

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
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- 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