

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

- In this subclass, groups designating parts of machine tools cover machine tools characterised by constructional features of such parts.
- 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.
- 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.

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

- 1/035 . . . {with an array of longitudinally movable rods defining a reconfigurable support surface} movement, the pairs are regarded as a single pair for the purposes of classification.
- 1/037 . . . {comprising series of support elements whose relative distance is adjustable} 1/44 . . . using particular mechanisms ([B23Q 1/26](#) takes precedence)
- 1/25 . Movable or adjustable work or tool supports 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}
- 1/26 . . . 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](#)) 1/46 . . . with screw pairs
- 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](#))} 1/48 . . . with sliding pairs and rotating pairs ([B23Q 1/46](#) takes precedence)
- 1/265 {between rotating members} 1/4804 {a single rotating pair followed perpendicularly by a single sliding pair}
- 1/267 {with means to prevent skewness between the relatively slidable members} 1/4809 {followed perpendicularly by a single rotating pair}
- 1/28 . . . Means for securing sliding members in any desired position 1/4814 {followed parallelly by a single rotating pair}
- 1/282 {co-operating with means to adjust the distance between the relatively slidable members} 1/4819 {followed perpendicularly by a single sliding pair}
- 1/285 {for securing two or more members simultaneously or selectively} 1/4823 {followed parallelly by a single sliding pair}
- 1/287 {using a hydraulically controlled membrane acting directly upon a sliding member} 1/4828 {a single rotating pair followed parallelly by a single sliding pair}
- 1/30 . . . controlled in conjunction with the feed mechanism 1/4833 {followed perpendicularly by a single rotating pair}
- 1/32 . . . Relative movement obtained by co-operating spherical surfaces, e.g. ball-and-socket joints 1/4838 {followed parallelly by a single rotating pair}
- 1/34 . . . Relative movement obtained by use of deformable elements, e.g. piezo-electric, magnetostrictive, elastic or thermally-dilatatable elements ([sensitive elements capable of producing movement or displacement for purposes not limited to measurement G12B 1/00](#)) 1/4842 {followed perpendicularly by a single sliding pair}
- 1/36 Springs 1/4847 {followed parallelly by a single sliding pair}
- 1/38 . . . using fluid bearings or fluid cushion supports 1/4852 {a single sliding pair followed perpendicularly by a single rotating pair}
- 1/385 {in which the thickness of the fluid-layer is adjustable} 1/4857 {followed perpendicularly by a single rotating pair}
- 1/40 . . . using ball, roller or wheel arrangements 1/4861 {followed parallelly by a single rotating pair}
- 1/42 . . . using T-, V-, dovetail-section or like guides ([B23Q 1/40](#) takes precedence) 1/4866 {followed perpendicularly by a single sliding pair}

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

- 1/4871 {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

- 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
- 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}

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](#))}

11/0875	. . {Wipers for clearing foreign matter from slideways or slidable coverings}	11/146	. . {by controlling the temperature of a cutting liquid}
11/0883	. . {for spindles, e.g. for their bearings or casings}	11/148	. . {by controlling the air temperature}
11/0891	. . {arranged between the working area and the operator}	13/00	Equipment for use with tools or cutters when not in operation, e.g. protectors for storage { B26B 29/00 takes precedence}
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)} . . {by submerging the tools or work partially or entirely in a liquid}	Measuring; Indicating; Controlling	
11/1007	. . {by supplying a cutting liquid through the spindle}	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)
11/1015	. . {Tool holders, or tools in general specially adapted for receiving the cutting liquid from the spindle}	15/007	. while the tool acts upon the workpiece
11/1023	. . . {Rotary joints specially adapted for feeding the cutting liquid to the spindle}	15/0075	. . {Controlling reciprocating movement, e.g. for planing-machine}
11/103	. . . {using cutting liquids with special characteristics, e.g. flow rate, quality}	15/013	. . Control or regulation of feed movement (B23Q 15/12 takes precedence)
11/1038	. . . {using a minimal quantity of lubricant (spraying apparatus using a carrying fluid B05B 7/00)}	15/02	. . . according to the instantaneous size and the required size of the workpiece acted upon (B23Q 15/06 takes precedence)
11/1046	. . . {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)}	15/04	. . . according to the final size of the previously-machined workpiece (B23Q 15/06 takes precedence)
11/1053	. . . {using cutting liquids with specially selected composition or state of aggregation}	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
11/1061	. . {Filtration systems specially adapted for cutting liquids (filtration in general B01D 24/00 - B01D 41/00)}	15/08	. . Control or regulation of cutting velocity (B23Q 15/12 takes precedence)
11/1076	. . {with a cutting liquid nozzle specially adaptable to different kinds of machining operations}	15/10	. . . to maintain constant cutting velocity between tool and workpiece
11/1084	. . {specially adapted for being fitted to different kinds of machines}	15/12	. . Adaptive control, i.e. adjusting itself to have a performance which is optimum according to a preassigned criterion
11/1092	. . {specially adapted for portable power-driven tools}	15/14	. . Control or regulation of the orientation of the tool with respect to the work
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)} . . {with lubricating effect for reducing friction (F16C 33/66 and F16H 57/04 take precedence)}	15/16	. . Compensation for wear of the tool
11/121	. . . {Lubricant supply devices (F16N 7/00 takes precedence)}	15/18	. . Compensation of tool-deflection due to temperature or force
11/122	. . . {for lubricating spindle bearings (F16C 33/66 takes precedence)}	15/20	. before or after the tool acts upon the workpiece
11/123	. . . {for lubricating linear guiding systems (F16C 29/005 takes precedence)}	15/22	. . Control or regulation of position of tool or workpiece
11/124	. . . {for lubricating ball screw systems}	15/225	. . . {in feed control, i.e. approaching of tool or work in successive decreasing velocity steps}
11/125	. . {for cooling only}	15/24	. . . of linear position
11/126	. . . {for cooling motors or spindles}	15/26	. . . of angular position
11/127	. . . {for cooling frame parts}	15/28	. . with compensation for tool wear
11/128	. . . {for cooling frame parts}	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)
11/14	. Methods or arrangements for maintaining a constant temperature in parts of machine tools	16/001	. {Stops, cams, or holders therefor}
11/141	. . {using a closed fluid circuit for cooling or heating}	16/002	. . {Stops for use in a hollow spindle}
11/143	. . {comprising heating means}	16/003	. {with means to return a tool back, after its withdrawal movement, to the previous working position}
11/145	. . {using a jet of gas or cutting liquid}	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}
- 16/007 . {Positioning by sine tables}
- 16/008 . {Cushioning the abutting movement}
- 16/02 . Indexing equipment (specially adapted for gear-cutting machines [B23F 23/08](#))
- 16/021 . . {in which only the positioning elements are of importance ([B23Q 16/04](#), [B23Q 16/08](#) take precedence)}
- 16/022 . . {in which only the indexing movement is of importance}
- 16/023 . . . {by converting a reciprocating or oscillating movement into or linear indexing movement}
- 16/024 . . . {and by converting a continuous movement into a linear indexing movement}
- 16/025 . . . {by converting a continuous movement into a rotary indexing movement}
- 16/026 . . . {by converting a reciprocating or oscillating movement into a rotary indexing movement}
- 16/027 . . {with means for adjusting the distance between two successive indexing-points}
- 16/028 . . {with positioning means between two successive indexing-points}
- 16/04 . . having intermediate members, e.g. pawls, for locking the relatively movable parts in the indexed position
- 16/043 . . . {with a reciprocating or oscillating drive ([B23Q 16/06](#) takes precedence)}
- 16/046 . . . {with a continuous drive ([B23Q 16/06](#) takes precedence)}
- 16/06 . . . Rotary indexing
- 16/065 {with a continuous drive}
- 16/08 . . having means for clamping the relatively movable parts together in the indexed position
- 16/083 . . . {with a reciprocating or oscillating drive ([B23Q 16/10](#) takes precedence)}
- 16/086 . . . {with a continuous drive ([B23Q 16/10](#) takes precedence)}
- 16/10 . . . Rotary indexing
- 16/102 {with a continuous drive}
- 16/105 {clamping with a disc brake}
- 16/107 {clamping with a drum brake}
- 16/12 . . using optics
- 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](#))**
- 2017/001 . {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](#))}
- 17/09 . . 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 \[B23B 49/00\]\(#\)](#))
- 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}
- 17/099 . . . {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}

- 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
- 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](#))**

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](#))}

- 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
- 2701/00 Members which are comprised in the general build-up of a form of the machine**
- 2701/01 . Frames or slideways for lathes; Frames for boring machines
- 2701/02 . Movable or adjustable work or tool supports for milling machines, their drive, control or guiding
- 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
- 2701/04 . Support braces for a milling machine
- 2701/06 . Tailstock for the spindle of a milling machine
- 2703/00 Work clamping**
- 2703/02 . Work clamping means
- 2703/04 . . using fluid means or a vacuum
- 2703/06 . . Mandrels with non rotatable claws; Mandrels with internal clamping; Clamping elements
- 2703/08 . . Devices for clamping a plurality of workpieces
- 2703/10 . . Devices for clamping workpieces of a particular form or made from a particular material
- 2703/105 . . . for clamping a crankshaft
- 2703/12 . Accessories for attaching
- 2705/00 Driving working spindles or feeding members carrying tools or work**
- 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
- 2705/02 . Driving working spindles
- 2705/023 . . General aspects of driving a boring spindle
- 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
- 2727/00 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 feeler 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