

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

SHAPING

B23 MACHINE TOOLS; METAL-WORKING NOT OTHERWISE PROVIDED FOR

(NOTES omitted)

B23C MILLING (broaching [B23D](#); broach-milling in making gears [B23F](#); arrangement for copying or controlling [B23Q](#))

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	Milling machines not designed for particular work or special operations	3/053 {having means for guiding the tool carrying spindle}
1/002	. {Gantry-type milling machines}	3/055 {for engines}
1/005	. {with a tool moving in a closed path around the workpiece}	3/056 {for taps or valves}
1/007	. {movable milling machines, e.g. on rails}	3/058	. . . {Reconditioning of valves}
1/02	. with one horizontal working-spindle	3/06	. Milling crankshafts
1/025	. . with working-spindle movable in a fixed position	3/08	. Milling cams, camshafts, or the like
1/027	. . with working-spindle movable in a vertical direction	3/10	. Relieving by milling
1/04	. with a plurality of horizontal working-spindles	3/12	. Trimming or finishing edges, e.g. deburring welded corners
1/045	. . {Opposed - spindle machines}	3/122	. . {of pipes or cylinders}
1/06	. with one vertical working-spindle	3/124	. . . {internally}
1/08	. with a plurality of vertical working-spindles	3/126	. . {Portable devices or machines for chamfering edges}
1/10	. with both horizontal and vertical working-spindles	3/128	. . {Trimming or finishing edges of doors and windows}
1/12	. with spindle adjustable to different angles, e.g. either horizontal or vertical	3/13	. Surface milling of plates, sheets or strips
1/14	. with rotary work-carrying table (work tables for machine tools in general B23Q 1/00)	3/14	. Scrubbing or peeling ingots or similar workpieces
1/16	. specially designed for control by copying devices { (not used; see B23Q 35/00) }	3/16	. Working surfaces curved in two directions
1/18	. . for milling while revolving the work	3/18	. . for shaping screw-propellers, turbine blades, or impellers
1/20	. Portable devices or machines (details or components, e.g. casings, bodies, of portable power-driven tools not particularly related to the operation performed B25F 5/00); Hand-driven devices or machines	3/20	. . for shaping dies
3/00	Milling particular work; Special milling operations; Machines therefor (milling gear-teeth B23F, heat assisted machining B23P 25/00)	3/22	. Forming overlapped joints, e.g. of the ends of piston-rings
3/002	. {Milling elongated workpieces}	3/24	. Making square or polygonal ends on workpieces, e.g. key studs on tools
3/005	. . {Rails}	3/26	. Making square or polygonal holes in workpieces, e.g. key holes in tools
3/007	. {Milling end surfaces of nuts or tubes}	3/28	. Grooving workpieces (tread-cutting by milling B23G 1/32)
3/02	. Milling surfaces of revolution (B23C 3/06 , B23C 3/08 take precedence)	3/30	. . Milling straight grooves, e.g. keyways
3/023	. . {Milling spherical surfaces}	3/305	. . . {in which more than one milling tool is used simultaneously, e.g. for sheet material}
3/026	. . . {Milling balls}	3/32	. . Milling helical grooves, e.g. in making twist-drills
3/04	. . while revolving the work	3/34	. . Milling grooves of other forms, e.g. circumferential
3/05	. . Finishing valves or valve seats {(machines for grinding seat surfaces, e.g. in valve housings, B24B 15/00)}	3/35	. . Milling grooves in keys
3/051	. . . {Reconditioning of valve seats}	3/355	. . . {Holders for the template keys}
		3/36	. Milling milling-cutters (B23C 3/28 takes precedence)
		5/00	Milling-cutters (for cutting gear-teeth B23F 21/12)
		5/003	. {with vibration suppressing means}

- 5/006 . {Details of the milling cutter body}
- 5/02 . characterised by the shape of the cutter
- 5/04 . . Plain cutters, i.e. having essentially a cylindrical or tapered cutting surface of substantial length (B23C 5/10 takes precedence)
- 5/06 . . Face-milling cutters, i.e. having only or primarily a substantially flat cutting surface
- 5/08 . . Disc-type cutters
- 5/10 . . Shank-type cutters, i.e. with an integral shaft
- 5/1009 . . . {Ball nose end mills}
- 5/1018 {with permanently fixed cutting inserts}
- 5/1027 {with one or more removable cutting inserts}
- 5/1036 {having a single cutting insert, the cutting edges of which subtend 180 degrees}
- 5/1045 {having a cutting insert, the cutting edge of which subtends substantially 90 degrees}
- 5/1054 . . . {T slot cutters}
- 5/1063 {with permanently fixed cutting inserts}
- 5/1072 {with removable cutting inserts}
- 5/1081 . . . {with permanently fixed cutting inserts (B23C 5/1018 and B23C 5/1063 take precedence)}
- 5/109 . . . {with removable cutting inserts}
- 5/12 . . Cutters specially designed for producing particular profiles (B23C 5/10 takes precedence)
- 5/14 . . . essentially comprising curves {(B23C 5/1009 takes precedence)}
- 5/16 . characterised by physical features other than shape
- 5/165 . . {with chipbreaking or chipdividing equipment (for turning machines B23B 25/02; turning tools B23B 27/00; drilling machines B23B 47/34)}
- 5/18 . . with permanently-fixed cutter-bits or teeth
- 5/20 . . with removable cutter bits or teeth {or cutting inserts}
- 5/202 . . . {Plate-like cutting inserts with special form (special form related to securing of the insert B23C 5/22)}
- 5/205 {characterised by chip-breakers of special form}
- 5/22 . . . Securing arrangements for bits or teeth {or cutting inserts}
- 5/2204 {with cutting inserts clamped against the walls of the recess in the cutter body by a clamping member acting upon the wall of a hole in the insert}
- 5/2208 {for plate-like cutting inserts (B23C 5/2226, B23C 5/2234 take precedence)}
- 5/2213 {having a special shape}
- 5/2226 {for plate-like cutting inserts fitted on an intermediate carrier, e.g. shank fixed in the cutter body}
- 5/2234 {for plate-like cutting inserts fitted on a ring or ring segment}
- 5/2239 {with cutting inserts clamped by a clamping member acting almost perpendicular on the cutting face}
- 5/2243 {for plate-like cutting inserts (B23C 5/2252, B23C 5/226 take precedence)}
- 5/2247 {having a special shape}
- 5/2252 {for plate-like cutting inserts fitted on an intermediate carrier, e.g. shank fixed in the cutter body}
- 5/226 {for plate-like cutting inserts fitted on a ring or ring segment}
- 5/2265 {by means of a wedge}
- 5/2269 {for plate-like cutting inserts (B23C 5/2278, B23C 5/2291 take precedence)}
- 5/2273 {having a special shape}
- 5/2278 {for plate-like cutting inserts fitted on an intermediate carrier, e.g. shank fixed in the cutter body}
- 5/2291 {for plate-like cutting inserts fitted on a ring or ring segment}
- 5/2295 {the cutting elements being clamped simultaneously}
- 5/2298 {secured by resilient/flexible means}
- 5/2301 {for plate-like cutting inserts (B23C 5/2306, B23C 5/2309 take precedence)}
- 5/2304 {having a special shape}
- 5/2306 {for plate-like cutting inserts fitted on an intermediate carrier, e.g. shank fixed in the cutter body}
- 5/2309 {for plate-like cutting inserts fitted on a ring or ring segment}
- 5/24 adjustable
- 5/2462 {the adjusting means being oblique surfaces}
- 5/2465 {the adjusting means being notches}
- 5/2468 {the adjusting means being serrations}
- 5/2472 {the adjusting means being screws}
- 5/2475 {the adjusting means being distance elements, e.g. shims or washers}
- 5/2479 {the adjusting means being eccentrics}
- 5/2482 {the adjusting means being hydraulic cylinders}
- 5/2486 {where the adjustment is made by elastically deforming the toolholders}
- 5/2489 {where the adjustment is made by changing the inclination of the inserts}
- 5/2493 {where the adjustment is made by deforming the seating surfaces}
- 5/2496 {where the adjusting means are gears and racks}
- 5/26 . Securing milling cutters to the driving spindle
- 5/265 . . {by fluid pressure means}
- 5/28 . Features relating to lubricating or cooling
- 5/281 . . {Coolant moving along the outside tool periphery towards the cutting edges}
- 5/282 . . {Coolant channel characterised by its cross-sectional shape}
- 5/283 . . {Cutting inserts with internal coolant channels}
- 5/285 . . {Nozzles}
- 5/286 . . {Deflectors}
- 5/287 . . . {intersecting the rotational axis}
- 7/00** **Milling devices able to be attached to a machine tool, whether or not replacing an operative portion of the machine tool**
- 7/02 . to lathes
- 7/04 . to planing or slotting machines

9/00	Details or accessories so far as specially adapted to milling machines or cutter (drives, control devices, or accessories, in general B23Q)		
9/005	. {milling heads}		
2200/00	Details of milling cutting inserts		
2200/04	. Overall shape	2200/32	. Chip breaking or chip evacuation
2200/0405	. . Hexagonal	2200/323	. . by chip-breaking projections
2200/0411	. . . irregular	2200/326	. . by chip-breaking grooves
2200/0416	. . Irregular	2200/36	. Other features of the milling insert not covered by B23C 2200/04 - B23C 2200/32
2200/0422	. . Octagonal	2200/361	. . Fixation holes
2200/0427	. . . rounded	2200/362	. . . Having two fixation holes
2200/0433	. . Parallelogram	2200/363	. . Lines for indexing round inserts
2200/0438	. . . rounded	2200/364	. . Porous inserts, e.g. lattice-shaped constructions
2200/0444	. . Pentagonal	2200/365	. . Lands, i.e. the outer peripheral section of rake faces
2200/045	. . Round	2200/366	. . . Variable
2200/0455	. . Square	2200/367	. . Mounted tangentially, i.e. where the rake face is not the face with largest area
2200/0461	. . . rounded	2200/368	. . Roughened surfaces
2200/0466	. . Star form	2200/369	. . Double-sided inserts
2200/0472	. . Trapezium	2200/3691	. . . Split inserts
2200/0477	. . Triangular	2210/00	Details of milling cutters
2200/0483	. . . rounded	2210/02	. Connections between the shanks and detachable cutting heads
2200/0488	. . Heptagonal	2210/03	. Cutting heads comprised of different material than the shank irrespective of whether the head is detachable from the shank
2200/0494	. . Rectangular	2210/04	. Angles
2200/08	. Rake or top surfaces	2210/0407	. . Cutting angles
2200/081	. . with projections	2210/0414	. . . different
2200/082	. . with an elevated clamping surface	2210/0421	. . . negative
2200/083	. . curved	2210/0428 axial rake angle
2200/085	. . discontinuous	2210/0435 radial rake angle
2200/086	. . with one or more grooves	2210/0442	. . . positive
2200/088	. . spherical	2210/045 axial rake angle
2200/12	. Side or flank surfaces	2210/0457 radial rake angle
2200/121	. . with projections	2210/0464	. . . neutral
2200/123	. . curved	2210/0471 axial rake angle
2200/125	. . discontinuous	2210/0478 radial rake angle
2200/126	. . . stepped	2210/0485	. . Helix angles
2200/128	. . with one or more grooves	2210/0492	. . . different
2200/16	. Supporting or bottom surfaces	2210/08	. Side or top views of the cutting edge
2200/161	. . with projections	2210/082	. . Details of the corner region between axial and radial cutting edges
2200/162	. . curved	2210/084	. . Curved cutting edges
2200/164	. . discontinuous	2210/086	. . Discontinuous or interrupted cutting edges
2200/165	. . with one or more grooves	2210/088	. . Cutting edges with a wave form
2200/167	. . star form	2210/12	. Cross section of the cutting edge
2200/168	. . with features related to indexing	2210/123	. . Bevelled cutting edges
2200/20	. Top or side views of the cutting edge	2210/126	. . Rounded cutting edges
2200/201	. . Details of the nose radius and immediately surrounding areas	2210/16	. Fixation of inserts or cutting bits in the tool
2200/203	. . Curved cutting edges	2210/161	. . Elastically deformable clamping members
2200/205	. . Discontinuous cutting edges	2210/163	. . Indexing
2200/206	. . Cutting edges having a wave-form	2210/165	. . Fixation bolts
2200/208	. . Wiper, i.e. an auxiliary cutting edge to improve surface finish	2210/166	. . Shims
2200/24	. Cross section of the cutting edge	2210/168	. . Seats for cutting inserts, supports for replaceable cutting bits
2200/243	. . bevelled or chamfered	2210/20	. Number of cutting edges
2200/246	. . rounded	2210/201	. . one
2200/28	. Angles	2210/202	. . three
2200/281	. . Negative rake angles	2210/203	. . four
2200/284	. . Negative clearance angles	2210/204	. . five
2200/287	. . Positive rake angles	2210/205	. . six
2200/289	. . Positive clearance angles	2210/206	. . seven
2200/291	. . Variable rake angles	2210/207	. . eight
2200/293	. . Variable clearance angles		

- 2210/208 . . ten
- 2210/209 . . twelve
- 2210/24 . Overall form of the milling cutter
- 2210/241 . . Cross sections of the whole milling cutter
- 2210/242 . . Form tools, i.e. cutting edges profiles to generate a particular form
- 2210/243 . . Cutting parts at both ends
- 2210/244 . . Milling cutters comprised of disc-shaped modules or multiple disc-like cutters
- 2210/245 . . Milling cutters comprising a disc having a wave form
- 2210/246 . . Milling cutters comprising a hole or hollow in the end face or between the cutting edges
- 2210/247 . . Stepped milling cutters
- 2210/248 . . . with enlarged cutting heads
- 2210/28 . Arrangement of teeth
- 2210/282 . . Unequal angles between the cutting edges, i.e. cutting edges unequally spaced in the circumferential direction
- 2210/285 . . Cutting edges arranged at different diameters
- 2210/287 . . Cutting edges arranged at different axial positions or having different lengths in the axial direction
- 2210/32 . Details of teeth
- 2210/321 . . Lands, i.e. the area on the rake face in the immediate vicinity of the cutting edge
- 2210/323 . . Separate teeth, i.e. discrete profiled teeth similar to those of a hob
- 2210/325 . . Different teeth, i.e. one tooth having a different configuration to a tooth on the opposite side of the flute
- 2210/326 . . File like cutting teeth, e.g. the teeth of cutting burrs
- 2210/328 . . Treated cutting edges
- 2210/40 . Flutes, i.e. chip conveying grooves
- 2210/402 . . of variable depth
- 2210/405 . . . having decreasing depth in the direction of the shank from the tip of the tool
- 2210/407 . . . having increasing depth in the direction of the shank from the tip of the tool
- 2210/44 . Margins, i.e. the part of the peripheral surface immediately adjacent the cutting edge
- 2210/445 . . variable
- 2210/48 . Chip breakers
- 2210/483 . . Chip breaking projections
- 2210/486 . . Chip breaking grooves or depressions
- 2210/50 . Cutting inserts
- 2210/501 . . with cutting edges following one or more helices
- 2210/502 . . with cutting edges following straight flutes or rows of more than one insert
- 2210/503 . . mounted internally on the cutter
- 2210/504 . . arranged in a manner that only extends longitudinally by one insert
- 2210/506 . . mounted so as to be able to rotate freely
- 2210/52 . Bushings
- 2210/54 . Configuration of the cutting part
- 2210/56 . Supporting or guiding sections located on the periphery of the tool
- 2210/58 . Brushes
- 2210/60 . Axis of the cutter inclined with respect to the axis of rotation
- 2210/62 . Selectable cutting diameters
- 2210/64 . End milling cutters having a groove in the end cutting face, the groove not being present so as to provide a cutting edge
- 2210/641 . . at least one groove or gash being different than another
- 2210/66 . Markings, i.e. symbols or indicating marks
- 2210/68 . Reground to nominal diameter by removal of material from both the front of the insert and the back of insert carrier
- 2210/70 . Pilots
- 2210/72 . Rotatable in both directions
- 2210/74 . Slits
- 2215/00 Details of workpieces**
- 2215/04 . Aircraft components
- 2215/045 . . Propellers
- 2215/08 . Automotive parts ([B23C 2215/16](#), [B23C 2215/20](#) and [B23C 2215/24](#) take precedence)
- 2215/085 . . Wheels
- 2215/12 . Propellers for boats
- 2215/16 . Camshafts
- 2215/20 . Crankshafts
- 2215/24 . Components of internal combustion engines
- 2215/242 . . Combustion chambers
- 2215/245 . . Connecting rods
- 2215/247 . . Components of diesel engines
- 2215/28 . Nipples
- 2215/32 . Railway tracks
- 2215/36 . Railway wheels
- 2215/40 . Spectacles
- 2215/44 . Turbine blades
- 2215/48 . Kaplan turbines
- 2215/52 . Axial turbine wheels
- 2215/56 . Radial turbine wheels
- 2215/60 . Valve guides in combination with the neighbouring valve seat
- 2215/64 . Well pipe windows, i.e. windows in tubings or casings for wells
- 2220/00 Details of milling processes**
- 2220/04 . Milling with the axis of the cutter inclined to the surface being machined
- 2220/08 . Milling with the axis of the tool perpendicular to the workpiece axis
- 2220/12 . Cutting off, i.e. producing multiple discrete components from a single piece of material
- 2220/16 . Chamferring
- 2220/20 . Deburring
- 2220/24 . Production of elliptical holes
- 2220/28 . Finishing
- 2220/32 . Five-axis
- 2220/36 . Production of grooves
- 2220/363 . . Spiral grooves
- 2220/366 . . Turbine blade grooves
- 2220/40 . Using guiding means
- 2220/44 . High speed milling
- 2220/48 . Methods of milling not otherwise provided for
- 2220/52 . Orbital drilling, i.e. use of a milling cutter moved in a spiral path to produce a hole
- 2220/56 . Plunge milling
- 2220/60 . Roughing
- 2220/605 . . Roughing and finishing

2220/64	• Using an endmill, i.e. a shaft milling cutter, to generate profile of a crankshaft or camshaft	2228/24	• Hard, i.e. after being hardened
2220/68	• Whirling	2228/25	• Honeycomb
2222/00	Materials of tools or workpieces composed of metals, alloys or metal matrices	2228/26	• Hot
2222/04	• Aluminium	2228/49	• Sintered
2222/06	• Babbitt metal	2228/50	• Soft metal
2222/12	• Brass	2230/00	Details of chip evacuation
2222/14	• Cast iron	2230/04	• Transport of chips
2222/16	• Cermet	2230/045	• . to the middle of the cutter or in the middle of a hollow cutter
2222/28	• Details of hard metal, i.e. cemented carbide	2230/08	• Using suction
2222/32	• Details of high-speed steel	2235/00	Details of milling keys
2222/52	• Magnesium	2235/04	• Keys with blind holes
2222/61	• Metal matrices with metallic or non-metallic particles or fibres	2235/08	• Brushes
2222/64	• Nickel	2235/12	• Using a database to store details of the key, the information in the database being used for the generation of the profile of the key
2222/76	• Silver	2235/16	• Dial indicators
2222/78	• Sodium	2235/21	• Calibration by electronic detection of position of probes and cutting wheels
2222/84	• Steel	2235/24	• Electronic sensors
2222/88	• Titanium	2235/28	• Key blanks
2222/98	• Zinc	2235/32	• Measurement systems
2224/00	Materials of tools or workpieces composed of a compound including a metal	2235/36	• Ring keys
2224/04	• Aluminium oxide	2235/41	• Scanning systems
2224/13	• Chromium nitride	2235/44	• Templates for the simulation of keys
2224/14	• Chromium aluminium nitride (CrAlN)	2235/48	• Tracers, probes or styli
2224/20	• Tantalum carbide	2240/00	Details of connections of tools or workpieces
2224/22	• Titanium aluminium carbide nitride (TiAlCN)	2240/04	• Bayonet connections
2224/24	• Titanium aluminium nitride (TiAlN)	2240/08	• Brazed connections
2224/28	• Titanium carbide	2240/12	• Connections using captive nuts
2224/32	• Titanium carbide nitride (TiCN)	2240/16	• Welded connections
2224/36	• Titanium nitride	2240/21	• Glued connections
2224/56	• Vanadium aluminium nitride (VAlN)	2240/24	• Connections using screws
2226/00	Materials of tools or workpieces not comprising a metal	2240/245	• . hollow screws, e.g. for the transmission of coolant
2226/12	• Boron nitride	2240/32	• Connections using screw threads
2226/125	• . cubic [CBN]	2245/00	Details of adjusting inserts or bits in the milling cutter
2226/18	• Ceramic	2245/04	• Adjustable wedge surfaces
2226/27	• Composites, e.g. fibre reinforced composites	2245/08	• Setting gauges
2226/31	• Diamond	2245/12	• Spiral discs
2226/315	• . polycrystalline [PCD]	2250/00	Compensating adverse effects during milling
2226/33	• Elastomers, e.g. rubber	2250/04	• Balancing the cutter
2226/37	• Fibreglass	2250/08	• compensating centrifugal force
2226/41	• Gypsum	2250/12	• Cooling and lubrication
2226/42	• Gem, i.e. precious stone	2250/16	• Damping vibrations
2226/45	• Glass	2250/21	• compensating wear of parts not designed to be exchanged as wear parts
2226/54	• Paper	2255/00	Regulation of depth of cut
2226/61	• Plastics not otherwise provided for, e.g. nylon	2255/04	• Depth indicators
2226/62	• Polystyrene foam	2255/08	• Limitation of depth of cut
2226/72	• Silicon carbide	2255/12	• Depth stops
2226/73	• Silicon nitride	2260/00	Details of constructional elements
2226/75	• Stone, rock or concrete	2260/04	• Adjustable elements
2228/00	Properties of materials of tools or workpieces, materials of tools or workpieces applied in a specific manner	2260/08	• Bearings
2228/04	• applied by chemical vapour deposition [CVD]	2260/12	• Cams
2228/08	• applied by physical vapour deposition [PVD]	2260/28	• Differential screw threads
2228/10	• Coating		
2228/12	• Cast, i.e. in the form of a casting		
2228/14	• Flexible		

B23C

- 2260/40 . Harmonic gearboxes, i.e. reduction gearing including a wave generator, a flex spline or a circular spline
- 2260/48 . Indication scales
- 2260/52 . Keys, e.g. spanners or Allen keys, especially for assembling or disassembling tooling
- 2260/56 . Lasers
- 2260/68 . Rings
- 2260/72 . Seals
- 2260/76 . Sensors
- 2260/80 . Serrations
- 2260/84 . Springs
- 2260/88 . Steadies
- 2265/00 Details of general geometric configurations**
- 2265/08 . Conical
- 2265/12 . Eccentric
- 2265/16 . Elliptical
- 2265/32 . Polygonal
- 2265/36 . Spherical
- 2265/40 . Spiral
- 2270/00 Details of milling machines, milling processes or milling tools not otherwise provided for**
- 2270/02 . Use of a particular power source
- 2270/022 . . Electricity
- 2270/025 . . Hydraulics
- 2270/027 . . Pneumatics
- 2270/04 . Use of centrifugal force
- 2270/06 . Use of elastic or plastic deformation
([B23C 2210/161 takes precedence](#))
- 2270/08 . Clamping mechanisms or provision for clamping
([B23C 2210/16 takes precedence](#))
- 2270/10 . Use of ultrasound
- 2270/12 . Centering of two elements relative to one another
- 2270/14 . Constructions comprising exactly two similar components
- 2270/16 . Constructions comprising three or more similar components
- 2270/18 . Milling internal areas of components
- 2270/20 . Milling external areas of components