

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](#) .

Guidance heading:

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| 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 }
Guidance heading:	
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