . . . of linear position
15/26 . . . of angular position
15/28 . . . with compensation for tool wear
16/00   . Equipment for precise positioning of tool or work into particular locations not otherwise provided for (automatic control or regulation of position of tool or work B23Q 15/22; arrangements for indicating or measuring existing or desired position of tool or work B23Q 17/22)
16/001 . . . [Stops, cams, or holders therefor]
16/002 . . . [Stops for use in a hollow spindle]
16/003 . . . [with means to return a tool back, after its withdrawal movement, to the previous working position]
16/004 . . . [positioning by combining gauges of different dimensions from a set of two or more gauges]
16/005 . . . [Equipment for measuring the contacting force or the distance before contacting between two members during the positioning operation]
Measuring; Indicating; Controlling

17/00 Arrangements for [observing,] indicating or measuring on machine tools (for automatic control or regulation of feed movement, cutting velocity or position of tool or work (B23Q 15/00))

17/001  . . . (Measurement or correction of run-out or eccentricity)

17/002  . . . (for indicating or measuring the holding action of work or tool holders (B23Q 3/16 takes precedence))

17/003  . . . (by measuring a position)

17/005  . . . (by measuring a force, a pressure or a deformation)

17/006  . . . (for indicating the presence of a work or tool in its holder (B23Q 17/002, B23Q 17/09 take precedence))

17/007  . . . (for managing machine functions not concerning the tool)

17/008  . . . (Life management for parts of the machine (tool life management B23Q 17/0995))

17/009  . . . for indicating or measuring cutting pressure or [for determining] cutting-tool condition, e.g. cutting ability, load on tool (arrangements preventing overload of tools B23Q 11/04; devices for indicating failure of drills during boring B23B 49/00)

17/09  . . . (for automatic control or regulation of feed movement, cutting velocity or position of tool or work (B23Q 15/00))

17/0904  . . . (before or after machining)

17/0909  . . . (Detection of broken tools)

17/0914  . . . (Arrangements for measuring or adjusting cutting-tool geometry machine tools)

17/0919  . . . (Arrangements for measuring or adjusting cutting-tool geometry in presetting devices)

17/0923  . . . (Tool length)

17/0928  . . . (Cutting angles of lathe tools)

17/0933  . . . (Cutting angles of milling cutters)

17/0938  . . . (Cutting angles of drills)

17/0942  . . . (Cutting angles of saws)

17/0947  . . . (Monitoring devices for measuring cutting angles)

17/0952  . . . (during machining)

17/0957  . . . (Detection of tool breakage (detecting failure of drills B23B 49/001))

17/0961  . . . (by measuring power, current or torque of a motor)

17/0966  . . . (by measuring a force on parts of the machine other than a motor)

17/0971  . . . (by measuring mechanical vibrations of parts of the machine (arrangements for measuring vibrations B23Q 17/12))

17/0976  . . . (Detection or control of chatter (B23Q 15/12 takes precedence))

17/098  . . . (by measuring noise)

17/0985  . . . (by measuring temperature)

17/0999  . . . (by measuring features of the machined workpiece (arrangements for measuring workpiece characteristics B23Q 17/20))

17/0995  . . . (Tool life management)

17/10  . . . (for indicating or measuring cutting speed or number of revolutions)

17/12  . . . (for indicating or measuring vibration)

17/20  . . . (for indicating or measuring workpiece characteristics, e.g. contour, dimension, hardness)

17/22  . . . (for indicating or measuring existing or desired position of tool or work (B23Q 16/005 takes precedence))

17/2208  . . . (Detection or prevention of collisions)

17/2216  . . . (for adjusting the tool into its holder (B23Q 17/0923 - B23Q 17/0942 takes precedence))

17/2225  . . . (with the toolholder as reference-element)

17/2233  . . . (for adjusting the tool relative to the workpiece)

17/2241  . . . (Detection of contact between tool and workpiece)

17/225  . . . (of a workpiece relative to the tool-axis)

17/2258  . . . (the workpiece rotating during the adjustment relative to the tool axis)

17/2266  . . . (of a tool relative to a workpiece-axis)

17/2275  . . . (of a tool-axis relative to a workpiece-axis)

17/2283  . . . (for adjusting the distance between coaxially rotating tools)

17/2291  . . . (for adjusting the workpiece relative to the holder thereof)

17/24  . . . using optics (or electromagnetic waves)
Measuring; Indicating; Controlling

35/00 Control systems or devices for copying directly from a pattern or a master model; Devices for use in copying manually [(copy milling classified also in B27C 5/003)]

35/005 . . . (copying by a curve composed of arcs of circles)

35/02 . . . Copying discrete points from the pattern, e.g. for determining the position of holes to be drilled

35/04 . . . using a feeler or the like travelling along the outline of the pattern, model or drawing; Feelers, patterns, or models therefor

35/06 . . . specially adapted for controlling successive operations, e.g. separate cuts, on a workpiece

35/08 . . . Means for transforming movement of the feeler or the like into feed movement of tool or work

35/10 . . . mechanically only

35/101 . . . . . [with a pattern composed of one or more lines used simultaneously for one tool]

35/102 . . . . . [of one line]

35/103 . . . . . [which turns continuously]

35/104 . . . . . [with coaxial tool and feeler]

35/105 . . . . . [of two lines]

35/106 . . . . . [with a single tool and two feelers rotating about parallel axis]

35/107 . . . . . [tool and feelers being coaxial]

35/108 . . . . . [of three or more lines]

35/109 . . . . . [with a continuously turning pattern (B23Q 35/101 takes precedence)]

35/12 . . . involving electrical means (programme recording for copying purposes in a separate apparatus G05, G11)

35/121 . . . using mechanical sensing

35/122 . . . . . the feeler opening or closing electrical contacts

35/123 . . . . . the feeler varying the impedance in a circuit

35/124 . . . . . varying resistance

35/125 . . . . . varying capacitance

35/126 . . . . . varying inductance

35/127 . . . . . using non-mechanical sensing

35/128 . . . Sensing by using optical means

35/129 . . . . . Sensing by using electric discharges

35/13 . . . Sensing by using magnetic means

35/14 . . . controlling one or more electromotors

35/16 . . . controlling fluid motors

35/18 . . . involving fluid means (B23Q 35/16 takes precedence)

35/181 . . . . . [with a pattern composed of one or more lines used simultaneously]

35/183 . . . . . [of one line]

35/185 . . . . . . [turning continuously]

35/186 . . . . . . [of two lines]

35/188 . . . . . . [with a continuously turning pattern (B23Q 35/181 takes precedence)]

35/20 . . . with special means for varying the ratio of reproduction

35/22 . . . specially adapted for compensating for wear of the tool

35/24 . . . . . . Feelers; Feeler units

35/26 . . . . . . designed for a physical contact with a pattern or a model

35/28 . . . . . . for control of a mechanical copying system

35/30 . . . . . . for control of an electrical or electro-hydraulic copying system
Metal-working machines comprising units or sub-assemblies:

**Associations of metal-working machines or units**

### 37/00 Metal-working machines, or constructional combinations thereof, built-up from units designed so that at least some of the units can form parts of different machines or combinations; Units therefor in so far as the feature of interchangeability is important (features relating to particular metal-working operations, [see the relevant subclass, e.g. B23P 23/00](#))

- 37/002 [Convertible machines, e.g. from horizontally working into vertically working (B27B 5/165; convertible sawing devices)]
- 37/005 [Modular base frames]
- 37/007 [Modular machining stations designed to be linked to each other]

### 39/00 Metal-working machines incorporating a plurality of sub-assemblies, each capable of performing a metal-working operation (B23Q 33/00, B23P 23/00 take precedence; if the operations are similar and the kind of operation is essential, [see the relevant subclass for the operation])

- 39/002 [Machines with twin spindles]
- 39/004 [Machines with tool turrets]
- 39/006 [Machines with multi-spindles]
- 39/008 [Machines of the lathe type]

- 39/02 the sub-assemblies being capable of being brought to act at a single operating station
- 39/021 with a plurality of toolheads per workholder, whereby the toolhead is a main spindle, a multispindle, a revolver or the like
- 39/022 with same working direction of toolheads on same workholder
- 39/023 simultaneous working of toolheads
- 39/024 consecutive working of toolheads
- 39/025 with different working directions of toolheads on same workholder
- 39/026 simultaneous working of toolheads
- 39/027 consecutive working of toolheads
- 39/028 with a plurality of workholder per toolhead in operating position (with only one workholder in operating position B23Q 1/66)

### 2210/00 Machine tools incorporating a specific component

- 2210/002 Flexures
- 2210/004 Torque motors
- 2210/006 Curved guiding rails
- 2210/008 Flexible guiding rails

### 2220/00 Machine tool components

- 2220/002 Tool turrets
- 2220/004 Rotary tables
- 2220/006 Spindle heads
- 2220/008 Rotatable tool holders coupled in parallel to a non-rotating accessory

### 2230/00 Special operations in a machine tool

- 2230/002 Using the spindle for performing a non-machining or non-measuring operation, e.g. cleaning, actuating a mechanism
- 2230/004 Using a cutting tool reciprocating at high speeds, e.g. "fast tool"
- 2230/006 Machining both ends of a workpiece consecutively
- 2230/008 Machining the middle part and the ends of a workpiece consecutively

### 2240/00 Machine tools specially suited for a specific kind of workpiece

- 2240/002 Flat workpieces
- 2240/005 Flexible, deformable workpieces
2705/00 Work clamping

2705/02 . Work clamping means
2705/04 . . using fluid means or a vacuum
2705/06 . . Mandrels with non rotatable claws; Mandrels with internal clamping; Clamping elements
2705/08 . . Devices for clamping a plurality of workpieces
2705/10 . . Devices for clamping workpieces of a particular form or made from a particular material
2705/12 . . for clamping a crankshaft
2705/00 Driving working spindles or feeding members carrying tools or work

2705/02 . Driving working spindles
2705/023 . . General aspects of driving arrangements in a lathe, e.g. indexing the spindle, devices for keeping the cutting speed constant, braking or reversing devices
2705/026 . . Main drive for the spindles of milling machines
2705/04 . . by fluid pressure
2705/043 . . for lathes
2705/046 . . for broaching machines
2705/06 . . Mechanical drives with means for varying the speed ratio
2705/062 . . for lathes
2705/064 . . mechanically controlled
2705/066 . . fluid pressure controlled
2705/068 . . electrically controlled
2705/08 . . Devices for preselecting speed in gear boxes of lathes
2705/10 . . Feeding members carrying tools or work
2705/102 . . for lathes
2705/104 . . for milling machines
2705/106 . . for planing machines
2705/108 . . for slotting or mortising machines
2705/12 . . Fluid-pressure drives
2705/122 . . for milling machines
2705/125 . . for planing machines
2705/127 . . for slotting or mortising machines
2705/14 . . Electric drives
2705/145 . . . for milling machines
2705/16 . . Feeding working spindles
2705/165 . . . General aspects of feeding a boring spindle
2705/18 . . Feeding other members supporting tools also feeding working spindles supports
2705/182 . . . in lathes
2705/185 . . . Clutches
2705/187 . . . Automatic clutches
2705/20 . . . Gear boxes for thread cutting lathes with a lead screw

2705/22 . Limiting feed movement of a boring spindle
2705/24 . General aspects of limiting the carriage movement in lathes
2705/26 . Stopping the feed in case of overload or a break in a boring machine

2707/00 Automatic supply or removal of metal workpieces
2707/003 . . in a lathe
2707/006 . . for thread cutting, e.g. bolts or crews
2707/02 . . Drive
2707/025 . . Driving by vibration, shaking or jotting
2707/04 . . by means of grippers also magnetic or pneumatic gripping
2707/05 . . by means of roller ways
2707/06 . . by means of magazines for plates
2707/16 . . Devices for organising or spreading out workpieces on a conveyor; Devices for placing the pieces at predetermined intervals or devices for forming a regular flow of the pieces

2709/00 Portable machines or devices for the cylindrical bores of valve bodies

2716/00 Equipment for precise positioning of tool or work into particular locations
2716/02 . . Devices for the axial positioning of the turret in a lathe; Devices for rotating and blocking the turret
2716/04 . . Indexing devices for boring machines
2716/06 . . Headstock dividers or devices for dividing in milling machines
2716/08 . . Holders for tools or work comprising a divider or positioning devices

2717/00 Arrangements for indicating or measuring
2717/003 . . in lathes
2717/006 . . in milling machines

2720/00 Lathes or mechanisms for making work with a non-circular section without a model or a shaped tool

2735/00 Control systems or devices for copying from a pattern or master model
2735/002 . . in a milling machine
2735/004 . . the workpiece being immobile during milling
2735/006 . . the workpiece rotating during milling
2735/008 . . in a planing machine
2735/02 . . Means for transforming movement of the feeder into feed movement of tool or work
2735/025 . . in a lathe
2735/04 . . mechanically only
2735/045 . . . in a milling machine
2735/06 . . involving electrical means
2735/062 . . . in a lathe
2735/065 . . . in a milling machine
2735/067 . . . . with rotation of the workpiece during milling
2735/08 . . . involving fluid means
2735/082 . . . in a lathe
2735/085 . . . in a milling machine
2735/087 . . . . with rotation of the workpiece during milling