

**CPC****COOPERATIVE PATENT CLASSIFICATION****B21J****FORGING; HAMMERING; PRESSING; 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](#); furnace in general [F27](#))

**B21J 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](#))}

[B21J 1/003](#)

. { [Selecting material](#) }

[B21J 1/006](#)

.. { [Amorphous metal](#) }

[B21J 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](#))

[B21J 1/025](#)

.. { [affecting grain orientation](#) }

[B21J 1/04](#)

. Shaping in the rough solely by forging or pressing

[B21J 1/06](#)

. Heating or cooling methods or arrangements specially adapted for performing forging or pressing operations ([B21J 5/063 takes precedence](#))

**B21J 3/00**

**Lubricating during forging or pressing** ([lubricating in general F16N](#))

**B21J 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**

[B21J 5/002](#)

. { [Hybrid process, e.g. forging following casting](#) }

[B21J 5/004](#)

. { [Thixotropic process, i.e. forging at semi-solid state](#) }

[B21J 5/006](#)

. { [using ultrasonic waves](#) }

[B21J 5/008](#)

. { [Incremental forging](#) }

[B21J 5/02](#)

. Die forging; Trimming by making use of special dies; { [Punching during forging](#) }

[B21J 5/022](#)

.. { [Open die forging](#) }

[B21J 5/025](#)

.. { [Closed die forging](#) }

[B21J 5/027](#)

.. { [Trimming](#) }

[B21J 5/04](#)

. by directly applied fluid pressure or explosive action

[B21J 5/06](#)

. for performing particular operations

- B21J 5/063 .. { Friction heat forging (friction heat riveting [B21J 15/027](#))}
- B21J 5/066 ... { Flow drilling }
- B21J 5/08 .. Upsetting
- B21J 5/10 .. Piercing billets (in combination with extrusion [B21C 23/00](#))
- B21J 5/12 .. Forming profiles on internal or external surfaces (making screw-thread by forging, pressing, or hammering [B21K](#))

**B21J 7/00 Hammers; Forging machines with hammers or die jaws acting by impact** (hand hammers [B25D](#); electrical features in section H)

- B21J 7/02 . Special design or construction
- B21J 7/04 .. Power hammers
- B21J 7/06 .. Drop hammers
  - B21J 7/08 ... with rigidly-guided hammer
  - B21J 7/10 .. with both drive and hammer connected to a fulcrumed lever, e.g. tail hammers
  - B21J 7/12 ... the lever being a spring, i.e. spring hammers
- B21J 7/14 .. Forging machines working with several hammers
  - B21J 7/145 ... { the hammers being driven by a rotating annular driving member }
  - B21J 7/16 ... in rotary arrangements
- B21J 7/18 .. Forging machines working with die jaws, e.g. pivoted, movable laterally of the forging or pressing direction e.g. for swaging
- B21J 7/20 . Drives for hammers; Transmission means therefor
- B21J 7/22 .. for power hammers
  - B21J 7/24 ... operated by steam, air, or other gaseous pressure
  - B21J 7/26 .... operated by internal combustion
  - B21J 7/28 ... operated by hydraulic or liquid pressure
  - B21J 7/30 ... operated by electro-magnets
  - B21J 7/32 ... operated by rotary drive, e.g. by electric motor
  - B21J 7/34 ... operating both the hammer and the anvil, so-called counter-tup
- B21J 7/36 .. for drop hammers
  - B21J 7/38 ... driven by steam, air, or other gaseous pressure
  - B21J 7/40 ... driven by hydraulic or liquid pressure
  - B21J 7/42 ... operated by rotary drive, e.g. electric motors
  - B21J 7/44 .... equipped with belts, ropes, cables, chains
- B21J 7/46 .. Control devices specially adapted to forging hammers, not restricted to one of the preceding sub-groups

**B21J 9/00 Forging presses**

- B21J 9/02 . Special design or construction
- B21J 9/022 .. { multi-stage forging presses (handling devices [B21K 27/00](#))}

- B21J 9/025 .. { with rolling or wobbling dies }
- B21J 9/027 .. { with punches moving along auxiliary lateral directions (B21J 13/025 takes precedence)}
- B21J 9/04 .. Piercing presses
- B21J 9/06 .. Swaging presses; Upsetting presses
- B21J 9/08 ... equipped with devices for heating the work-piece (electric heating elements H05B)
- B21J 9/10 . Drives for forging presses
- B21J 9/12 .. operated by hydraulic or liquid pressure
- B21J 9/14 ... in conjunction with electric power
- B21J 9/16 ... in conjunction with steam or gas power
- B21J 9/18 .. operated by making use of gearing mechanisms, e.g. levers, spindles, crankshafts, eccentrics, toggle-levers, rack bars
- B21J 9/20 .. Control devices specially adapted to forging presses not restricted to one of the preceding sub-groups

## **B21J 11/00 Forging hammers combined with forging presses; Forging machines with provision for hammering and pressing**

### **B21J 13/00 Details of machines for forging, pressing, or hammering**

- B21J 13/02 . Dies or mountings therefor
- B21J 13/025 .. { Dies with parts moving along auxiliary lateral directions }
- B21J 13/03 .. Die mountings
- B21J 13/04 . Frames; Guides
- B21J 13/06 . Hammers tups; Anvils; Anvil blocks
- B21J 13/08 . Accessories for handling work or tools
- B21J 13/085 .. { handling of tools }
- B21J 13/10 .. Manipulators (in general B25J)
- B21J 13/12 ... Turning means
- B21J 13/14 .. Ejecting devices

### **B21J 15/00 Riveting**

- B21J 15/02 . Riveting procedures
- B21J 15/022 .. { Setting rivets by means of swaged-on locking collars, e.g. lockbolts }
- B21J 15/025 .. { Setting self-piercing rivets }
- B21J 15/027 .. { Setting rivets by friction heating }
- B21J 15/04 .. Riveting hollow rivets mechanically

- B21J 15/041 ... { by pushing a drive-pin }
- B21J 15/043 ... { by pulling a mandrel }
- B21J 15/045 .... { and swaging locking means, i.e. locking the broken off mandrel head to the hollow rivet }
- B21J 15/046 ... { by edge-curling }
- B21J 15/048 ... { Setting self-drilling hollow rivets }
- B21J 15/06 .. { Riveting hollow rivets by means of hydraulic, liquid, or gas pressure (portable riveters [B21J 15/105](#)) }
- B21J 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)}
- B21J 15/10 . Riveting machines (electric heating elements [H05B](#))
- B21J 15/105 .. { Portable riveters (pliers for riveting [B21J 15/386](#)) }
- B21J 15/12 .. with tools or tool parts having a movement additional to the feed movement, e.g. spin {(B21J 15/027 takes precedence)}
- B21J 15/14 .. specially adapted for riveting specific articles, e.g. brake lining machines
- B21J 15/142 ... { Aerospace structures }
- B21J 15/145 ... { Turbines }
- B21J 15/147 ... { Composite articles }
- B21J 15/16 .. Drives for riveting machines; Transmission means therefor
- B21J 15/18 ... operated by air pressure or other gas pressure, e.g. explosion pressure
- B21J 15/185 .... { by explosion pressure }
- B21J 15/20 ... operated by hydraulic or liquid pressure
- B21J 15/205 .... { Riveting tools having hand operated pumps for building up the hydraulic pressure }
- B21J 15/22 ... operated by both hydraulic or liquid pressure and gas pressure
- B21J 15/24 ... operated by electro-magnets
- B21J 15/26 ... operated by rotary drive, e.g. by electric motor
- B21J 15/28 .. Control devices specially adapted to riveting machines not restricted to one of the preceding sub-groups
- B21J 15/285 ... { for controlling the rivet upset cycle }
- B21J 15/30 .. Particular elements, e.g. supports; Suspension equipment specially adapted for portable riveters
- B21J 15/32 ... Devices for inserting or holding rivets in position with or without feeding arrangements
- B21J 15/323 .... { using a carrier strip }
- B21J 15/326 .... { Broken-off mandrel collection }
- B21J 15/34 .... for installing { multiple-type } tubular rivets
- B21J 15/36 .. Rivet sets, i.e. tools for forming heads; Mandrels for expanding parts of hollow rivets
- B21J 15/365 ... { Mandrels for expanding parts of hollow rivets }
- B21J 15/38 . Accessories for use in connection with riveting, e.g. pliers for upsetting; Hand tools for riveting

- B21J 15/383 . . { Hand tools for riveting }
- B21J 15/386 . . { Pliers for riveting }
- B21J 15/40 . . for forming rivet heads
- B21J 15/42 . . Special clamping devices for workpieces to be riveted together, e.g. operating through the rivet holes
- B21J 15/44 . . Rivet hole positioners
- B21J 15/46 . . Positioners for rivets for making tube joints
- B21J 15/48 . . Devices for caulking rivets
- B21J 15/50 . . Removing or cutting devices for rivets
  
- B21J 17/00** **Forge furnaces** (furnaces for heat treatment [C21D 9/00](#); furnaces in general [F27](#))
  
- B21J 17/02 . electrically heated (electric heating elements [H05B](#))
  
- B21J 19/00** **Blacksmiths requisites not otherwise provided for**
  
- B21J 19/02 . Hearths; Air supply arrangements specially adapted therefor
- B21J 19/025 . . { Tyre heaters }
  
- B21J 19/04 . Anvils; Associated items