

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
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