

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](#))

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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)} | 5/063 | . . {Friction heat forging (friction heat riveting B21J 15/027)} |
| 1/003 | . {Selecting material} | 5/066 | . . . {Flow drilling} |
| 1/006 | . . {Amorphous metal} | 5/08 | . . Upsetting |
| 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) | 5/10 | . . Piercing billets (in combination with extrusion B21C 23/00) |
| 1/025 | . . {affecting grain orientation} | 5/12 | . . Forming profiles on internal or external surfaces (making screw-thread by forging, pressing, or hammering B21K) |
| 1/04 | . Shaping in the rough solely by forging or pressing | 7/00 | Hammers; Forging machines with hammers or die jaws acting by impact (hand hammers B25D; electrical features in section H) |
| 1/06 | . Heating or cooling methods or arrangements specially adapted for performing forging or pressing operations {(B21J 5/063 takes precedence)} | 7/02 | . Special design or construction |
| 3/00 | Lubricating during forging or pressing (lubricating in general F16N) | 7/04 | . . Power hammers |
| 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 | 7/06 | . . Drop hammers |
| 5/002 | . {Hybrid process, e.g. forging following casting} | 7/08 | . . . with rigidly-guided hammer |
| 5/004 | . {Thixotropic process, i.e. forging at semi-solid state} | 7/10 | . . with both drive and hammer connected to a fulcrumed lever, e.g. tail hammers |
| 5/006 | . {using ultrasonic waves} | 7/12 | . . . the lever being a spring, i.e. spring hammers |
| 5/008 | . {Incremental forging} | 7/14 | . . Forging machines working with several hammers |
| 5/02 | . Die forging; Trimming by making use of special dies {; Punching during forging} | 7/145 | . . . {the hammers being driven by a rotating annular driving member} |
| 5/022 | . . {Open die forging} | 7/16 | . . . in rotary arrangements |
| 5/025 | . . {Closed die forging} | 7/18 | . . Forging machines working with die jaws, e.g. pivoted, movable laterally of the forging or pressing direction, e.g. for swaging |
| 5/027 | . . {Trimming} | 7/20 | . Drives for hammers; Transmission means therefor |
| 5/04 | . by directly applied fluid pressure or explosive action | 7/22 | . . for power hammers |
| 5/06 | . for performing particular operations | 7/24 | . . . operated by steam, air, or other gaseous pressure |
| | | 7/26 | operated by internal combustion |
| | | 7/28 | operated by hydraulic or liquid pressure |
| | | 7/30 | operated by electro-magnets |
| | | 7/32 | operated by rotary drive, e.g. by electric motor |
| | | 7/34 | operating both the hammer and the anvil, so-called counter-tup |

7/36	. . for drop hammers	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) }
7/38	. . . driven by steam, air, or other gaseous pressure	15/10	. Riveting machines (electric heating elements H05B)
7/40	. . . driven by hydraulic or liquid pressure	15/105	. . { Portable riveters (pliers for riveting B21J 15/386) }
7/42	. . . operated by rotary drive, e.g. electric motors	15/12	. . with tools or tool parts having a movement additional to the feed movement, e.g. spin { (B21J 15/027 takes precedence) }
7/44 equipped with belts, ropes, cables, chains	15/14	. . specially adapted for riveting specific articles, e.g. brake lining machines
7/46	. . Control devices specially adapted to forging hammers, not restricted to one of the preceding subgroups	15/142	. . . { Aerospace structures }
9/00	Forging presses	15/145	. . . { Turbines }
9/02	. Special design or construction	15/147	. . . { Composite articles }
9/022	. . { multi-stage forging presses (handling devices B21K 27/00) }	15/16	. . Drives for riveting machines; Transmission means therefor
9/025	. . { with rolling or wobbling dies }	15/18	. . . operated by air pressure or other gas pressure, e.g. explosion pressure
9/027	. . { with punches moving along auxiliary lateral directions (B21J 13/025 takes precedence) }	15/185 { by explosion pressure }
9/04	. . Piercing presses	15/20	. . . operated by hydraulic or liquid pressure
9/06	. . Swaging presses; Upsetting presses	15/205 { Riveting tools having hand operated pumps for building up the hydraulic pressure }
9/08	. . . equipped with devices for heating the work-piece (electric heating elements H05B)	15/22	. . . operated by both hydraulic or liquid pressure and gas pressure
9/10	. Drives for forging presses	15/24	. . . operated by electro-magnets
9/12	. . operated by hydraulic or liquid pressure	15/26	. . . operated by rotary drive, e.g. by electric motor
9/14	. . . in conjunction with electric power	15/28	. . Control devices specially adapted to riveting machines not restricted to one of the preceding subgroups
9/16	. . . in conjunction with steam or gas power	15/285	. . . { for controlling the rivet upset cycle }
9/18	. . operated by making use of gearing mechanisms, e.g. levers, spindles, crankshafts, eccentrics, toggle-levers, rack bars	15/30	. . Particular elements, e.g. supports; Suspension equipment specially adapted for portable riveters
9/20	. . Control devices specially adapted to forging presses not restricted to one of the preceding subgroups	15/32	. . . Devices for inserting or holding rivets in position with or without feeding arrangements
11/00	Forging hammers combined with forging presses; Forging machines with provision for hammering and pressing	15/323 { using a carrier strip }
13/00	Details of machines for forging, pressing, or hammering	15/326 { Broken-off mandrel collection }
13/02	. Dies or mountings therefor	15/34 for installing { multiple-type } tubular rivets
13/025	. . { Dies with parts moving along auxiliary lateral directions }	15/36	. . Rivet sets, i.e. tools for forming heads; Mandrels for expanding parts of hollow rivets
13/03	. . Die mountings	15/365	. . . { Mandrels for expanding parts of hollow rivets }
13/04	. Frames; Guides	15/38	. Accessories for use in connection with riveting, e.g. pliers for upsetting; Hand tools for riveting
13/06	. Hammers tups; Anvils; Anvil blocks	15/383	. . { Hand tools for riveting }
13/08	. Accessories for handling work or tools	15/386	. . { Pliers for riveting }
13/085	. . { handling of tools }	15/40	. . for forming rivet heads
13/10	. . Manipulators (in general B25J)	15/42	. . Special clamping devices for workpieces to be riveted together, e.g. operating through the rivet holes
13/12	. . . Turning means	15/44	. . Rivet hole positioners
13/14	. . Ejecting devices	15/46	. . Positioners for rivets for making tube joints
15/00	Riveting	15/48	. . Devices for caulking rivets
15/02	. Riveting procedures	15/50	. . Removing or cutting devices for rivets
15/022	. . { Setting rivets by means of swaged-on locking collars, e.g. lockbolts }	17/00	Forge furnaces (furnaces for heat treatment C21D 9/00; furnaces in general F27)
15/025	. . { Setting self-piercing rivets }	17/02	. electrically heated (electric heating elements H05B)
15/027	. . { Setting rivets by friction heating }	19/00	Blacksmiths requisites not otherwise provided for
15/04	. . Riveting hollow rivets mechanically	19/02	. Hearths; Air supply arrangements specially adapted therefor
15/041	. . . { by pushing a drive-pin }	19/025	. . { Tyre heaters }
15/043	. . . { by pulling a mandrel }	19/04	. Anvils; Associated items
15/045 { and swaging locking means, i.e. locking the broken off mandrel head to the hollow rivet }		
15/046	. . . { by edge-curling }		
15/048	. . . { Setting self-drilling hollow rivets }		
15/06	. . Riveting hollow rivets by means of hydraulic, liquid, or gas pressure { (portable riveters B21J 15/105) }		