

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

SHAPING

B23 MACHINE TOOLS; METAL-WORKING NOT OTHERWISE PROVIDED FOR
(punching, perforating, making articles by processing sheet metal, tubes, or profiles [B21D](#); wire-working [B21F](#); making pins, needles, or nails [B21G](#); making chains [B21L](#); grinding [B24](#))
(NOTES 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.

- | | |
|--|--|
| <p>1/00 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 7/005; handling of mask or wafer G03F 7/70691; adjusting or compensating devices for optical apparatuses G12B 5/00; piezoelectric or electrostrictive positioners H01L 41/09})</p> | <p>1/0054 . {Means for adjusting the position of a machine tool with respect to its supporting surface (B23Q 1/262 takes precedence)}</p> |
| <p>1/0009 . {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)}</p> | <p>1/0063 . {Connecting non-slidable parts of machine tools to each other}</p> |
| <p>1/0018 . . {comprising hydraulic means}</p> | <p>1/0072 . . {using a clamping opening for receiving an insertion bolt or nipple}</p> |
| <p>1/0027 . . . {between moving parts between which an uninterrupted energy-transfer connection is maintained}</p> | <p>1/0081 . . {using an expanding clamping member insertable in a receiving hole}</p> |
| <p>1/0036 {one of those parts being a tool}</p> | <p>1/009 . . . {the receiving hole being cylindrical or conical}</p> |
| <p>1/0045 . . {Control panels or boxes}</p> | <p>1/01 . Frames, beds, pillars or like members; Arrangement of ways</p> |
| | <p>1/012 . . {Portals}</p> |
| | <p>1/015 . . {Frames, beds, pillars}</p> |
| | <p>1/017 . . {Arrangements of ways}</p> |
| | <p>1/03 . Stationary work or tool supports (B23Q 1/70 takes precedence; auxiliary tables B23Q 1/74; tailstocks B23B 23/00)</p> |
| | <p>1/032 . . {characterised by properties of the support surface}</p> |

- 1/035 . . . {with an array of longitudinally movable rods defining a reconfigurable support surface}
- 1/037 . . . {comprising series of support elements whose relative distance is adjustable}
- 1/25 . Movable or adjustable work or tool supports
- 1/26 . . . 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 ball, roller or wheel arrangements
- 1/42 . . . using T-, V-, dovetail-section or like guides (B23Q 1/40 takes precedence)
- 1/44 . . . using particular mechanisms (B23Q 1/26 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 parallelly by a single rotating pair}
- 1/4819 {followed perpendicularly by a single sliding pair}
- 1/4823 {followed parallelly by a single sliding pair}
- 1/4828 {a single rotating pair followed parallelly by a single sliding pair}
- 1/4833 {followed perpendicularly by a single rotating pair}
- 1/4838 {followed parallelly by a single rotating pair}
- 1/4842 {followed perpendicularly by a single sliding pair}
- 1/4847 {followed parallelly 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 parallelly by a single rotating pair}
- 1/4866 {followed perpendicularly by a single sliding pair}
- 1/4871 {followed parallelly by a single sliding pair}
- 1/4876 {a single sliding pair followed parallelly by a single rotating pair}
- 1/488 {followed perpendicularly by a single rotating pair}
- 1/4885 {followed parallelly by a single rotating pair}
- 1/489 {followed perpendicularly by a single sliding pair}
- 1/4895 {followed parallelly 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
- movement, the pairs are regarded as a single pair for the purposes of classification.

NOTES

- In groups B23Q 1/44 - B23Q 1/62, the following expressions are used with the meaning indicated:
 - "sliding pair" means a pair consisting of two elements operating in such a way that only straight line movement between both elements is possible;
 - "rotating pair" means a pair consisting of two elements operating in such a way that only rotary movement between both elements is possible;
 - "screw pair" means a pair consisting of two elements operating in such a way as to produce simultaneous rotation and axial translation between both elements.
- In groups B23Q 1/44 - B23Q 1/62, where more than one pair of elements is provided on the same axis for the same kind of

- 1/5406 {a single rotating pair followed perpendicularly by a single rotating pair ([B23Q 1/545](#) takes precedence)}
- 1/5412 {followed perpendicularly by a single rotating pair}
- 1/5418 {followed parallelly by a single rotating pair}
- 1/5425 {followed perpendicularly by a single sliding pair}
- 1/5431 {followed parallelly 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 parallelly by a single rotating pair}
- 1/5475 {followed perpendicularly by a single rotating pair}
- 1/5481 {followed parallelly by a single rotating pair}
- 1/5487 {followed perpendicularly by a single sliding pair}
- 1/5493 {followed parallelly 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 parallelly by a single sliding pair}
- 1/603 {followed perpendicularly by a single rotating pair}
- 1/605 {followed parallelly by a single rotating pair}
- 1/606 {followed perpendicularly by a single sliding pair}
- 1/608 {followed parallelly 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 parallelly by a single rotating pair}
- 1/626 {followed perpendicularly by a single sliding pair}
- 1/628 {followed parallelly 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}
- 1/72 . . Auxiliary arrangements; Interconnections between auxiliary tables and movable machine elements {([independent of machine tool B23Q 3/105](#))}
- 1/74 . . Auxiliary tables
- 1/76 . . Steadies; Rests {([B23B 13/126](#) takes precedence; steadies combined with cutting tool holders [B23B 29/16](#))}
- 1/763 . . . {Rotating steadies or rests}
- 1/766 . . . {Steadies or rests moving together with the tool support}
- 3/00** **Devices holding, supporting, or positioning work or tools, of a kind normally removable from the machine** (work-tables or other parts, e.g. faceplates, normally not incorporating means for securing work [B23Q 1/00](#); automatic position control [B23Q 15/00](#) {; food cutting boards [A47J 47/00](#); workpiece support for dies [B21D 37/02](#)); rotary tool heads for turning-machines [B23B 3/24](#), [B23B 3/26](#); non-driven tool holders [B23B 29/00](#); general features of turrets [B23B 29/24](#) {; drawbars in spindles [B23B 31/261](#); for electrical discharge machining [B23H 11/003](#); for welding [B23K 37/04](#); means for securing grinding wheels [B24B 45/00](#); mountings for abrasive wheels [B24D 5/16](#)); tools or bench devices for fastening, connecting, disengaging or holding [B25B](#) {; chucks for percussive tools [B25D 17/084](#); work benches for manual work [B25H 1/00](#); devices for securing circular saw blades [B27B 5/32](#); for assembling or manufacturing aircrafts [B64F 5/10](#); for holding semiconductors or wafers [H01L 21/67](#); devices for holding circuit boards [H05K 13/0061](#))}
- 3/002 . . {Means to press a workpiece against a guide}
- 3/005 . . {Guides for workpieces}
- 3/007 . . {provided with measuring means allowing the positioning of the guides}
- 3/02 . . for mounting on a work-table, tool-slide, or analogous part ([B23Q 3/15](#) takes precedence)
- 3/04 . . adjustable in inclination
- 3/06 . . Work-clamping means
- 3/061 . . . {adapted for holding a plurality of workpieces}
- 3/062 . . . {adapted for holding workpieces having a special form or being made from a special material}
- 3/063 {for holding turbine blades}
- 3/064 {for holding elongated workpieces, e.g. pipes, bars or profiles}
- 3/065 {for holding workpieces being specially deformable, e.g. made from thin-walled or elastic material}
- 3/066 . . . {Bench vices}
- 3/067 . . . {Blocks with collet chucks}
- 3/068 {fluid-operated}
- 3/069 {for pressing workpieces against a work-table}
- 3/08 . . . other than mechanically-actuated {([B23Q 3/061](#), [B23Q 3/066](#), and [B23Q 3/067](#) take precedence)}
- 3/082 {hydraulically actuated}

- 3/084 {using adhesive means}
- 3/086 {using a solidifying liquid, e.g. with freezing, setting or hardening means}
- 3/088 {using vacuum means}
- 3/10 . . Auxiliary devices, e.g. bolsters, extension members {(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 31/02](#))
- 3/14 . . Mandrels in general (expansion mandrels [B23B 31/40](#))
- 3/15 . . Devices for holding work using magnetic or electric force acting directly on the work
- 3/152 . . Rotary devices
- 3/154 . . Stationary devices
- 3/1543 . . . {using electromagnets}
- 3/1546 . . . {using permanent magnets}
- 3/155 . . Arrangements for automatic insertion or removal of tools {, e.g. combined with manual handling ([B23Q 7/046](#) takes precedence)}
- 3/15503 . . {Processes characterized by special sequencing of operations or the like, e.g. for optimizing tool changing time or capacity in tool storage}
- 3/15506 . . {the tool being inserted in a tool holder directly from a storage device (without transfer device)}
- 3/15513 . . {the tool being taken from a storage device and transferred to a tool holder by means of transfer devices}
- 3/1552 . . {parts of devices for automatically inserting or removing tools}
- 3/15526 . . . {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

Group [B23Q 3/15526](#) is impacted by reclassification into groups [B23Q 2003/15527](#), [B23Q 2003/15528](#), [B23Q 2003/1553](#), [B23Q 2003/15531](#), [B23Q 2003/15532](#), [B23Q 3/15534](#), [B23Q 3/15536](#), [B23Q 2003/15537](#) and [B23Q 3/15539](#).

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

- 2003/15527 {the storage device including means to latch tools}

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.

- 3/15533 {combined with manual tool transfers}
- 3/15534 {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

Group [B23Q 3/1554](#) is impacted by reclassification into groups [B23Q 2003/155404](#), [B23Q 2003/155407](#), [B23Q 2003/155411](#), [B23Q 2003/155414](#), [B23Q 2003/155418](#), [B23Q 2003/155421](#), [B23Q 2003/155425](#), [B23Q 2003/155428](#), [B23Q 2003/155432](#), [B23Q 2003/155435](#), [B23Q 2003/155439](#), [B23Q 2003/155442](#), [B23Q 2003/155446](#), [B23Q 2003/155449](#), [B23Q 2003/155453](#) and [B23Q 2003/155456](#).

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

2003/155404 {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.

2003/155425 {pivotable}

WARNING

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.

2003/155428 {about a common axis}

WARNING

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.

2003/155432 {about different axes}

WARNING

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.

2003/155435 {and linearly movable}

WARNING

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.

2003/155439 {along the pivoting axis}

WARNING

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.

2003/155442 {radially to the pivoting axis}

WARNING

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.

2003/155446 {with translation of the pivoting axis}

WARNING

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.

2003/155449 {linearly movable only}

WARNING

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.

2003/155453 {including different gripper configurations for holding differently-configured tools}

WARNING

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.

2003/155456 {using separate transfer mechanisms for each tool in the magazine}

WARNING

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}
- 3/157 . . . of rotary tools {([in combination with non-rotary tools B23Q 3/15506, B23Q 3/15513](#))}
- 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 3/15793 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 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 controlled
- 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](#))**
- 7/001 . {Lateral transport of long workpieces}
- 7/002 . {Screw or rotary spiral conveyors ([B23Q 7/1426](#) takes precedence)}
- 7/003 . {Cyclically moving conveyors ([B23Q 7/1426](#) takes precedence)}
- 7/005 . {Lifting devices}
- 7/006 . {Ejectors}
- 7/007 . {Flying working devices}
- 7/008 . {Catching devices ([B23Q 7/12](#) takes precedence)}
- 7/02 . by means of drums or rotating tables or discs
- 7/03 . by means of endless chain conveyors ([B23Q 7/1447](#), [B23Q 7/16](#) take precedence)
- 7/035 . . {on which work holders are fixed}
- 7/04 . by means of grippers {([B23Q 7/1494](#) takes precedence)}
- 7/041 . . {step by step}
- 7/042 . . . {for the axial transport of long workpieces ([B23B 13/022](#) takes precedence)}
- 7/043 . . {Construction of the grippers ([B23Q 7/048](#) takes precedence)}
- 7/045 . . {using a tool holder as a work-transporting gripper}
- 7/046 . . {Handling workpieces or tools}
- 7/047 . . {the gripper supporting the workpiece during machining}
- 7/048 . . {Multiple gripper units}
- 7/05 . by means of roller-ways {([B23Q 7/1468](#), [B23Q 7/16](#) take precedence)}
- 7/055 . . {some of the rollers being driven}
- 7/06 . by means of pushers {([B23Q 7/1457](#), [B23Q 7/1489](#), [B23B 13/02](#), [B23B 13/12](#) take precedence)}
- 7/08 . by means of slides or chutes
- 7/10 . by means of magazines
- 7/103 . . {for flat material}
- 7/106 . . {with means to deliver a certain quantity ([B23Q 7/103](#) takes precedence)}
- 7/12 . Sorting arrangements
- 7/14 . co-ordinated in production lines
- 7/1405 . . {with a series disposition of similar working devices}
- 7/141 . . {with a series disposition of different working devices and with the axial transport for long workpieces of which a plurality of final products are made}
- 7/1415 . . {with a series disposition of working devices not corresponding with the sequence of the working}
- 7/1421 . . {with a parallel disposition of working devices}
- 7/1426 . . {with work holders not rigidly fixed to the transport devices ([B23Q 7/005](#), [B23Q 7/035](#) take precedence)}
- 7/1431 . . . {Work holder changers ([B23Q 7/1442](#) takes precedence)}
- 7/1436 . . . {using self-propelled work holders}
- 7/1442 . . . {using carts carrying work holders}
- 7/1447 . . . {using endless conveyors}
- 7/1452 {comprising load-supporting surfaces}
- 7/1457 {comprising an impeller or a series of impellers}
- 7/1463 . . . {using rotary driving means}
- 7/1468 {comprising rollers or cogwheels, or pinions or the like}
- 7/1473 {comprising screw conveyors}

- 7/1478 . . . {using a conveyor comprising cyclically-moving means}
- 7/1484 {with carrier means}
- 7/1489 {with impeller means}
- 7/1494 . . . {using grippers}
- 7/16 . Loading work on to conveyors; Arranging work on conveyors, e.g. varying spacing between individual workpieces
- 7/165 . . {Turning devices}
- 7/18 . . Orienting work on conveyors
- 9/00 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](#)})
- 9/0007 . {Portable machines comprising means for their guidance or support directly on the workpiece}
- 9/0014 . {Portable machines provided with or cooperating with guide means supported directly by the workpiece during action}
- 9/0021 . . {the tool being guided in a circular path}
- 9/0028 . . {the guide means being fixed only on the machine}
- 9/0035 . . . {and being capable of guiding the tool in a circular path}
- 9/0042 . . {the guide means being fixed only on the workpiece}
- 9/005 . . . {angularly adjustable}
- 9/0057 . . . {and being capable of guiding the tool in a circular path}
- 9/0064 . {Portable machines cooperating with guide means not supported by the workpiece during working}
- 9/0071 . . {the guide means being fixed to the machine}
- 9/0078 . . {the guide means being fixed to a support}
- 9/0085 . . . {Angularly adjustable}
- 9/0092 . . . {Workpieces angularly adjustable relative to the support}
- 9/02 . for securing machines or apparatus to workpieces, or other parts, of particular shape, e.g. to beams of particular cross-section
- Accessories**
- 11/00 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 59/00](#)}); **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](#))
- 11/0003 . {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)}
- 11/0007 . . {by compensating occurring thermal dilations ([B23Q 15/18](#) takes precedence)}
- 11/001 . {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](#))}
- 11/0014 . . {using static reinforcing elements, e.g. pre-stressed ties}
- 11/0017 . . {compensating the weight of vertically moving elements, e.g. by balancing liftable machine parts ([B23B 47/26](#) takes precedence)}
- 11/0021 . . . {the elements being rotating or pivoting}
- 11/0025 . . . {using resilient means, e.g. springs, hydraulic dampers}
- 11/0028 . . {by actively reacting to a change of the configuration of the machine ([B23Q 15/00](#) takes precedence)}
- 11/0032 . {Arrangements for preventing or isolating vibrations in parts of the machine ([B23B 29/022](#), [B23D 47/005](#) take precedence; means for damping or suppressing vibrations, in general [F16F](#))}
- 11/0035 . . {by adding or adjusting a mass, e.g. counterweights}
- 11/0039 . . {by changing the natural frequency of the system or by continuously changing the frequency of the force which causes the vibration}
- 11/0042 . {Devices for removing chips ([B23Q 11/02](#), [B23Q 11/0875](#) take precedence)}
- 11/0046 . . {by sucking}
- 11/005 . . {by blowing}
- 11/0053 . . {using the gravity force}
- 11/0057 . . {outside the working area}
- 11/006 . . {by sucking and blowing simultaneously}
- 11/0064 . . {by using a magnetic or electric field}
- 11/0067 . . {chip containers located under a machine or under a chip conveyor}
- 11/0071 . . {dust collectors for hand tools}
- 11/0075 . . {for removing chips or coolant from the workpiece after machining}
- 11/0078 . {Safety devices protecting the operator, e.g. against accident or noise (protecting the machine tool [B23Q 5/58](#); protecting people, in general [F16P 1/00](#), [F16P 3/00](#))}
- 11/0082 . . {by determining whether the operator is in a dangerous position ([B23Q 17/2438](#) takes precedence)}
- 11/0085 . . {by determining whether the machine tool is in a dangerous configuration}
- 11/0089 . . {actuating operator protecting means, e.g. closing a cover element, producing an alarm signal}
- 11/0092 . . {actuating braking or stopping means}
- 11/0096 . . {protecting against noise}
- 11/02 . Devices for removing scrap from the cutting teeth of circular {or non-circular} cutters
- 11/04 . Arrangements preventing overload of tools, e.g. restricting load
- 11/06 . Safety devices for circular cutters
- 11/08 . Protective coverings for parts of machine tools; Splash guards
- 2011/0808 . . {Means for maintaining identical distances between relatively movable cover parts}
- 11/0816 . . {Foldable coverings, e.g. bellows}
- 11/0825 . . {Relatively slidable coverings, e.g. telescopic}
- 11/0833 . . . {with a non-rectilinear shifting}
- 11/0841 . . . {with spirally wound coverings}
- 11/085 . . {Flexible coverings, e.g. coiled-up belts}
- 11/0858 . . {using a liquid bath or a liquid curtain}
- 11/0866 . . {using covering means adaptable to the workpieces, e.g. curtains or bristles}

- 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 . . {arranged 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 77/006; 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 closed fluid circuit for cooling or heating}
- 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}

16/006	• {positioning by bringing a stop into contact with one of two or more stops, fitted on a common carrier}	17/09	• 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)
16/007	• {Positioning by sine tables}	17/0904	• • {before or after machining}
16/008	• {Cushioning the abutting movement}	17/0909	• • • {Detection of broken tools}
16/02	• Indexing equipment (specially adapted for gear-cutting machines B23F 23/08)	17/0914	• • • {Arrangements for measuring or adjusting cutting-tool geometry machine tools}
16/021	• • {in which only the positioning elements are of importance (B23Q 16/04 , B23Q 16/08 take precedence)}	17/0919	• • • {Arrangements for measuring or adjusting cutting-tool geometry in presetting devices}
16/022	• • {in which only the indexing movement is of importance}	17/0923	• • • • {Tool length}
16/023	• • • {by converting a reciprocating or oscillating movement into or linear indexing movement}	17/0928	• • • • {Cutting angles of lathe tools}
16/024	• • • {and by converting a continuous movement into a linear indexing movement}	17/0933	• • • • {Cutting angles of milling cutters}
16/025	• • • {by converting a continuous movement into a rotary indexing movement}	17/0938	• • • • {Cutting angles of drills}
16/026	• • • {by converting a reciprocating or oscillating movement into a rotary indexing movement}	17/0942	• • • • {Cutting angles of saws}
16/027	• • {with means for adjusting the distance between two successive indexing-points}	17/0947	• • • • {Monitoring devices for measuring cutting angles}
16/028	• • {with positioning means between two successive indexing-points}	17/0952	• • {during machining}
16/04	• • having intermediate members, e.g. pawls, for locking the relatively movable parts in the indexed position	17/0957	• • • {Detection of tool breakage (detecting failure of drills B23B 49/001)}
16/043	• • • {with a reciprocating or oscillating drive (B23Q 16/06 takes precedence)}	17/0961	• • • {by measuring power, current or torque of a motor}
16/046	• • • {with a continuous drive (B23Q 16/06 takes precedence)}	17/0966	• • • {by measuring a force on parts of the machine other than a motor}
16/06	• • • Rotary indexing	17/0971	• • • {by measuring mechanical vibrations of parts of the machine (arrangements for measuring vibrations B23Q 17/12)}
16/065	• • • • {with a continuous drive}	17/0976	• • • • {Detection or control of chatter (B23Q 15/12 takes precedence)}
16/08	• • having means for clamping the relatively movable parts together in the indexed position	17/098	• • • • {by measuring noise}
16/083	• • • {with a reciprocating or oscillating drive (B23Q 16/10 takes precedence)}	17/0985	• • • • {by measuring temperature}
16/086	• • • {with a continuous drive (B23Q 16/10 takes precedence)}	17/099	• • • • {by measuring features of the machined workpiece (arrangements for measuring workpiece characteristics B23Q 17/20)}
16/10	• • • Rotary indexing	17/0995	• • {Tool life management}
16/102	• • • • {with a continuous drive}	17/10	• for indicating or measuring cutting speed or number of revolutions
16/105	• • • • {clamping with a disc brake}	17/12	• for indicating or measuring vibration
16/107	• • • • {clamping with a drum brake}	17/20	• for indicating or measuring workpiece characteristics, e.g. contour, dimension, hardness
16/12	• • using optics	17/22	• for indicating or measuring existing or desired position of tool or work {(B23Q 16/005 takes precedence)}
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)	17/2208	• • {Detection or prevention of collisions}
2017/001	• {Measurement or correction of run-out or eccentricity}	17/2216	• • {for adjusting the tool into its holder (B23Q 17/0923 - B23Q 17/0942 takes precedence)}
17/002	• {for indicating or measuring the holding action of work or tool holders (B23Q 3/16 takes precedence)}	17/2225	• • • {with the toolholder as reference-element}
17/003	• • {by measuring a position}	17/2233	• • • {for adjusting the tool relative to the workpiece}
17/005	• • {by measuring a force, a pressure or a deformation}	17/2241	• • • • {Detection of contact between tool and workpiece}
17/006	• {for indicating the presence of a work or tool in its holder (B23Q 17/002 , B23Q 17/09 take precedence)}	17/225	• • • • {of a workpiece relative to the tool-axis}
17/007	• {for managing machine functions not concerning the tool}	17/2258	• • • • • {the workpiece rotating during the adjustment relative to the tool axis}
17/008	• • {Life management for parts of the machine (tool life management B23Q 17/0995)}	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}

- 17/2404 . . {Arrangements for improving direct observation of the working space, e.g. using mirrors or lamps (structural combinations of lighting devices with other articles, not otherwise provided for, [F21V 33/00](#))}
- 17/2409 . . {Arrangements for indirect observation of the working space using image recording means, e.g. a camera}
- 17/2414 . . {for indicating desired positions guiding the positioning of tools or workpieces ([B25H 1/0092](#) takes precedence)}
- 17/2419 . . . {by projecting a single light beam}
- 17/2423 . . . {by projecting crossing light beams}
- 17/2428 . . {for measuring existing positions of tools or workpieces}
- 17/2433 . . {Detection of presence or absence}
- 17/2438 . . . {of an operator or a part thereof}
- 17/2442 . . . {of a tool}
- 17/2447 . . . {of a workpiece}
- 17/2452 . . {for measuring features or for detecting a condition of machine parts, tools or workpieces ([B23Q 17/2428](#), [B23Q 17/2433](#) take precedence)}
- 17/2457 . . . {of tools}
- 17/2461 {Length}
- 17/2466 {Diameter}
- 17/2471 . . . {of workpieces}
- 17/2476 . . . {of clamping devices, e.g. work or tool holders}
- 17/248 . . {using special electromagnetic means or methods}
- 17/2485 . . . {using interruptions of light beams}
- 17/249 . . . {using image analysis, e.g. for radar, infrared or array camera images}
- 17/2495 . . . {using interferometers}
- 23/00** Arrangements for compensating for irregularities or wear, e.g. of ways, of setting mechanisms ([automatic control B23Q 15/00](#))
- 27/00** Geometrical mechanisms for the production of work of particular shapes, not fully provided for in another subclass
- 27/003 . {of conical non-circular section manufactured by an apparatus with a first rotational cutting vector and a second linear feed vector, intersecting the first vector}
- 27/006 . {by rolling without slippage two bodies of particular shape relative to each other}

Copying

NOTE

In groups [B23Q 33/00](#) or [B23Q 35/00](#), the following term is used with the meaning indicated:

- "copying" covers the derivation of a required shape from a pattern, of the same or a different shape or scale, by a mechanism or equivalent means controlled by a member following the pattern. The pattern may be a model or drawing, or an element such as a cam incorporated in the operating mechanism of a machine. This term does not cover the derivation of a required shape from simple geometrical shapes, e.g. generating a cycloid by a rolling circle, which in general is provided for in group [B23Q 27/00](#)

33/00 Methods for copying

- 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 means of 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

- 35/32 in which the feeler makes and breaks an electrical contact or contacts, e.g. with brush-type tracers
- 35/34 in which the feeler varies an electrical characteristic in a circuit, e.g. capacity, frequency
- 35/36 for control of a hydraulic or pneumatic copying system
- 35/38 . . . designed for sensing the pattern, model, or drawing without physical contact ([sensing by means of a fluid jet B23Q 35/36](#))
- 35/40 involving optical or photoelectrical systems
- 35/42 . . Patterns; Masters models
- 35/44 . . . provided with means for adjusting the contact face, e.g. comprising flexible bands held by set-screws
- 35/46 . . . Supporting devices therefor
- 35/48 . . . using a feeler or the like travelling to-and-fro between opposite parts of the outline of the pattern, model or drawing

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](#))

- 2039/002 . {Machines with twin spindles}
- 2039/004 . {Machines with tool turrets}
- 2039/006 . {Machines with multi-spindles}
- 2039/008 . {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](#))}

- 39/029 . . . {with a twin table for alternatively working on one of the tables}
- 39/04 . the sub-assemblies being arranged to operate simultaneously at different stations, e.g. with an annular work-table moved in steps ([associations of machines connected only by work-transferring means B23Q 41/00](#))
- 39/042 . . {with circular arrangement of the sub-assemblies}
- 39/044 . . . {having at least one tool station cooperating with each work holder, e.g. multi-spindle lathes}
- 39/046 . . . {including a loading and/or unloading station}
- 39/048 . . {the work holder of a work station transfers directly its workpiece to the work holder of a following work station}

- 41/00 Combinations or associations of metal-working machines not directed to a particular result according to classes [B21](#), [B23](#), or [B24](#)** ([B23Q 37/00, B23Q 39/00 take precedence; features relating to operations performed, if the different metal-working operations are of the same kind, see the subclass for the kind of operation, e.g. punching \[B21D\]\(#\), welding \[B23K\]\(#\), grinding \[B24B\]\(#\); features relating to technically specified combinations of different metal-working operations \[B23P 23/00\]\(#\)](#))

- 41/02 . Features relating to transfer of work between machines ([arrangements for handling work for machine tools coordinated in production lines B23Q 7/14](#))
- 41/04 . Features relating to relative arrangements of machines
- 41/06 . Features relating to organisation of working of machines
- 41/08 . Features relating to maintenance of efficient operation

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

2240/007	. Elongated workpieces	2705/22	. Limiting feed movement of a boring spindle
2701/00	Members which are comprised in the general build-up of a form of the machine	2705/24	. General aspects of limiting the carriage movement in lathes
2701/01	. Frames or slideways for lathes; Frames for boring machines	2705/26	. Stopping the feed in case of overload or a break in a boring machine
2701/02	. Movable or adjustable work or tool supports for milling machines, their drive, control or guiding	2707/00	Automatic supply or removal of metal workpieces
2701/025	. . Work-tables rotating around an axis vertical to the surface of the table; this kind of table comprising a divider, indexer or positioning means	2707/003	. in a lathe
2701/04	. Support braces for a milling machine	2707/006	. for thread cutting, e.g. bolts or crews
2701/06	. Tailstock for the spindle of a milling machine	2707/02	. Drive
2703/00	Work clamping	2707/025	. . Driving by vibration, shaking or jotting
2703/02	. Work clamping means	2707/04	. by means of grippers also magnetic or pneumatic gripping
2703/04	. . using fluid means or a vacuum	2707/05	. by means of roller ways
2703/06	. . Mandrels with non rotatable claws; Mandrels with internal clamping; Clamping elements	2707/06	. by means of magazines for plates
2703/08	. . Devices for clamping a plurality of workpieces	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
2703/10	. . Devices for clamping workpieces of a particular form or made from a particular material	2709/00	Portable machines or devices for the cylindrical bores of valve bodies
2703/105	. . . for clamping a crankshaft	2716/00	Equipment for precise positioning of tool or work into particular locations
2703/12	. Accessories for attaching	2716/02	. Devices for the axial positioning of the turret in a lathe; Devices for rotating and blocking the turret
2705/00	Driving working spindles or feeding members carrying tools or work	2716/04	. Indexing devices for boring machines
2705/005	. General aspects of driving arrangements in a lathe, e.g. indexing the spindle, devices for keeping the cutting speed constant, braking or reversing devices	2716/06	. Headstock dividers or devices for dividing in milling machines
2705/02	. Driving working spindles	2716/08	. Holders for tools or work comprising a divider or positioning devices
2705/023	. . General aspects of driving a boring spindle	2717/00	Arrangements for indicating or measuring
2705/026	. . Main drive for the spindles of milling machines	2717/003	. in lathes
2705/04	. . by fluid pressure	2717/006	. in milling machines
2705/043	. . . for lathes	2727/00	Lathes or mechanisms for making work with a non-circular section without a model or a shaped tool
2705/046	. . . for broaching machines	2735/00	Control systems or devices for copying from a pattern or master model
2705/06	. . Mechanical drives with means for varying the speed ratio	2735/002	. in a milling machine
2705/062	. . . for lathes	2735/004	. . the workpiece being immobile during milling
2705/064	. . . . mechanically controlled	2735/006	. . the workpiece rotating during milling
2705/066	. . . . fluid pressure controlled	2735/008	. in a planing machine
2705/068	. . . . electrically controlled	2735/02	. Means for transforming movement of the feeler into feed movement of tool or work
2705/08	. . Devices for preselecting speed in gear boxes of lathes	2735/025	. . in a lathe
2705/10	. Feeding members carrying tools or work	2735/04	. . mechanically only
2705/102	. . for lathes	2735/045	. . . in a milling machine
2705/104	. . for milling machines	2735/06	. . involving electrical means
2705/106	. . for planing machines	2735/062	. . . in a lathe
2705/108	. . for slotting or mortising machines	2735/065	. . . in a milling machine
2705/12	. . Fluid-pressure drives	2735/067	. . . . with rotation of the workpiece during milling
2705/122	. . . for milling machines	2735/08	. . involving fluid means
2705/125	. . . for planing machines	2735/082	. . . in a lathe
2705/127	. . . for slotting or mortising machines	2735/085	. . . in a milling machine
2705/14	. . Electric drives	2735/087	. . . . with rotation of the workpiece during milling
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		