

# CPC COOPERATIVE PATENT CLASSIFICATION

## B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

### SHAPING

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

(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. Attention is drawn to the Notes following the title of class [B23](#).
3. {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.}

### 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 ( <a href="#">B23Q 37/00</a> takes precedence {; positioning supports for measuring arrangements <a href="#">G01B 5/0004</a> ; motorised alignment for optical elements <a href="#">G02B 7/005</a> ; handling of mask or wafer <a href="#">G03F 7/70691</a> ; adjusting or compensating devices for optical apparatuses <a href="#">G12B 5/00</a> ; piezoelectric or electrostrictive positioners <a href="#">H10N 30/20</a> })	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}
		1/009	. . . {the receiving hole being cylindrical or conical}
		1/01	. Frames, beds, pillars or like members; Arrangement of ways
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 <a href="#">B23Q 5/54</a> )}	1/012	. . {Portals}
		1/015	. . {Frames, beds, pillars}
		1/017	. . {Arrangements of ways}
1/0018	. . {comprising hydraulic means}	1/03	. Stationary work or tool supports ( <a href="#">B23Q 1/70</a> takes precedence; auxiliary tables <a href="#">B23Q 1/74</a> ; tailstocks <a href="#">B23B 23/00</a> )
1/0027	. . . {between moving parts between which an uninterrupted energy-transfer connection is maintained}	1/032	. . {characterised by properties of the support surface}
1/0036	. . . . {one of those parts being a tool}	1/035	. . {with an array of longitudinally movable rods defining a reconfigurable support surface}
1/0045	. . {Control panels or boxes}	1/037	. . {comprising series of support elements whose relative distance is adjustable}
1/0054	. {Means for adjusting the position of a machine tool with respect to its supporting surface ( <a href="#">B23Q 1/262</a> takes precedence)}	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. piezoelectric, 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
- 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}

#### NOTES

- In this group, 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 this group, where more than one pair of elements is provided on the same axis for the same kind of movement, the pairs are regarded as a single pair for the purposes of classification.

- 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](#); devices for holding circuit boards [H05K 13/0061](#); for holding semiconductors or wafers [H10P 72/00](#))}
- 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 <a href="#">B23Q 1/76</a> )}	3/1554	. . . {Transfer mechanisms, e.g. tool gripping arms; Drive mechanisms therefore}
3/101	. . . {for supporting a workpiece during its transport to or from a tool holder}		<b>NOTE</b>
3/102	. . . {for fixing elements in slots}		{When classifying in this group the usage of indexing codes <a href="#">B23Q 2003/155404</a> – <a href="#">B23Q 2003/155456</a> is obligatory.}
3/103	. . . {Constructional elements used for constructing work holders}	2003/155404	. . . . {the transfer mechanism comprising a single gripper}
3/104	. . . {V-blocks}	2003/155407	. . . . . {linearly movable}
3/105	. . . {Auxiliary supporting devices independent of the machine tool}	2003/155411	. . . . . {pivotable}
3/106	. . . {extendable members, e.g. extension members}	2003/155414	. . . . . {the transfer mechanism comprising two or more grippers}
3/107	. . . . {with positive adjustment means}	2003/155418	. . . . . {the grippers moving together}
3/108	. . . . {with non-positive adjustment means}	2003/155421	. . . . . {the grippers moving independently from each other}
3/12	. for securing to a spindle in general ( <a href="#">B23Q 3/152</a> takes precedence; chucks <a href="#">B23B 31/02</a> )	2003/155425	. . . . . {pivotable}
3/14	. . Mandrels in general (expansion mandrels <a href="#">B23B 31/40</a> )	2003/155428	. . . . . {about a common axis}
3/15	. Devices for holding work using magnetic or electric force acting directly on the work	2003/155432	. . . . . {about different axes}
3/152	. . Rotary devices	2003/155435	. . . . . {and linearly movable}
3/154	. . Stationary devices	2003/155439	. . . . . {along the pivoting axis}
3/1543	. . . {using electromagnets}	2003/155442	. . . . . {radially to the pivoting axis}
3/1546	. . . {using permanent magnets}	2003/155446	. . . . . {with translation of the pivoting axis}
3/155	. Arrangements for automatic insertion or removal of tools {, e.g. combined with manual handling ( <a href="#">B23Q 7/046</a> takes precedence)}	2003/155449	. . . . . {linearly movable only}
3/15503	. . {Processes characterized by special sequencing of operations or the like, e.g. for optimizing tool changing time or capacity in tool storage}	2003/155453	. . . . . {including different gripper configurations for holding differently-configured tools}
3/15506	. . {the tool being inserted in a tool holder directly from a storage device (without transfer device)}	2003/155456	. . . . . {using separate transfer mechanisms for each tool in the magazine}
3/15513	. . {the tool being taken from a storage device and transferred to a tool holder by means of transfer devices}	3/15546	. . . {Devices for recognizing tools in a storage device, e.g. coding devices}
3/1552	. . {parts of devices for automatically inserting or removing tools}	3/15553	. . . {Tensioning devices or tool holders, e.g. grippers (driving working-spindles and adjusting or stopping them in a predetermined angular position <a href="#">B23Q 5/20</a> ; securing milling cutters to the driving spindle in a given angular position <a href="#">B23C 5/26</a> )}
3/15526	. . . {Storage devices; Drive mechanisms therefor}	3/1556	. . . {of non-rotary tools (in combination with rotary tools: <a href="#">B23Q 3/15506</a> , <a href="#">B23Q 3/15513</a> )}
	<b>NOTE</b>	3/15566	. . . {the tool being inserted in a tool holder directly from a storage device, i.e. without using transfer devices}
	{When classifying in this group or one of its subgroups the usage of indexing codes <a href="#">B23Q 2003/15527</a> – <a href="#">B23Q 2003/15532</a> , <a href="#">B23Q 2003/15537</a> is obligatory.}	3/15573	. . . {the tool being taken from a storage device and transferred to a tool holder by means of transfer devices}
2003/15527	. . . . {the storage device including means to latch tools}	2003/1558	. . {involving insertion or removal of other machine components together with the removal or insertion of tools or tool holders}
2003/15528	. . . . {the storage device including means to project tools therefrom, e.g. for transferring them}	2003/15586	. . {of tools in turrets}
2003/1553	. . . . . {by rectilinear projection}	3/157	. . of rotary tools {(in combination with non-rotary tools <a href="#">B23Q 3/15506</a> , <a href="#">B23Q 3/15513</a> )}
2003/15531	. . . . . {by pivoting projection movement}	3/15706	. . . {a single tool being inserted in a spindle directly from a storage device, i.e. without using transfer devices ( <a href="#">B23Q 3/15786</a> takes precedence)}
2003/15532	. . . . . {the storage device including tool pots, adaptors or the like}	3/15713	. . . {a transfer device taking a single tool from a storage device and inserting it in a spindle ( <a href="#">B23Q 3/15793</a> takes precedence)}
3/15533	. . . . . {combined with manual tool transfers}	3/1572	. . . . {the storage device comprising rotating or circulating storing means}
3/15534	. . . . . {Magazines mounted on the spindle}	3/15722	. . . . . {Rotary discs or drums}
3/15536	. . . . . {Non-rotary fixed racks}	3/15724	. . . . . {Chains or belts}
2003/15537	. . . . {Linearly moving storage devices}	3/15726	. . . . . {the storage means rotating or circulating in a plane parallel to the axis of the spindle}
3/15539	. . . . {Plural magazines, e.g. involving tool transfer from one magazine to another (involving manual operation <a href="#">B23Q 3/15533</a> )}		



3/15733	. . . . . {the axis of the stored tools being arranged in the rotating or circulating plane of the storage means}	5/145	. . . . . {fluid-operated}
3/1574	. . . . . {the axis of the stored tools being arranged perpendicularly to the rotating or circulating plane of the storage means}	5/147	. . . . . {electrically-operated}
3/15746	. . . . . {the storage means comprising pivotable tool storage elements}	5/16	. . . . . infinitely-variable
3/15753	. . . . . {the storage means rotating or circulating in a plane perpendicular to the axis of the spindle}	5/162	. . . . . {mechanically-operated}
3/1576	. . . . . {the axis of the stored tools being arranged in the rotating or circulating plane of the storage means}	5/165	. . . . . {fluid-operated}
3/15766	. . . . . {the axis of the stored tools being arranged perpendicularly to the rotating or circulating plane of the storage means}	5/167	. . . . . {electrically-operated}
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}	5/18	. . . . . Devices for preselecting speed of working-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}	5/20	. . . Adjusting or stopping working-spindles in a predetermined position
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}	5/22	. Feeding members carrying tools or work
3/15793	. . . {a transfer device simultaneously taking a plurality of tools and inserting them simultaneously in a plurality of spindles}	5/225	. . {not mechanically connected to the main drive, e.g. with separate motors ( <a href="#">connected to main drive through servomotors B23Q 5/36</a> )}
3/16	. controlled in conjunction with the operation of the tool	5/26	. . Fluid-pressure drives
3/18	. for positioning only	5/261	. . . {for spindles}
3/183	. . {Centering devices}	5/263	. . . . {with means to control the feed rate by controlling the fluid flow}
3/186	. . {Aligning devices}	5/265	. . . . . {this regulation depending upon the position of the tools or work}
<b>5/00</b>	<b>Driving or feeding mechanisms; Control arrangements therefor</b> ( <a href="#">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</a> ; <a href="#">numerical program-control of machine tools G05B 19/18</a> )	5/266	. . . {with means to control the feed rate by controlling the fluid flow}
2005/005	. {Driving or feeding mechanisms with a low and a high speed mode}	5/268	. . . . {depending upon the position of the tool or work}
5/02	. Driving main working members	5/28	. . Electric drives
5/027	. . reciprocating members	5/32	. . Feeding working-spindles ( <a href="#">feeding working-spindle supports B23Q 5/34</a> )
5/033	. . . driven essentially by fluid pressure	5/323	. . . {cam-operated}
5/04	. . rotary shafts, e.g. working-spindles	5/326	. . . {screw-operated}
5/041	. . . {Spindle-reversing devices}	5/34	. . Feeding other members supporting tools or work, e.g. saddles, tool-slides, through mechanical transmission
5/043	. . . {Accessories for spindle drives}	5/341	. . . {cam-operated}
5/045	. . . . {Angle drives}	5/342	. . . . {Cam followers ( <a href="#">see also B23Q 35/26</a> )}
5/046	. . . . {Offset spindle drives}	5/344	. . . . {Cams ( <a href="#">see also B23Q 35/42</a> )}
5/048	. . . . {Speed-changing devices}	5/345	. . . . {Cam assembly ( <a href="#">see also B23Q 35/46</a> )}
5/06	. . . driven essentially by fluid pressure or pneumatic power	5/347	. . . . {controlled in conjunction with tool or work indexing means}
5/08	. . . . electrically controlled	5/348	. . . {by means of clutches}
5/10	. . . driven essentially by electrical means	5/36	. . . in which a servomotor forms an essential element
5/12	. . . Mechanical drives with means for varying the speed ratio	5/38	. . . feeding continuously
5/14	. . . . step-by-step	5/385	. . . . {using a gear and rack mechanism or a friction wheel co-operating with a rail}
5/142	. . . . . {mechanically-operated}	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 {( <a href="#">B23Q 11/04 takes precedence</a> )}
		5/54	. Arrangements or details not restricted to group <a href="#">B23Q 5/02</a> or group <a href="#">B23Q 5/22</a> respectively {, e.g. <a href="#">control handles</a> }
		5/56	. . Preventing backlash
		5/58	. . Safety devices {( <a href="#">protecting the operator B23Q 11/0089</a> )}

5/585	. . . {Preventing the misuse of accessories, e.g. chuck keys}	7/1452	. . . . {comprising load-supporting surfaces}
<b>7/00</b>	<b>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 <a href="#">B23B 13/00</a>)</b>	7/1457	. . . . {comprising an impeller or a series of impellers}
7/001	. {Lateral transport of long workpieces}	7/1463	. . . {using rotary driving means}
7/002	. {Screw or rotary spiral conveyors ( <a href="#">B23Q 7/1426</a> takes precedence)}	7/1468	. . . . {comprising rollers or cogwheels, or pinions or the like}
7/003	. {Cyclically moving conveyors ( <a href="#">B23Q 7/1426</a> takes precedence)}	7/1473	. . . . {comprising screw conveyors}
7/005	. {Lifting devices}	7/1478	. . . {using a conveyor comprising cyclically-moving means}
7/006	. {Ejectors}	7/1484	. . . . {with carrier means}
7/007	. {Flying working devices}	7/1489	. . . . {with impeller means}
7/008	. {Catching devices ( <a href="#">B23Q 7/12</a> takes precedence)}	7/1494	. . . {using grippers}
7/02	. by means of drums or rotating tables or discs	7/16	. Loading work on to conveyors; Arranging work on conveyors, e.g. varying spacing between individual workpieces
7/03	. by means of endless chain conveyors ( <a href="#">B23Q 7/1447</a> , <a href="#">B23Q 7/16</a> take precedence)	7/165	. . {Turning devices}
7/035	. . {on which work holders are fixed}	7/18	. . Orienting work on conveyors
7/04	. by means of grippers ( <a href="#">B23Q 7/1494</a> takes precedence)}	<b>9/00</b>	<b>Arrangements for supporting or guiding portable metal-working machines or apparatus ({turning machine for reconditioning wheel sets without removing same from vehicle <a href="#">B23B 5/32</a>; } for tapping pipes {<a href="#">B23B 41/00</a>, <a href="#">F16L 41/04</a>}; specially designed for drilling {<a href="#">B23B 45/00</a>, <a href="#">B25H 1/0021</a>})</b>
7/041	. . {step by step}	9/0007	. {Portable machines comprising means for their guidance or support directly on the workpiece}
7/042	. . . {for the axial transport of long workpieces ( <a href="#">B23B 13/022</a> takes precedence)}	9/0014	. {Portable machines provided with or cooperating with guide means supported directly by the workpiece during action}
7/043	. . {Construction of the grippers ( <a href="#">B23Q 7/048</a> takes precedence)}	9/0021	. . {the tool being guided in a circular path}
7/045	. . {using a tool holder as a work-transporting gripper}	9/0028	. . {the guide means being fixed only on the machine}
7/046	. . {Handling workpieces or tools}	9/0035	. . . {and being capable of guiding the tool in a circular path}
7/047	. . {the gripper supporting the workpiece during machining}	9/0042	. . {the guide means being fixed only on the workpiece}
7/048	. . {Multiple gripper units}	9/005	. . . {angularly adjustable}
7/05	. by means of roller-ways ( <a href="#">B23Q 7/1468</a> , <a href="#">B23Q 7/16</a> take precedence)	9/0057	. . . {and being capable of guiding the tool in a circular path}
7/055	. . {some of the rollers being driven}	9/0064	. {Portable machines cooperating with guide means not supported by the workpiece during working}
7/06	. by means of pushers ( <a href="#">B23Q 7/1457</a> , <a href="#">B23Q 7/1489</a> , <a href="#">B23B 13/02</a> , <a href="#">B23B 13/12</a> take precedence)}	9/0071	. . {the guide means being fixed to the machine}
7/08	. by means of slides or chutes	9/0078	. . {the guide means being fixed to a support}
7/10	. by means of magazines	9/0085	. . . {Angularly adjustable}
7/103	. . {for flat material}	9/0092	. . . {Workpieces angularly adjustable relative to the support}
7/106	. . {with means to deliver a certain quantity ( <a href="#">B23Q 7/103</a> takes precedence)}	9/02	. for securing machines or apparatus to workpieces, or other parts, of particular shape, e.g. to beams of particular cross-section
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 ( <a href="#">B23Q 7/005</a> , <a href="#">B23Q 7/035</a> take precedence)}		
7/1431	. . . {Work holder changers ( <a href="#">B23Q 7/1442</a> takes precedence)}		
7/1436	. . . {using self-propelled work holders}		
7/1442	. . . {using carts carrying work holders}		
7/1447	. . . {using endless conveyors}		

#### Accessories

<b>11/00</b>	<b>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 <a href="#">B23D 59/00</a>}); 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 <a href="#">B23B 47/32</a> takes precedence; safety devices in general <a href="#">F16P</a>)</b>
11/0003	. {Arrangements for preventing undesired thermal effects on tools or parts of the machine ( <a href="#">B23Q 11/10</a> , <a href="#">B23Q 11/12</a> and <a href="#">B23Q 11/14</a> 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
- 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**

- 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}
- 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 (program 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)**
- 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	<ul style="list-style-type: none"> <li>the sub-assemblies being arranged to operate simultaneously at different stations, e.g. with an annular work-table moved in steps (<a href="#">associations of machines connected only by work-transferring means B23Q 41/00</a>)</li> </ul>	2701/00	<b>Members which are comprised in the general build-up of a form of the machine</b>
39/042	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{with circular arrangement of the sub-assemblies}</li> </ul> </li> </ul>	2701/01	<ul style="list-style-type: none"> <li>Frames or slideways for lathes; Frames for boring machines</li> </ul>
39/044	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{having at least one tool station cooperating with each work holder, e.g. multi-spindle lathes}</li> </ul> </li> </ul>	2701/02	<ul style="list-style-type: none"> <li>Movable or adjustable work or tool supports for milling machines, their drive, control or guiding</li> </ul>
39/046	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{including a loading and/or unloading station}</li> </ul> </li> </ul>	2701/025	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Work-tables rotating around an axis vertical to the surface of the table; this kind of table comprising a divider, indexer or positioning means</li> </ul> </li> </ul>
39/048	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{the work holder of a work station transfers directly its workpiece to the work holder of a following work station}</li> </ul> </li> </ul>	2701/04	<ul style="list-style-type: none"> <li>Support braces for a milling machine</li> </ul>
41/00	<b>Combinations or associations of metal-working machines not directed to a particular result according to classes <a href="#">B21</a>, <a href="#">B23</a>, or <a href="#">B24</a> (<a href="#">B23Q 37/00</a>, <a href="#">B23Q 39/00</a> take precedence; features relating to operations performed, if the different metal-working operations are of the same kind, <a href="#">see</a> the subclass for the kind of operation, e.g. punching <a href="#">B21D</a>, welding <a href="#">B23K</a>, grinding <a href="#">B24B</a>; features relating to technically specified combinations of different metal-working operations <a href="#">B23P 23/00</a>)</b>	2701/06	<ul style="list-style-type: none"> <li>Tailstock for the spindle of a milling machine</li> </ul>
41/02	<ul style="list-style-type: none"> <li>Features relating to transfer of work between machines (<a href="#">arrangements for handling work for machine tools coordinated in production lines B23Q 7/14</a>)</li> </ul>	2703/00	<b>Work clamping</b>
41/04	<ul style="list-style-type: none"> <li>Features relating to relative arrangements of machines</li> </ul>	2703/02	<ul style="list-style-type: none"> <li>Work clamping means</li> </ul>
41/06	<ul style="list-style-type: none"> <li>Features relating to organisation of working of machines</li> </ul>	2703/04	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>using fluid means or a vacuum</li> </ul> </li> </ul>
41/08	<ul style="list-style-type: none"> <li>Features relating to maintenance of efficient operation</li> </ul>	2703/06	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Mandrels with non rotatable claws; Mandrels with internal clamping; Clamping elements</li> </ul> </li> </ul>
2210/00	<b>Machine tools incorporating a specific component</b>	2703/08	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Devices for clamping a plurality of workpieces</li> </ul> </li> </ul>
2210/002	<ul style="list-style-type: none"> <li>Flexures</li> </ul>	2703/10	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Devices for clamping workpieces of a particular form or made from a particular material</li> </ul> </li> </ul>
2210/004	<ul style="list-style-type: none"> <li>Torque motors</li> </ul>	2703/105	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for clamping a crankshaft</li> </ul> </li> </ul>
2210/006	<ul style="list-style-type: none"> <li>Curved guiding rails</li> </ul>	2703/12	<ul style="list-style-type: none"> <li>Accessories for attaching</li> </ul>
2210/008	<ul style="list-style-type: none"> <li>Flexible guiding rails</li> </ul>	2705/00	<b>Driving working spindles or feeding members carrying tools or work</b>
2220/00	<b>Machine tool components</b>	2705/005	<ul style="list-style-type: none"> <li>General aspects of driving arrangements in a lathe, e.g. indexing the spindle, devices for keeping the cutting speed constant, braking or reversing devices</li> </ul>
2220/002	<ul style="list-style-type: none"> <li>Tool turrets</li> </ul>	2705/02	<ul style="list-style-type: none"> <li>Driving working spindles</li> </ul>
2220/004	<ul style="list-style-type: none"> <li>Rotary tables</li> </ul>	2705/023	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>General aspects of driving a boring spindle</li> </ul> </li> </ul>
2220/006	<ul style="list-style-type: none"> <li>Spindle heads</li> </ul>	2705/026	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Main drive for the spindles of milling machines</li> </ul> </li> </ul>
2220/008	<ul style="list-style-type: none"> <li>Rotatable tool holders coupled in parallel to a non rotating accessory</li> </ul>	2705/04	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>by fluid pressure</li> </ul> </li> </ul>
2230/00	<b>Special operations in a machine tool</b>	2705/043	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for lathes</li> </ul> </li> </ul>
2230/002	<ul style="list-style-type: none"> <li>Using the spindle for performing a non machining or non measuring operation, e.g. cleaning, actuating a mechanism</li> </ul>	2705/046	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for broaching machines</li> </ul> </li> </ul>
2230/004	<ul style="list-style-type: none"> <li>Using a cutting tool reciprocating at high speeds, e.g. "fast tool"</li> </ul>	2705/06	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Mechanical drives with means for varying the speed ratio</li> </ul> </li> </ul>
2230/006	<ul style="list-style-type: none"> <li>Machining both ends of a workpiece consecutively</li> </ul>	2705/062	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for lathes</li> </ul> </li> </ul>
2230/008	<ul style="list-style-type: none"> <li>Machining the middle part and the ends of a workpiece consecutively</li> </ul>	2705/064	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>mechanically controlled</li> </ul> </li> </ul>
2240/00	<b>Machine tools specially suited for a specific kind of workpiece</b>	2705/066	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>fluid pressure controlled</li> </ul> </li> </ul>
2240/002	<ul style="list-style-type: none"> <li>Flat workpieces</li> </ul>	2705/068	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>electrically controlled</li> </ul> </li> </ul>
2240/005	<ul style="list-style-type: none"> <li>Flexible, deformable workpieces</li> </ul>	2705/08	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Devices for preselecting speed in gear boxes of lathes</li> </ul> </li> </ul>
2240/007	<ul style="list-style-type: none"> <li>Elongated workpieces</li> </ul>	2705/10	<ul style="list-style-type: none"> <li>Feeding members carrying tools or work</li> </ul>
		2705/102	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for lathes</li> </ul> </li> </ul>
		2705/104	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for milling machines</li> </ul> </li> </ul>
		2705/106	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for planing machines</li> </ul> </li> </ul>
		2705/108	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for slotting or mortising machines</li> </ul> </li> </ul>
		2705/12	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Fluid-pressure drives</li> </ul> </li> </ul>
		2705/122	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for milling machines</li> </ul> </li> </ul>
		2705/125	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for planing machines</li> </ul> </li> </ul>
		2705/127	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for slotting or mortising machines</li> </ul> </li> </ul>
		2705/14	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Electric drives</li> </ul> </li> </ul>
		2705/145	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for milling machines</li> </ul> </li> </ul>
		2705/16	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Feeding working spindles</li> </ul> </li> </ul>
		2705/165	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>General aspects of feeding a boring spindle</li> </ul> </li> </ul>
		2705/18	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Feeding other members supporting tools also feeding working spindles supports</li> </ul> </li> </ul>
		2705/182	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>in lathes</li> </ul> </li> </ul>
		2705/185	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Clutches</li> </ul> </li> </ul>
		2705/187	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Automatic clutches</li> </ul> </li> </ul>
		2705/20	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Gear boxes for thread cutting lathes with a lead screw</li> </ul> </li> </ul>
		2705/22	<ul style="list-style-type: none"> <li>Limiting feed movement of a boring spindle</li> </ul>

- 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