

CPC**COOPERATIVE PATENT CLASSIFICATION****B23P****OTHER WORKING OF METAL; COMBINED OPERATIONS;
UNIVERSAL MACHINE TOOLS** (arrangements for copying or controlling [B23Q](#))**NOTE**

This subclass does not cover non-mechanical operations on non-metallic materials unless such operations are specially mentioned in this subclass.

In this subclass, the following expressions are used with the meanings indicated:
"combined operations" excludes the assembling of parts if it is an essential feature of the next metal-working operation, since it is not regarded as an operation per se.

"working of metal" and equivalent expressions include non-mechanical treatment of metal so far as it is not provided for in any other class or subclass, for example in [C21D](#), [C22C](#), [C22F](#), [C23](#). Thus, combinations of such non-mechanical treatment with other metal-working are classified in this subclass.

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 vice versa, 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
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- B23P 17/00 Metal-working operations, not covered by a single other subclass or another group in this subclass**
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- 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