

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	<ul style="list-style-type: none"> • {by expanding or crimping}
B23P 11/02	<ul style="list-style-type: none"> • by first expanding and then shrinking or <u>vice versa</u>, e.g. by using pressure fluids; by making force fits
B23P 11/022	<ul style="list-style-type: none"> • . {by using pressure fluids}
B23P 11/025	<ul style="list-style-type: none"> • . {by using heat or cold}
B23P 11/027	<ul style="list-style-type: none"> • . . {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	<ul style="list-style-type: none"> • in which only the machining operations are important
B23P 13/04	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • {valves or valve housings (welding B23K; valve housings per se F16K)}
B23P 15/002	<ul style="list-style-type: none"> • . {poppet valves}
B23P 15/003	<ul style="list-style-type: none"> • {bearings (see also F16C 33/00)}
B23P 15/005	<ul style="list-style-type: none"> • {keys (making keys without essentially removing material, e.g. by punching B21D 53/42; milling grooves in keys B23C 3/35)}
B23P 15/006	<ul style="list-style-type: none"> • {turbine wheels}
B23P 15/007	<ul style="list-style-type: none"> • {injection moulding tools}
B23P 15/008	<ul style="list-style-type: none"> • {Rocket engine parts, e.g. nozzles, combustion chambers}
B23P 15/02	<ul style="list-style-type: none"> • turbine or like blades from one piece
B23P 15/04	<ul style="list-style-type: none"> • turbine or like blades from several pieces
B23P 15/06	<ul style="list-style-type: none"> • piston rings from one piece
B23P 15/065	<ul style="list-style-type: none"> • . {from metal strip}
B23P 15/08	<ul style="list-style-type: none"> • piston rings from several pieces
B23P 15/10	<ul style="list-style-type: none"> • pistons
B23P 15/105	<ul style="list-style-type: none"> • . {Enlarging pistons}
B23P 15/12	<ul style="list-style-type: none"> • gratings {(making gratings by methods covered by other subclasses B21D 47/005)}
B23P 15/14	<ul style="list-style-type: none"> • gear parts, e.g. gear wheels
B23P 15/16	<ul style="list-style-type: none"> • plates with holes of very small diameter, e.g. for spinning or burner nozzles
B23P 15/18	<ul style="list-style-type: none"> • brake shoes
B23P 15/20	<ul style="list-style-type: none"> • railroad requirements, e.g. buffers
B23P 15/22	<ul style="list-style-type: none"> • cartridges or like shells
B23P 15/24	<ul style="list-style-type: none"> • 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