

CPC**COOPERATIVE PATENT CLASSIFICATION****B23P**

**OTHER WORKING OF METAL; COMBINED OPERATIONS;
UNIVERSAL MACHINE TOOLS** (arrangements for copying or controlling
[B23Q](#))

NOTES

1. This subclass covers:
 - combinations of work-modifying operations covered by different subclasses of classes [B21](#) - [B24](#);
 - combinations of metal-working operations with non-mechanical treatments of metal not provided for elsewhere, for example in [C21D](#), [C22C](#), [C22F](#) or [C23](#).
2. This subclass does not cover
 - non-mechanical operations on non-metallic materials unless such operations are specially mentioned in this subclass;
 - subsidiary operations performed in conjunction with main operations covered by a single subclass, e.g. assembling of parts as an essential feature of a following metal-working operation, since they are not regarded as operations per se.
3. Attention is drawn to the Notes following the title of class [B23](#).

B23P 5/00

Setting gems or the like on metal parts, e.g. diamonds on tools

B23P 6/00

Restoring or reconditioning objects (straightening or restoring form of sheet metal, metal rods, metal tubes, metal profiles, or specific articles made therefrom [B21D 1/00](#), [B21D 3/00](#); repairing defective or damaged objects by casting techniques [B22D 19/10](#); procedures or apparatus covered by a single other subclass, see the relevant subclass)

[B23P 6/002](#)

- . {Repairing turbine components, e.g. moving or stationary blades, rotors, ([B23P 6/045](#) takes precedence)}

[B23P 6/005](#)

- . . {using only replacement pieces of a particular form}

[B23P 6/007](#)

- . . {using only additive methods, e.g. build-up welding}

[B23P 6/02](#)

- . Pistons or cylinders

[B23P 6/04](#)

- . Repairing fractures or cracked metal parts or products, e.g. castings

[B23P 6/045](#)

- . . {of turbine components, e.g. moving or stationary blades, rotors, etc.}

B23P 9/00

Treating or finishing surfaces mechanically, with or without calibrating, primarily to resist wear or impact, e.g. smoothing or roughening turbine blades or bearings (treatment covered by a single other subclass, see the relevant subclass, e.g. [B24C](#), [C21D 7/00](#), [C22F 1/00](#)); **Features of such surfaces not otherwise provided for, their treatment being unspecified**

[B23P 9/02](#)

- . Treating or finishing by applying pressure, e.g. knurling ([B23P 9/04](#) takes precedence)

[B23P 9/025](#)

- . . {to inner walls of holes by using axially moving tools}

[B23P 9/04](#)

- . Treating or finishing by hammering or applying repeated pressure

B23P 11/00	Connecting metal parts or objects by metal-working techniques, not covered wholly by either B21J or B23K (connecting sheet metal or metal tubes, rods, or profiles B21D 39/00; {objects produced by methods not important per se, see the relevant subclasses dealing with the objects, e.g. B21F 15/00; B21L 19/00}; hand tools for connecting wire or strip B25B 25/00; connecting metal parts by adhesives F16B 11/00)
B23P 11/005	. {by expanding or crimping}
B23P 11/02	. by first expanding and then shrinking or <u>vice versa</u> , e.g. by using pressure fluids; by making force fits
B23P 11/022	. . {by using pressure fluids}
B23P 11/025	. . {by using heat or cold}
B23P 11/027	. . . {for mounting tools in tool holders}
B23P 13/00	Making metal objects by operations essentially involving machining but not covered by a single other subclass (making specific objects B23P 15/00)
B23P 13/02	. in which only the machining operations are important
B23P 13/04	. involving slicing of profiled material
B23P 15/00	Making specific metal objects by operations not covered by a single other subclass or a group in this subclass
B23P 15/001	. {valves or valve housings (welding B23K ; valve housings per se F16K)}
B23P 15/002	. . {poppet valves}
B23P 15/003	. {bearings (see also F16C 33/00)}
B23P 15/005	. {keys (making keys without essentially removing material, e.g. by punching B21D 53/42 ; milling grooves in keys B23C 3/35)}
B23P 15/006	. {turbine wheels}
B23P 15/007	. {injection moulding tools}
B23P 15/008	. {Rocket engine parts, e.g. nozzles, combustion chambers}
B23P 15/02	. turbine or like blades from one piece
B23P 15/04	. turbine or like blades from several pieces
B23P 15/06	. piston rings from one piece
B23P 15/065	. . {from metal strip}
B23P 15/08	. piston rings from several pieces
B23P 15/10	. pistons
B23P 15/105	. . {Enlarging pistons}
B23P 15/12	. gratings {(making gratings by methods covered by other subclasses B21D 47/005)}
B23P 15/14	. gear parts, e.g. gear wheels
B23P 15/16	. plates with holes of very small diameter, e.g. for spinning or burner nozzles
B23P 15/18	. brake shoes
B23P 15/20	. railroad requirements, e.g. buffers
B23P 15/22	. cartridges or like shells
B23P 15/24	. dies (B21C 3/18 , B21C 25/10 , B21D 37/20 take precedence)
B23P 15/243	. . {Honeycomb dies}

B23P 15/246	. . {Laminated dies}
B23P 15/26	. heat exchangers {or the like (making heat exchangers by methods covered by other subclasses B21D 53/02)}
B23P 15/28	. cutting tools (sawing tools B23D 63/00 , B23D 65/00 ; files or rasps B23D 73/00)
B23P 15/30	. . lathe or like tools
B23P 15/32	. . twist-drills
B23P 15/34	. . milling cutters
B23P 15/36	. . . for thread-cutting
B23P 15/38	. . planing or slotting tools (B23P 15/30 takes precedence)
B23P 15/40	. . shearing tools
B23P 15/403	. . . {razor blades}
B23P 15/406	. . . {rotary or plane die cutters}
B23P 15/42	. . broaching tools
B23P 15/44	. . scraping or shaving tools
B23P 15/46	. . reaming tools
B23P 15/48	. . threading tools (milling cutters for thread-cutting B23P 15/36)
B23P 15/50	. . . dies
B23P 15/52	. . . taps
B23P 17/00	Metal-working operations, not covered by a single other subclass or another group in this subclass
B23P 17/02	. Single metal-working processes; Machines or apparatus therefor
B23P 17/04	. characterised by the nature of the material involved or the kind of product independently of its shape
B23P 17/06	. . Making steel wool or the like
B23P 19/00	Machines for simply fitting together or separating metal parts, or metal and non-metal parts, whether or not involving some deformation (connecting metal parts or objects by metal-working procedures B23P 11/00, B21J, B23K); Tools or devices therefor so far as not provided for in other classes (hand tools in general B25)
B23P 19/001	. {Article feeders for assembling machines (screws or nuts being carried by a disposable strip or disc B25B 23/045)}
B23P 19/002	. . {orientating the articles}
B23P 19/003	. . {Escapement mechanisms used therewith}
B23P 19/004	. . {Feeding the articles from hoppers to machines or dispensers}
B23P 19/005	. . . {by using flowing gases}
B23P 19/006	. . {Holding or positioning the article in front of the applying tool}
B23P 19/007	. . {Picking-up and placing mechanisms}
B23P 19/008	. {the parts being continuously transported through the machine during assembling or disassembling}
B23P 19/02	. for connecting objects by press fit or for detaching same
B23P 19/021	. . {Railroad wheels on axles}

B23P 19/022	. . {Extracting or inserting relatively long parts}
B23P 19/024	. . . {tube bundles}
B23P 19/025	. . {For detaching only}
B23P 19/027	. . using hydraulic or pneumatic means (B23P 19/033 takes precedence)
B23P 19/033	. . using vibration
B23P 19/04	. for assembling or disassembling parts
B23P 19/041	. . {for disassembling pallets}
B23P 19/042	. . {specially adapted for combustion engines (shape of casings adapted to facilitate fitting or dismantling of engine parts for combustion engines F02F 7/0046)}
B23P 19/043	. . . {for inserting piston-connecting rods assemblies in cylinders}
B23P 19/045	. . . {for assembling valve cotters and retainers of engine valves}
B23P 19/046	. . {Disassembling lids from drums, e.g. by unfolding, for reconditioning or recovery}
B23P 19/047	. . {for flexible profiles, e.g. sealing or decorating strips in grooves or on other profiles by devices moving along the flexible profile (hand tools therefor B25B 27/0092)}
B23P 19/048	. . {Springs}
B23P 19/06	. . Screw or nut setting or loosening machines
B23P 19/061	. . . {for pipes or pipe-couplings}
B23P 19/062	. . . {Pierce nut setting machines}
B23P 19/063 {Deforming the nut only}
B23P 19/064 {Deforming the support material only, e.g. the sheet or plate}
B23P 19/065	. . . {Arrangements for torque limiters or torque indicators in screw or nut setting machines (for hand tools B25B 23/14)}
B23P 19/066 {by electrical means}
B23P 19/067	. . . {Bolt tensioners (for hand tools B25B 29/02)}
B23P 19/068 {by using heating means}
B23P 19/069	. . . {Multi-spindle machines}
B23P 19/08	. . Machines for placing washers, circlips, or the like on bolts or other members
B23P 19/082	. . . {for placing washers on nuts}
B23P 19/084	. . . {for placing resilient or flexible rings, e.g. O-rings, circlips}
B23P 19/086 {Non-metallic protective bellows}
B23P 19/088 {Piston rings in piston grooves}
B23P 19/10	. Aligning parts to be fitted together
B23P 19/102	. . {using remote centre compliance devices}
B23P 19/105	. . . {using sensing means}
B23P 19/107	. . {using oscillating, rotating or vibrating movements}
B23P 19/12	. . Alignment of parts for insertion into bores
B23P 21/00	Machines for assembling a multiplicity of different parts to compose units, with or without preceding or subsequent working of such parts, e.g. with programme control
B23P 21/002	. {the units stationary whilst being composed}
B23P 21/004	. {the units passing two or more work-stations whilst being composed}

B23P 21/006	. . {the conveying means comprising a rotating table}
B23P 21/008	. {the assembling machines or tools moving synchronously with the units while these are being assembled}
B23P 23/00	Machines or arrangements of machines for performing specified combinations of different metal-working operations not covered by a single other subclass (if the particular kinds of operation are not essential B23Q 37/00 to B23Q 41/00; {working by laser beam combined with other working of metal B23K 26/0093})
B23P 23/02	. Machine tools for performing different machining operations (lathes, e.g. capstan lathes, B23B ; combined horizontal boring and milling machines B23B 39/02)
B23P 23/04	. for both machining and other metal-working operations
B23P 23/06	. Metal-working plant comprising a number of associated machines or apparatus
B23P 25/00	Auxiliary treatment of workpieces, before or during machining operations, to facilitate the action of the tool or the attainment of a desired final condition of the work, e.g. relief of internal stress
B23P 25/003	. {immediately preceeding a cutting tool}
B23P 25/006	. . {Heating the workpiece by laser during machining}
B23P 2700/00	Indexing scheme relating to the articles being treated, e.g. manufactured, repaired, assembled, connected or other operations covered in the subgroups
B23P 2700/01	. Aircraft parts
B23P 2700/02	. Camshafts
B23P 2700/03	. Catalysts or parts thereof
B23P 2700/04	. Connecting rods
B23P 2700/05	. Cooking vessels
B23P 2700/06	. Cooling passages of turbine components, e.g. unblocking or preventing blocking of cooling passages of turbine components
B23P 2700/07	. Crankshafts
B23P 2700/08	. Fittings for doors and windows of buildings
B23P 2700/09	. Heat pipes
B23P 2700/10	. Heat sinks
B23P 2700/11	. Joints, e.g. ball joints, universal joints
B23P 2700/12	. Laminated parts
B23P 2700/13	. Parts of turbine combustion chambers
B23P 2700/14	. Suspension elements of automobile vehicles
B23P 2700/50	. Other automobile vehicle parts, i.e. manufactured in assembly lines