

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

SHAPING

B21 MECHANICAL METAL-WORKING WITHOUT ESSENTIALLY REMOVING MATERIAL; PUNCHING METAL (casting, powder metallurgy [B22](#); shearing [B23D](#); working of metal by the action of a high concentration of electric current [B23H](#); soldering, welding, flame-cutting [B23K](#); other working of metal [B23P](#); punching sheet material in general [B26F](#); processes for changing of physical properties of metals [C21D](#), [C22F](#); electroforming [C25D 1/00](#))

(NOTES omitted)

B21J FORGING; HAMMERING; PRESSING METAL; RIVETING; FORGE FURNACES (rolling of metal [B21B](#); making particular products by forging or pressing [B21K](#); cladding or plating [B23K](#); finishing surfaces by hammering [B23P 9/04](#); compacting surfaces by blasting with particulate material [B24C 1/10](#); general features of presses, presses for consolidating scrap [B30B](#); furnaces in general [F27](#))

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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|-------------|--|-------------|--|
| 1/00 | Preparing metal stock {or similar ancillary operations prior, during or post forging, e.g. heating or cooling (pretreatment for rolling B21B 1/02, B21B 15/0035)} | 5/04 | • by directly applied fluid pressure or explosive action |
| 1/003 | • {Selecting material} | 5/06 | • for performing particular operations |
| 1/006 | • • {Amorphous metal} | 5/063 | • • {Friction heat forging (friction heat riveting B21J 15/027)} |
| 1/02 | • Preliminary treatment of metal stock without particular shaping, e.g. salvaging segregated zones, forging or pressing in the rough (modifying the physical properties by deformation C21D 7/00 , C22F 1/00) | 5/066 | • • • {Flow drilling} |
| 1/025 | • • {affecting grain orientation} | 5/08 | • • Upsetting |
| 1/04 | • Shaping in the rough solely by forging or pressing | 5/10 | • • Piercing billets (in combination with extrusion B21C 23/00) |
| 1/06 | • Heating or cooling methods or arrangements specially adapted for performing forging or pressing operations {(B21J 5/063 takes precedence)} | 5/12 | • • Forming profiles on internal or external surfaces (making screw-thread by forging, pressing, or hammering B21K) |
| 3/00 | Lubricating during forging or pressing (lubricating in general F16N) | 7/00 | Hammers; Forging machines with hammers or die jaws acting by impact (hand hammers B25D; electrical features in section H) |
| 5/00 | Methods for forging, hammering, or pressing (for working sheet-metal or metal tubes, rods, or profiles B21D; for working wire B21F); Special equipment or accessories therefor | 7/02 | • Special design or construction |
| 5/002 | • {Hybrid process, e.g. forging following casting} | 7/04 | • • Power hammers |
| 5/004 | • {Thixotropic process, i.e. forging at semi-solid state} | 7/06 | • • Drop hammers |
| 5/006 | • {using ultrasonic waves} | 7/08 | • • • with rigidly-guided hammer |
| 5/008 | • {Incremental forging} | 7/10 | • • with both drive and hammer connected to a fulcrumed lever, e.g. tail hammers |
| 5/02 | • Die forging; Trimming by making use of special dies {; Punching during forging} | 7/12 | • • • the lever being a spring, i.e. spring hammers |
| 5/022 | • • {Open die forging} | 7/14 | • • Forging machines working with several hammers |
| 5/025 | • • {Closed die forging} | 7/145 | • • • {the hammers being driven by a rotating annular driving member} |
| 5/027 | • • {Trimming} | 7/16 | • • • in rotary arrangements |
| | | 7/18 | • • Forging machines working with die jaws, e.g. pivoted, movable laterally of the forging or pressing direction, e.g. for swaging |
| | | 7/20 | • Drives for hammers; Transmission means therefor |
| | | 7/22 | • • for power hammers |
| | | 7/24 | • • • operated by steam, air, or other gaseous pressure |

7/26	. . . . operated by internal combustion	15/045	. . . . {and swaging locking means, i.e. locking the broken off mandrel head to the hollow rivet}
7/28	. . . . operated by hydraulic or liquid pressure	15/046	. . . . {by edge-curling}
7/30	. . . . operated by electro-magnets	15/048	. . . . {Setting self-drilling hollow rivets}
7/32	. . . . operated by rotary drive, e.g. by electric motor	15/06	. . . Riveting hollow rivets by means of hydraulic, liquid, or gas pressure {(portable riveters B21J 15/105)}
7/34	. . . . operating both the hammer and the anvil, so-called counter-tup	15/08	. . . Riveting by applying heat {, e.g.} to the end parts of the rivets to enable heads to be formed {(B21J 15/027 takes precedence)}
7/36	. . . for drop hammers	15/10	. . Riveting machines (electric heating elements H05B)
7/38	. . . . driven by steam, air, or other gaseous pressure	15/105	. . {Portable riveters (pliers for riveting B21J 15/386)}
7/40	. . . . driven by hydraulic or liquid pressure	15/12	. . with tools or tool parts having a movement additional to the feed movement, e.g. spin {(B21J 15/027 takes precedence)}
7/42	. . . . operated by rotary drive, e.g. electric motors	15/14	. . specially adapted for riveting specific articles, e.g. brake lining machines
7/44	. . . . equipped with belts, ropes, cables, chains	15/142	. . . . {Aerospace structures}
7/46	. . Control devices specially adapted to forging hammers, not restricted to one of the preceding subgroups	15/145	. . . . {Turbines}
9/00	Forging presses	15/147	. . . . {Composite articles}
9/02	. Special design or construction	15/16	. . Drives for riveting machines; Transmission means therefor
9/022	. . {multi-stage forging presses (handling devices B21K 27/00)}	15/18	. . . . operated by air pressure or other gas pressure, e.g. explosion pressure
9/025	. . {with rolling or wobbling dies}	15/185	. . . . {by explosion pressure}
9/027	. . {with punches moving along auxiliary lateral directions (B21J 13/025 takes precedence)}	15/20	. . . . operated by hydraulic or liquid pressure
9/04	. . Piercing presses	15/205	. . . . {Riveting tools having hand operated pumps for building up the hydraulic pressure}
9/06	. . Swaging presses; Upsetting presses	15/22	. . . . operated by both hydraulic or liquid pressure and gas pressure
9/08	. . . equipped with devices for heating the work-piece (electric heating elements H05B)	15/24	. . . . operated by electro-magnets
9/10	. Drives for forging presses	15/26	. . . . operated by rotary drive, e.g. by electric motor
9/12	. . operated by hydraulic or liquid pressure	15/28	. . Control devices specially adapted to riveting machines not restricted to one of the preceding subgroups
9/14	. . . in conjunction with electric power	15/285	. . . . {for controlling the rivet upset cycle}
9/16	. . . in conjunction with steam or gas power	15/30	. . Particular elements, e.g. supports; Suspension equipment specially adapted for portable riveters
9/18	. . operated by making use of gearing mechanisms, e.g. levers, spindles, crankshafts, eccentrics, toggle-levers, rack bars	15/32	. . . Devices for inserting or holding rivets in position with or without feeding arrangements
9/20	. . Control devices specially adapted to forging presses not restricted to one of the preceding subgroups	15/323	. . . . {using a carrier strip}
11/00	Forging hammers combined with forging presses; Forging machines with provision for hammering and pressing	15/326	. . . . {Broken-off mandrel collection}
13/00	Details of machines for forging, pressing, or hammering	15/34	. . . . for installing {multiple-type} tubular rivets
13/02	. Dies or mountings therefor	15/36	. . Rivet sets, i.e. tools for forming heads; Mandrels for expanding parts of hollow rivets
13/025	. . {Dies with parts moving along auxiliary lateral directions}	15/365	. . . . {Mandrels for expanding parts of hollow rivets}
13/03	. . Die mountings	15/38	. . Accessories for use in connection with riveting, e.g. pliers for upsetting; Hand tools for riveting
13/04	. Frames; Guides	15/383	. . {Hand tools for riveting}
13/06	. Hammers tups; Anvils; Anvil blocks	15/386	. . {Pliers for riveting}
13/08	. Accessories for handling work or tools	15/40	. . for forming rivet heads
13/085	. . {handling of tools}	15/42	. . Special clamping devices for workpieces to be riveted together, e.g. operating through the rivet holes
13/10	. . Manipulators (in general B25J)	15/44	. . Rivet hole positioners
13/12	. . . Turning means	15/46	. . Positioners for rivets for making tube joints
13/14	. . Ejecting devices	15/48	. . Devices for caulking rivets
15/00	Riveting	15/50	. . Removing or cutting devices for rivets
15/02	. Riveting procedures	17/00	Forge furnaces (furnaces for heat treatment C21D 9/00; furnaces in general F27)
15/022	. . {Setting rivets by means of swaged-on locking collars, e.g. lockbolts}		
15/025	. . {Setting self-piercing rivets}		
15/027	. . {Setting rivets by friction heating}		
15/04	. . Riveting hollow rivets mechanically		
15/041	. . . {by pushing a drive-pin}		
15/043	. . . {by pulling a mandrel}		

B21J

- 17/02 . electrically heated ([electric heating elements H05B](#))
- 19/00 Blacksmiths requisites not otherwise provided for**
- 19/02 . Hearths; Air supply arrangements specially adapted therefor
- 19/025 . . {Tyre heaters}
- 19/04 . Anvils; Associated items