

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

SHAPING

B23 MACHINE TOOLS; METAL-WORKING NOT OTHERWISE PROVIDED FOR

(NOTES omitted)

B23K SOLDERING OR UNSOLDERING; WELDING; CLADDING OR PLATING BY SOLDERING OR WELDING; CUTTING BY APPLYING HEAT LOCALLY, e.g. FLAME CUTTING; WORKING BY LASER BEAM (making metal-coated products by extruding metal [B21C 23/22](#); building up linings or coverings by casting [B22D 19/08](#); casting by dipping [B22D 23/04](#); manufacture of composite layers by sintering metal powder [B22F 7/00](#); arrangements on machine tools for copying or controlling [B23Q](#); covering metals or covering materials with metals, not otherwise provided for [C23C](#); burners [F23D](#))

NOTES

1. This subclass covers also electric circuits specially adapted for the purposes covered by the title of the subclass.
2. In this subclass, the following term is used with the meaning indicated:
 - "soldering" means uniting metals using solder and applying heat without melting either of the parts to be united

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

B23K 35/04 - B23K 35/20	covered by	B23K 35/0205 - B23K 35/0294
B23K 35/363	covered by	B23K 35/3601 - B23K 35/3618
2. 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.

Soldering, e.g. brazing, or unsoldering (essentially requiring the use of welding machines or welding equipment, [see the relevant groups for the welding machines or welding equipment](#))

- 1/00 Soldering, e.g. brazing, or unsoldering** ([B23K 3/00](#) takes precedence; characterised only by the use of special materials or media [B23K 35/00](#); dip or wave soldering in the manufacture of printed circuits [H05K 3/34](#))
- 1/0002 . {Soldering by means of dipping in a fused salt bath}
 - 1/0004 . {Resistance soldering}
 - 1/0006 . {Exothermic brazing}
 - 1/0008 . {specially adapted for particular articles or work}
 - 1/001 . . {Sealing small holes in metal containers, e.g. tins}
 - 1/0012 . . {Brazing heat exchangers}
 - 1/0014 . . {Brazing of honeycomb sandwich structures}
 - 1/0016 . . {Brazing of electronic components}
 - 1/0018 . . {Brazing of turbine parts}
 - 1/002 . Soldering by means of induction heating
 - 1/005 . Soldering by means of radiant energy
 - 1/0053 . . {soldering by means of I.R.}
 - 1/0056 . . {soldering by means of beams, e.g. lasers, E.B.}
 - 1/008 . Soldering within a furnace ([B23K 1/012](#) takes precedence)
 - 1/012 . Soldering with the use of hot gas
 - 1/015 . . Vapour-condensation soldering

- 1/018 . Unsoldering; Removal of melted solder or other residues
- 1/06 . making use of vibrations, e.g. supersonic vibrations
- 1/08 . Soldering by means of dipping in molten solder
- 1/085 . . {Wave soldering}
- 1/14 . specially adapted for soldering seams (making tubes involving operations other than soldering [B21C](#))
- 1/16 . . longitudinal seams, e.g. of shells
- 1/18 . . circumferential seams, e.g. of shells
- 1/19 . taking account of the properties of the materials to be soldered
- 1/20 . Preliminary treatment of work or areas to be soldered, e.g. in respect of a galvanic coating (preparation of surfaces in particular ways, [see the relevant classes for the treatments or the materials treated, e.g. C04B, C23C](#))
- 1/203 . . {Fluxing, i.e. applying flux onto surfaces}
- 1/206 . . {Cleaning}
- 3/00 Tools, devices, or special appurtenances for soldering, e.g. brazing, or unsoldering, not specially adapted for particular methods** ([materials used for soldering B23K 35/00](#))
 - 3/02 . Soldering irons; Bits
 - 3/021 . . {Flame-heated soldering irons}
 - 3/022 . . . {using a gaseous fuel}
 - 3/023 . . . {using a liquid fuel}
 - 3/024 . . . {using a solid fuel}

- 3/025 . . . {Bits or tips}
- 3/026 . . . {Removable soldering bits}
- 3/027 . . . {Holders for soldering irons}
- 3/028 . . . {Devices for cleaning soldering iron tips
([B23K 3/027](#) takes precedence)}
- 3/029 . . . {Solder or residue removing devices}
- 3/03 . . . electrically heated
- 3/0307 . . . {with current flow through the workpiece}
- 3/0315 . . . {Quick-heating soldering irons having the tip-
material forming part of the electric circuit
([B23K 3/0323](#) takes precedence)}
- 3/0323 . . . {Battery-powered soldering irons}
- 3/033 . . . {comprising means for controlling or selecting
the temperature or power}
- 3/0338 . . . {Constructional features of electric soldering
irons}
- 3/0346 {Handles}
- 3/0353 {Heating elements or heating element
housings}
- 3/0361 {Couplings between the handle and the
heating element housing}
- 3/0369 {Couplings between the heating element
housing and the bit or tip}
- 3/0376 . . . {comprising carbon heating elements or
electrodes ([B23K 3/0384](#) and [B23K 3/0392](#)
take precedence)}
- 3/0384 . . . {the heat being generated by an arc}
- 3/0392 . . . {the heat being generated by contact
resistance}
- 3/04 . . Heating appliances ([soldering lamps or blowpipes](#)
[F23D](#); [electric heating in general H05B](#))
- 3/043 . . {Flame-heated appliances}
- 3/047 . . electric
- 3/0471 . . . {using resistance rod or bar, e.g. carbon silica}
- 3/0473 . . . {using Joule effect at the place of contact
between a rod and the soldering tip}
- 3/0475 . . . {using induction effects, e.g. Kelvin or skin
effects}
- 3/0476 . . . {Soldering pliers}
- 3/0478 . . . {comprising means for controlling or selecting
the temperature or power}
- 3/053 . . . using resistance wires
- 3/06 . . Solder feeding devices; Solder melting pans
- 3/0607 . . {Solder feeding devices}
- 3/0615 . . . {forming part of a soldering iron}
- 3/0623 . . . {for shaped solder piece feeding, e.g. preforms,
bumps, balls, pellets, droplets}
- 3/063 . . . {for wire feeding}
- 3/0638 . . . {for viscous material feeding, e.g. solder paste
feeding ([B23K 3/0623](#) takes precedence)}
- 3/0646 . . {Solder baths}
- 3/0653 . . . {with wave generating means, e.g. nozzles,
jets, fountains}
- 3/0661 . . . {Oscillating baths}
- 3/0669 . . . {with dipping means}
- 3/0676 {Conveyors therefor}
- 3/0684 {with means for oscillating the workpiece}
- 3/0692 . . . {with intermediary means for bringing solder
on workpiece, e.g. rollers}
- 3/08 . . Auxiliary devices therefor ([cleaning pipes or tubes](#)
or [systems of pipes or tubes](#), e.g. before soldering,
[B08B 9/02](#))
- 3/082 . . {Flux dispensers; Apparatus for applying flux}

- 3/085 . . . {Cooling, heat sink or heat shielding means}
- 3/087 . . . {Soldering or brazing jigs, fixtures or clamping
means}

Flame welding or cutting**5/00 Gas flame welding**

- 5/003 . . {the welding zone being shielded against the
influence of the surrounding atmosphere ([selection](#)
[of media B23K 35/38](#))}
- 5/006 . . {specially adapted for particular articles or work}
- 5/02 . . Seam welding ([making tubes involving operations](#)
[other than welding B21C](#))
- 5/023 . . {of horizontal seams in assembling vertical plates
a welding unit being adapted to travel along the
upper horizontal edge of the plates}
- 5/026 . . {of non-horizontal seams in assembling non-
horizontal plates}
- 5/04 . . using additional profiled strips or the like of
welding metal along seam edges
- 5/06 . . Welding longitudinal seams
- 5/08 . . Welding circumferential seams
- 5/083 . . . {Welding three-dimensional seams}
- 5/086 {helicoidal seams}
- 5/10 . . Welding workpieces essentially comprising layers
of different metals, e.g. plated workpieces
- 5/12 . . taking account of the properties of the material to be
welded
- 5/14 . . of non-ferrous metals ([B23K 5/16](#) takes
precedence)
- 5/16 . . of different metals
- 5/18 . . for purposes other than joining parts, e.g. built-up
welding
- 5/20 . . making use of vibrations, e.g. supersonic vibrations
- 5/213 . . Preliminary treatment
- 5/22 . . Auxiliary equipment, e.g. backings, guides
- 5/24 . . Arrangements for supporting torches ([not](#)
[restricted to flame welding B23K 37/02](#))

**7/00 Cutting, scarfing, or desurfacing by applying
flames {(thermal deburring B23D 79/005)}**

- 7/001 . . {for profiling plate edges or for cutting grooves}
- 7/002 . . {Machines, apparatus, or equipment for cutting
plane workpieces, e.g. plates}
- 7/003 . . {Machines, apparatus, or equipment for cutting
long articles, e.g. cast stands, plates, in parts of
predetermined length}
- 7/004 . . {Seam tracking}
- 7/005 . . {Machines, apparatus, or equipment specially
adapted for cutting curved workpieces, e.g. tubes}
- 7/006 . . {for tubes}
- 7/007 . . . {for obtaining tube intersection profiles}
- 7/008 . . {Preliminary treatment}
- 7/06 . . Machines, apparatus, or equipment specially
designed for scarfing or desurfacing
- 7/08 . . by applying additional compounds or means
favouring the cutting, scarfing, or desurfacing
procedure
- 7/10 . . Auxiliary devices, e.g. for guiding or supporting
the torch ([guiding means applicable to other metal-
working machines B23Q](#))
- 7/102 . . {for controlling the spacial relationship between
the workpieces and the gas torch}
- 7/105 . . {specially adapted for particular geometric
forms}

7/107 . . . {for cutting circles}

Electric welding or cutting

9/00 **Arc welding or cutting (electro-slag welding [B23K 25/00](#); welding transformers [H01F](#); welding generators [H02K](#))**

- 9/0008 . {Welding without shielding means against the influence of the surrounding atmosphere}
- 9/0017 . . {using more than one electrode}
- 9/0026 . {specially adapted for particular articles or work}
- 9/0035 . . {of thin articles}
- 9/0043 . . {Locally welding a thin plate to a thick piece ([spot welding B23K 9/007](#))}
- 9/0052 . . {Welding of pipe panels}
- 9/0061 . {Underwater arc welding}
- 9/007 . Spot arc welding
- 9/013 . Arc cutting, gouging, scarfing or desurfacing
- 9/0135 . . {Arc saw cutting}
- 9/02 . Seam welding; Backing means; Inserts
- 9/0203 . . {Inserts}
- 9/0206 . . {of horizontal seams in assembling vertical plates, a welding unit being adapted to travel along the upper horizontal edge of the plates}
- 9/0209 . . {of non-horizontal seams in assembling non-horizontal plates}
- 9/0213 . . {Narrow gap welding}
- 9/0216 . . {Seam profiling, e.g. weaving, multilayer}
- 9/022 . . Welding by making use of electrode vibrations
- 9/025 . . for rectilinear seams
- 9/0253 . . . {for the longitudinal seam of tubes}
- 9/0256 . . . {for welding ribs on plates}
- 9/028 . . for curved planar seams
- 9/0282 . . . {for welding tube sections}
- 9/0284 {with an electrode working inside the tube}
- 9/0286 {with an electrode moving around the fixed tube during the welding operation}
- 9/0288 . . . {for welding of tubes to tube plates}
- 9/032 . . for three-dimensional seams
- 9/0325 . . . {helical seams}
- 9/035 . . with backing means disposed under the seam
- 9/0352 . . . {the backing means being movable during the welding operation}
- 9/0354 . . . {the backing means being expandable}
- 9/0356 . . . {the backing means being a tape or strip}
- 9/0358 . . . {the backing means being a ring or sleeve}
- 9/038 . . using moulding means ([not restricted to arc welding B23K 37/06](#))
- 9/04 . Welding for other purposes than joining, e.g. built-up welding
- 9/042 . . {Built-up welding on planar surfaces}
- 9/044 . . {Built-up welding on three-dimensional surfaces}
- 9/046 . . . {on surfaces of revolution}
- 9/048 {on cylindrical surfaces}
- 9/06 . Arrangements or circuits for starting the arc, e.g. by generating ignition voltage, or for stabilising the arc
- 9/067 . . Starting the arc
- 9/0671 . . . {by means of brief contacts between the electrodes}
- 9/0672 . . . {without direct contact between electrodes}
- 9/0673 {Ionisation of the arc gap by means of a tension with a step front (pulses or high frequency tensions)}

- 9/0675 {Ionization of the arc gap by means of radiation or particle bombardment}
- 9/0676 {Ionization of the arc gap by means of heating}
- 9/0677 {Ionization of the arc gap by means of a contact piece disposed between the electrodes}
- 9/0678 {Ionization of the arc gap by means of an auxiliary arc}
- 9/073 . . Stabilising the arc
- 9/0731 . . . {Stabilising of the arc tension}
- 9/0732 . . . {Stabilising of the arc current}
- 9/0734 . . . {Stabilising of the arc power}
- 9/0735 . . . {Stabilising of the arc length}
- 9/0737 . . . {Stabilising of the arc position}
- 9/0738 . . . {Stabilising of the arc by automatic re-ignition means}
- 9/08 . Arrangements or circuits for magnetic control of the arc ([stabilising of the arc position by magnetic means B23K 9/0737](#))
- 9/09 . Arrangements or circuits for arc welding with pulsed current or voltage
- 9/091 . . {characterised by the circuits}
- 9/092 . . . {characterised by the shape of the pulses produced}
- 9/093 . . . {the frequency of the pulses produced being modulatable}
- 9/095 . Monitoring or automatic control of welding parameters
- 9/0953 . . {using computing means}
- 9/0956 . . {using sensing means, e.g. optical}
- 9/10 . Other electric circuits therefor; Protective circuits; Remote controls
- 9/1006 . . {Power supply}
- 9/1012 . . . {characterised by parts of the process}
- 9/1018 {Improvements of the cos (phi) of arc welding installations}
- 9/1025 {Means for suppressing or reducing DC components in AC arc welding installations}
- 9/1031 {Reduction of the arc voltage beneath the arc striking value, e.g. to zero voltage, during non-welding periods}
- 9/1037 {Means preventing crater forming at the extremity of the seam}
- 9/1043 . . . {characterised by the electric circuit ([B23K 9/1012 takes precedence](#))}
- 9/105 {by using discharge tubes or mechanical contactors ([B23K 9/1068 takes precedence](#))}
- 9/1056 {by using digital means ([B23K 9/1068 takes precedence](#))}
- 9/1062 {with computing means}
- 9/1068 {Electric circuits for the supply of power to two or more arcs from a single source}
- 9/1075 . . . {Parallel power supply, i.e. multiple power supplies or multiple inverters supplying a single arc or welding current}
- 9/1081 . . {Arc welding by means of accumulated energy}
- 9/1087 . . {Arc welding using remote control}
- 9/1093 . . {Consumable electrode or filler wire preheat circuits}
- 9/12 . Automatic feeding or moving of electrodes or work for spot or seam welding or cutting
- 9/121 . . {Devices for the automatic supply of at least two electrodes one after the other}

- 9/122 . . {Devices for guiding electrodes, e.g. guide tubes}
- 9/123 . . . {Serving also as contacting devices supplying welding current to an electrode}
- 9/124 . . {Circuits or methods for feeding welding wire}
- 9/125 . . . {Feeding of electrodes (for stabilising arc [B23K 9/073](#))}
- 9/126 . . {Controlling the spatial relationship between the work and the gas torch (between wire tip and piece [B23K 9/073](#))}
- 9/127 . . Means for tracking lines during arc welding or cutting (copying in general [B23Q 35/00](#))
- 9/1272 . . . {Geometry oriented, e.g. beam optical trading}
- 9/1274 {Using non-contact, optical means, e.g. laser means}
- 9/1276 {Using non-contact, electric or magnetic means, e.g. inductive means}
- 9/1278 {Using mechanical means}
- 9/133 . . Means for feeding electrodes, e.g. drums, rolls, motors
- 9/1333 . . . {Dereeling means}
- 9/1336 . . . {Driving means}
- 9/14 . making use of insulated electrodes
- 9/142 . . {Drag welding, the arc length being determined by an insulated layer between the welding electrode and the welding spot or seam}
- 9/145 . . . {the insulated welding electrode being laid along the seam}
- 9/147 . . . {the insulated welding electrode resting with one extremity on the workpiece}
- 9/16 . making use of shielding gas {(selection of media [B23K 35/38](#))}
- 9/162 . . {making use of a stationary fluid}
- 9/164 . . {making use of a moving fluid}
- 9/167 . . and of a non-consumable electrode
- 9/1675 . . . {making use of several electrodes}
- 9/173 . . and of a consumable electrode
- 9/1735 . . . {making use of several electrodes}
- 9/18 . Submerged-arc welding
- 9/182 . . {making use of a non-consumable electrode}
- 9/184 . . . {making use of several electrodes}
- 9/186 . . {making use of a consumable electrodes}
- 9/188 . . . {making use of several electrodes}
- 9/20 . Stud welding
- 9/201 . . {of the extremity of a small piece on a great or large basis}
- 9/202 . . . {by means of portable equipment, e.g. stud welding gun}
- 9/203 . . {of cooling fins}
- 9/205 . . {Means for determining, controlling or regulating the arc interval}
- 9/206 . . {with automatic stud supply}
- 9/207 . . {Features related to studs (welding studs [per se B23K 35/0288](#))}
- 9/208 . . . {Ferrules, e.g. for confining molten material}
- 9/22 . Percussion welding
- 9/23 . taking account of the properties of the materials to be welded
- 9/232 . . {of different metals}
- 9/235 . Preliminary treatment
- 9/24 . Features related to electrodes (form or composition of electrodes [B23K 35/00](#))
- 9/26 . . Accessories for electrodes, e.g. ignition tips
- 9/28 . . Supporting devices for electrodes (not restricted to arc welding or cutting [B23K 37/02](#))
- 9/282 . . . {Electrode holders not supplying shielding means to the electrode}
- 9/285 . . . {Cooled electrode holders}
- 9/287 . . . {Supporting devices for electrode holders (not restricted to arc welding [B23K 37/02](#))}
- 9/29 . . . Supporting devices adapted for making use of shielding means
- 9/291 {the shielding means being a gas}
- 9/293 {using consumable electrode-rod}
- 9/295 {using consumable electrode-wire}
- 9/296 {using non-consumable electrodes}
- 9/298 {the shielding means being a powder}
- 9/30 . . . Vibrating holders for electrodes ([B23K 9/022](#) takes precedence)
- 9/32 . Accessories (earthing connections [H01R](#))
- 9/321 . . {Protecting means (protecting means in general [F16P 1/06](#))}
- 9/322 . . . {Head protecting means (masks, shields or hoods for weldersp [A61F 9/06](#))}
- 9/323 . . {Combined coupling means, e.g. gas, electricity, water or the like (electrical only [H01R](#))}
- 9/324 . . {Devices for supplying or evacuating a shielding or a welding powder, e.g. a magnetic powder}
- 9/325 . . {Devices for supplying or evacuating shielding gas}
- 9/326 . . . {Purge gas rings, i.e. devices for supplying or evacuating shielding gas inside of hollow or tubular articles, e.g. pipes, vessels}
- 9/327 . . {Means for transporting supplies (carriages in general [B23K 37/02](#))}
- 9/328 . . {Cleaning of weld torches, i.e. removing weld-spatter; Preventing weld-spatter, e.g. applying anti-adhesives}
- 10/00 Welding or cutting by means of a plasma**
- 10/003 . {Scarfig, desurfacing or deburring (by applying flames [B23K 7/06](#))}
- 10/006 . {Control circuits therefor (circuits for plasma torches [H05H 1/36](#))}
- 10/02 . Plasma welding
- 10/022 . . {Spot welding}
- 10/025 . . {by making use of electrode vibrations}
- 10/027 . . {Welding for purposes other than joining, e.g. build-up welding}
- 11/00 Resistance welding; Severing by resistance heating**
- 11/0006 . {the welding zone being shielded against the influence of the surrounding atmosphere (selection of media [B23K 35/38](#))}
- 11/0013 . {welding for reasons other than joining, e.g. build up welding}
- 11/002 . {specially adapted for particular articles or work}
- 11/0026 . . {Welding of thin articles}
- 11/0033 . . {Welding locally a thin plate to a large piece}
- 11/004 . . {Welding of a small piece to a great or broad piece}
- 11/0046 . . . {the extremity of a small piece being welded to a base, e.g. cooling studs or fins to tubes or plates}
- 11/0053 {Stud welding, i.e. resistive (with an arc [B23K 9/20](#))}
- 11/006 {Welding a tip to a base, e.g. pen point nibs}

- 11/0066 . . . {Riveting}
- 11/0073 . . {Butt welding of long articles advanced axially}
- 11/008 . . {Manufacturing of metallic grids or mats by spot welding}
- 11/0086 . . . {Grids or mats used in concrete structures
([B23K 11/11 takes precedence](#))}
- 11/0093 . . {Welding of honeycomb sandwich structures
(brazing of honeycomb sandwich structure
[B23K 1/0014](#))}
- 11/02 . Pressure butt welding
- 11/04 . Flash butt welding
- 11/043 . . {characterised by the electric circuits used therewith}
- 11/046 . . {Apparatus therefor}
- 11/06 . using roller electrodes
- 11/061 . . {for welding rectilinear seams}
- 11/062 . . . {for welding longitudinal seams of tubes}
- 11/063 {Lap welding}
- 11/065 . . {for welding curved planar seams}
- 11/066 . . . {of tube sections}
- 11/067 . . {for welding three-dimensional seams}
- 11/068 . . . {of helicoidal seams}
- 11/08 . Seam welding not restricted to one of the preceding subgroups
- 11/082 . . {of three-dimensional seams}
- 11/084 . . . {of helicoidal seams}
- 11/087 . . for rectilinear seams
- 11/0873 . . . {of the longitudinal seam of tubes}
- 11/0876 {Lap welding}
- 11/093 . . for curved planar seams
- 11/0935 . . . {of tube sections}
- 11/10 . Spot welding; Stitch welding
- 11/105 . . {Stitch welding}
- 11/11 . . Spot welding
- 11/115 . . . {by means of two electrodes placed opposite one another on both sides of the welded parts}
- 11/12 . . making use of vibrations
- 11/14 . Projection welding
- 11/16 . taking account of the properties of the material to be welded
- 11/163 . . {Welding of coated materials}
- 11/166 . . . {of galvanized or tinned materials}
- 11/18 . . of non-ferrous metals ([B23K 11/20 takes precedence](#))
- 11/185 . . . {of aluminium or aluminium alloys}
- 11/20 . . of different metals
- 11/22 . Severing by resistance heating
- 11/24 . Electric supply or control circuits therefor
- 11/241 . . {Electric supplies ([B23K 11/248 takes precedence](#))}
- 11/243 . . . {Multiple welding installations fed by one source}
- 11/245 . . . {using a stepping counter in synchronism with the welding pulses (electromagnetic counters
[G06M](#))}
- 11/246 . . . {for flash welding}
- 11/248 . . {Electric supplies using discharge tubes}
- 11/25 . Monitoring devices
- 11/251 . . . {using analog means}
- 11/252 . . . {using digital means}
- 11/253 {the measured parameter being a displacement or a position}
- 11/255 {the measured parameter being a force
([B23K 11/253 takes precedence](#))}
- 11/256 {the measured parameter being the inter-electrode electrical resistance}
- 11/257 {the measured parameter being an electrical current}
- 11/258 {the measured parameter being a voltage}
- 11/26 . . Storage discharge welding
- 11/28 . Portable welding equipment
- 11/30 . Features relating to electrodes (form or composition of electrodes [B23K 35/00](#))
- 11/3009 . . {Pressure electrodes}
- 11/3018 . . . {Cooled pressure electrodes}
- 11/3027 . . {Slide or drag electrodes}
- 11/3036 . . {Roller electrodes}
- 11/3045 . . . {Cooled roller electrodes}
- 11/3054 . . {Cooled electrodes ([B23K 11/3018](#),
[B23K 11/3045 take precedence](#))}
- 11/3063 . . {Electrode maintenance, e.g. cleaning, grinding}
- 11/3072 . . {Devices for exchanging or removing electrodes or electrode tips}
- 11/3081 . . {Electrodes with a seam contacting part shaped so as to correspond to the shape of the bond area, e.g. for making an annular bond without relative movement in the longitudinal direction of the seam between the electrode holder and the work}
- 11/309 . . {Wire electrodes}
- 11/31 . . Electrode holders {and actuating devices therefor}(not restricted to resistance welding or severing by resistance heating [B23K 37/02](#))
- 11/311 . . . {the actuating device comprising an electric motor}
- 11/312 . . . {for several electrodes}
- 11/314 . . . {Spot welding guns, e.g. mounted on robots}
- 11/315 {with one electrode moving on a linear path}
- 11/317 . . . {Equalizing; Balancing devices for electrode holders}
- 11/318 . . . {Supporting devices for electrode holders}
- 11/34 . Preliminary treatment
- 11/36 . Auxiliary equipment ([B23K 11/31 takes precedence](#))
- 11/362 . . {Contact means for supplying welding current to the electrodes}
- 11/364 . . . {Clamping contacts}
- 11/366 . . . {Sliding contacts}
- 11/368 . . . {Liquid contacts, e.g. mercury contacts}
- 13/00 Welding by high-frequency current heating**
- 13/01 . by induction heating
- 13/015 . . {Butt welding}
- 13/02 . . Seam welding
- 13/025 . . . {for tubes}
- 13/04 . by conduction heating {([B23K 13/02 takes precedence](#))}
- 13/043 . . {Seam welding}
- 13/046 . . . {for tubes}
- 13/06 . characterised by the shielding of the welding zone against influence of the surrounding atmosphere
(selection of media [B23K 35/38](#))
- 13/08 . Electric supply or control circuits therefor

Other welding or cutting; Working by laser beam**15/00 Electron-beam welding or cutting (electron- or ion-beam tubes [H01J 37/00](#))**

- 15/0006 . {specially adapted for particular articles}
- 15/0013 . {Positioning or observing workpieces, e.g. with respect to the impact; Aligning, aiming or focusing electronbeams}
- 15/002 . {Devices involving relative movement between electronbeam and workpiece}
- 15/0026 . {Auxiliary equipment}
- 15/0033 . {Preliminary treatment}
- 15/004 . {Tandem beams or torches, i.e. working simultaneously with several beams or torches}
- 15/0046 . {Welding}
- 15/0053 . . {Seam welding}
- 15/006 . . . {of rectilinear seams}
- 15/0066 . . . {with backing means disposed under the seams}
- 15/0073 . . . {with interposition of particular material to facilitate connecting the parts, e.g. using a filler}
- 15/008 . . {Spot welding}
- 15/0086 . . {welding for purposes other than joining, e.g. built-up welding}
- 15/0093 . . {characterised by the properties of the materials to be welded}
- 15/02 . Control circuits therefor
- 15/04 . for welding annular seams
- 15/06 . within a vacuum chamber ([B23K 15/04](#) takes precedence)
- 15/08 . Removing material, e.g. by cutting, by hole drilling
- 15/085 . . {Boring}
- 15/10 . Non-vacuum electron beam-welding or cutting

17/00 Use of the energy of nuclear particles in welding or related techniques**20/00 Non-electric welding by applying impact or other pressure, with or without the application of heat, e.g. cladding or plating**

- 20/001 . {by extrusion or drawing}
- 20/002 . {specially adapted for particular articles or work ([B23K 20/129](#) takes precedence)}
- 20/004 . . {Wire welding}
- 20/005 . . . {Capillary welding}
- 20/007 {Ball bonding}
- 20/008 . {pressure combined with radiant energy}
- 20/02 . by means of a press {; Diffusion bonding ([B23K 20/001](#), [B23K 20/04](#) take precedence)}
- 20/021 . . {Isostatic pressure welding}
- 20/023 . . {Thermo-compression bonding}
- 20/025 . . . {Bonding tips therefor}
- 20/026 . . . {with diffusion of soldering material}
- 20/028 . . {Butt welding}
- 20/04 . by means of a rolling mill
- 20/06 . by means of high energy impulses, e.g. magnetic energy
- 20/08 . . Explosive welding
- 20/085 . . . {for tubes, e.g. plugging}
- 20/10 . making use of vibrations, e.g. ultrasonic welding
- 20/103 . . {using a roller}
- 20/106 . . {Features related to sonotrodes}

- 20/12 . the heat being generated by friction; Friction welding
- 20/1205 . . {using translation movement}
- 20/121 . . {Control circuits therefor}
- 20/1215 . . {for other purposes than joining, e.g. built-up welding}
- 20/122 . . {using a non-consumable tool, e.g. friction stir welding}
- 20/1225 . . . {Particular aspects of welding with a non-consumable tool}
- 20/123 . . . {Controlling or monitoring the welding process}
- 20/1235 {with temperature control during joining}
- 20/124 {at the beginning or at the end of a weld}
- 20/1245 . . . {characterised by the apparatus}
- 20/125 {Rotary tool drive mechanism}
- 20/1255 {Tools therefor, e.g. characterised by the shape of the probe}
- 20/126 {Workpiece support, i.e. backing or clamping}
- 20/1265 . . . {Non-butt welded joints, e.g. overlap-joints, T-joints or spot welds}
- 20/127 . . . {friction stir welding involving a mechanical connection ([forged connections B21K 25/005](#); [riveted connections B21J 15/027](#))}
- 20/1275 . . . {involving metallurgical change}
- 20/128 . . . {making use of additional material}
- 20/1285 . . {Portable friction welding machines}
- 20/129 . . {specially adapted for particular articles or workpieces}
- 20/1295 . . . {Welding studs}
- 20/14 . Preventing or minimising gas access, or using protective gases or vacuum during welding ([formed by material interposed between workpieces B23K 20/18](#))
- 20/16 . with interposition of special material to facilitate connection of the parts, e.g. material for absorbing or producing gas
- 20/165 . . {involving an exothermic reaction of the interposed material}
- 20/18 . Zonal welding by interposing weld-preventing substances between zones not to be welded
- 20/20 . Special methods allowing subsequent separation, e.g. of metals of high quality from scrap material
- 20/22 . taking account of the properties of the materials to be welded
- 20/227 . . with ferrous layer
- 20/2275 . . . {the other layer being aluminium}
- 20/233 . . without ferrous layer
- 20/2333 . . . {one layer being aluminium, magnesium or beryllium}
- 20/2336 . . . {both layers being aluminium}
- 20/24 . Preliminary treatment
- 20/26 . Auxiliary equipment
- 23/00 Alumino-thermic welding**
- 25/00 Slag welding, i.e. using a heated layer or mass of powder, slag, or the like in contact with the material to be joined ([B23K 23/00](#) takes precedence; [submerged-arc welding B23K 9/18](#))**
- 25/005 . {Welding for purposes other than joining, e.g. built-up welding}

26/00 Working by laser beam, e.g. welding, cutting or boring**NOTES**

1. This subclass covers:
 - laser working for making a weakened layer, with or without removing material;
 - laser shock processing;
 - apparatus for laser surface treatment;
 - laser ablation.
2. This subclass does not cover:
 - laser assisted deposition which is covered by subclass [C23C](#);
 - laser sintering which is covered by group [B22F 3/105](#) for metallic powder, by group [B29C 67/04](#) for plastics, by group [C03B 19/06](#) for glass or by group [C04B 35/64](#) for ceramics;
 - laser assisted chemical etching which is covered by group [C23F 1/00](#).

26/0006	• {taking account of the properties of the material involved (B23K 26/32 , B23K 26/40 take precedence)}	26/0617	• {and with spots spaced along the common axis}
26/009	• {using a non-absorbing, e.g. transparent, reflective or refractive, layer on the workpiece (using a mask on the workpiece B23K 26/066)}	26/0619	• {with spots located on opposed surfaces of the workpiece}
26/0093	• {combined with mechanical machining or metal-working covered by other subclasses than B23K (combined welding or cutting procedures or apparatus B23K 28/02)}	26/062	• . . . by direct control of the laser beam
26/0096	• {Portable laser equipment, e.g. hand-held laser apparatus (surgical laser instruments A61B 18/20 , Dental Lasers A61C 1/0046 , Hand-held laser dental apparatus for curing resins A61C 19/004)}	26/0622	• by shaping pulses
26/02	• Positioning or observing the workpiece, e.g. with respect to the point of impact; Aligning, aiming or focusing the laser beam	26/0624	• {using ultrashort pulses, i.e. pulses of 1ns or less}
26/03	• . . Observing, e.g. monitoring, the workpiece	26/0626	• {Energy control of the laser beam (B23K 26/0622 takes precedence)}
26/032	• . . . {using optical means}	26/064	• . . . by means of optical elements, e.g. lenses, mirrors or prisms
26/034	• . . . {Observing the temperature of the workpiece}	26/0643	• {comprising mirrors}
26/0342	• . . . {Observing magnetic fields related to the workpiece}	26/0648	• {comprising lenses}
26/0344	• . . . {Observing the speed of the workpiece}	26/0652	• {comprising prisms}
26/035	• . . Aligning the laser beam (automatically B23K 26/042)	26/066	• by using masks
26/037	• . . . {by pressing on the workpiece, e.g. pressing roller foot}	26/0661	• {disposed on the workpiece}
26/04	• . . Automatically aligning, aiming or focusing the laser beam, e.g. using the back-scattered light	26/0665	• . . . {by beam condensation on the workpiece, e.g. for focusing}
26/042	• . . . Automatically aligning the laser beam	26/067	• . . . Dividing the beam into multiple beams, e.g. multifocusing
26/043	• {along the beam path, i.e. alignment of laser beam axis relative to laser beam apparatus}	26/0673	• {into independently operating sub-beams, e.g. beam multiplexing to provide laser beams for several stations}
26/044	• . . . Seam tracking	26/0676	• {into dependently operating sub-beams, e.g. an array of spots with fixed spatial relationship or for performing simultaneously identical operations}
26/046	• . . . Automatically focusing the laser beam	26/073	• . . . Shaping the laser spot
26/048	• {by controlling the distance between laser head and workpiece}	26/0732	• {into a rectangular shape}
26/06	• . . Shaping the laser beam, e.g. by masks or multi-focusing	26/0734	• {into an annular shape}
26/0604	• . . . {by a combination of beams}	26/0736	• {into an oval shape, e.g. elliptic shape}
26/0608	• {in the same heat affected zone [HAZ] (B23K 26/0613 , B23K 26/0619 take precedence)}	26/0738	• {into a linear shape}
26/0613	• {having a common axis (B23K 26/0619 takes precedence)}	26/08	• Devices involving relative movement between laser beam and workpiece
		26/082	• . . Scanning systems, i.e. devices involving movement of the laser beam relative to the laser head
		26/0821	• . . . {using multifaceted mirrors, e.g. polygonal mirror}
		26/0823	• . . {Devices involving rotation of the workpiece}
		26/083	• . . {Devices involving movement of the workpiece in at least one axial direction}
		26/0838	• . . . {by using an endless conveyor belt}
		26/0846	• {for moving elongated workpieces longitudinally, e.g. wire or strip material}
		26/0853	• . . . {Devices involving movement of the workpiece in at least in two axial directions, e.g. in a plane}
		26/0861	• {in at least in three axial directions}
		26/0869	• . . {Devices involving movement of the laser head in at least one axial direction}
		26/0876	• . . . {in at least two axial directions}
		26/0884	• {in at least in three axial directions, e.g. manipulators, robots}
		26/0892	• . . . {Controlling the laser beam travel length}
		26/10	• . . using a fixed support {, i.e. involving moving the laser beam}
		26/103	• . . . {the laser beam rotating around the fixed workpiece (B23K 26/28 takes precedence)}
		26/106	• {inside the workpiece}
		26/12	• . . in a special atmosphere, e.g. in an enclosure
		26/122	• . . in a liquid, e.g. underwater

- 26/1224 . . {in vacuum}
- 26/123 . . {in an atmosphere of particular gases}
- 26/125 . . . {of mixed gases}
- 26/126 . . {in an atmosphere of gases chemically reacting with the workpiece}
- 26/127 . . {in an enclosure}
- 26/128 . . . {Laser beam path enclosures}
- 26/14 . . using a fluid stream, e.g. a jet of gas, in conjunction with the laser beam; Nozzles therefor ([B23K 26/12 takes precedence](#))
- 26/142 . . for the removal of by-products
- 26/1423 . . {the flow carrying an electric current}
- 26/1435 . . {involving specially adapted flow control means}
- 26/1436 . . . {for pressure control}
- 26/1437 . . . {for flow rate control}
- 26/1438 . . . {for directional control}
- 26/144 . . the fluid stream containing particles, e.g. powder
- 26/146 . . the fluid stream containing a liquid
- 26/1462 . . {Nozzles; Features related to nozzles}
- 26/1464 . . . {Supply to, or discharge from, nozzles of media, e.g. gas, powder, wire}
- 26/147 {Features outside the nozzle for feeding the fluid stream towards the workpiece}
- 26/1476 {Features inside the nozzle for feeding the fluid stream through the nozzle}
- 26/1482 . . . {Detachable nozzles, e.g. exchangeable or provided with breakaway lines}
- 26/1488 . . . {Means for protecting nozzles, e.g. the tip surface ([by breakaway lines B23K 26/1482](#))}
- 26/1494 . . . {Maintenance of nozzles}
- 26/16 . . Removal of by-products, e.g. particles or vapours produced during treatment of a workpiece ([by a fluid stream B23K 26/142](#))
- 26/18 . . using absorbing layers on the workpiece, e.g. for marking or protecting purposes
- 26/20 . . Bonding ([soldering by means of radiant energy B23K 1/005](#); [joining of preformed plastics parts by heating using laser beam B29C 65/16](#))
- 26/206 . . {Laser sealing}
- 26/21 . . by welding
- 26/211 . . . with interposition of special material to facilitate connection of the parts
- 26/22 . . . Spot welding
- 26/24 . . . Seam welding
- 26/242 Fillet welding, i.e. involving a weld of substantially triangular cross section joining two parts
- 26/244 Overlap seam welding
- 26/26 of rectilinear seams
- 26/262 of longitudinal seams of tubes
- 26/28 of curved planar seams
- 26/282 of tube sections
- 26/30 of three-dimensional seams
- 26/302 of helicoidal seams
- 26/32 . . taking account of the properties of the material involved
- 26/322 . . . involving coated metal parts ([using absorbing layers on the workpiece B23K 26/18](#))
- 26/323 . . . involving parts made of dissimilar metallic material
- 26/324 . . . involving non-metallic parts
- 26/34 . . Laser welding for purposes other than joining
- 26/342 . . Build-up welding
- 26/346 . . in combination with welding or cutting covered by groups [B23K 5/00](#) - [B23K 25/00](#), e.g. in combination with resistance welding
- 26/348 . . in combination with arc heating, e.g. TIG [tungsten inert gas], MIG [metal inert gas] or plasma welding ([laser beam for starting a welding or cutting arc B23K 9/067](#))
- 26/351 . . for trimming or tuning of electrical components
- 26/352 . . for surface treatment
- 26/354 . . by melting
- 26/355 . . {Texturing}
- 26/356 . . by shock processing
- 26/3568 . . {Modifying rugosity}
- 26/3576 . . . {Diminishing rugosity, e.g. grinding; Polishing; Smoothing}
- 26/3584 . . . {Increasing rugosity, e.g. roughening}
- 26/359 . . by providing a line or line pattern, e.g. a dotted break initiation line
- 26/36 . . Removing material ([B23K 26/55](#), [B23K 26/57 take precedence](#))
- 26/361 . . for deburring or mechanical trimming ([B23K 26/351 takes precedence](#))
- 26/362 . . Laser etching
- 26/364 . . . for making a groove or trench, e.g. for scribing a break initiation groove
- 26/38 . . by boring or cutting
- 26/382 . . . by boring
- 26/384 of specially shaped holes
- 26/386 of blind holes
- 26/388 Trepanning, i.e. boring by moving the beam spot about an axis
- 26/389 {of fluid openings, e.g. nozzles, jets ([laser machining of inkjet nozzles B41J 2/1634](#))}
- 26/40 . . taking account of the properties of the material involved
- 26/402 . . . involving non-metallic material, e.g. isolators
- 26/50 . . Working by transmitting the laser beam through or within the workpiece
- 26/53 . . for modifying or reforming the material inside the workpiece, e.g. for producing break initiation cracks
- 26/55 . . for creating voids inside the workpiece, e.g. for forming flow passages or flow patterns
- 26/57 . . the laser beam entering a face of the workpiece from which it is transmitted through the workpiece material to work on a different workpiece face, e.g. for effecting removal, fusion splicing, modifying or reforming
- 26/60 . . Preliminary treatment
- 26/70 . . Auxiliary operations or equipment
- 26/702 . . {Auxiliary equipment}
- 26/703 . . . {Cooling arrangements ([by using a fluid stream B23K 26/14](#))}
- 26/704 . . . {Beam dispersers, e.g. beam wells}
- 26/705 . . . {Beam measuring device}
- 26/706 . . . {Protective screens}
- 26/707 . . . {for monitoring laser beam transmission optics}
- 28/00 **Welding or cutting not covered by any of the preceding groups, e.g. electrolytic welding**
- 28/003 . . {Welding in a furnace}

28/006	. {Welding metals by means of an electrolyte (working metal, e.g. cutting, by means of an electrolyte B23H)}	35/025	. . . . {Pastes, creams, slurries}
28/02	. Combined welding or cutting procedures or apparatus	35/0255	. . {for use in welding (B23K 35/0205 takes precedence)}
31/00	Processes relevant to this subclass, specially adapted for particular articles or purposes, but not covered by only one of the preceding main groups (making tubes or profiled bars involving operations other than soldering or welding B21C 37/04, B21C 37/08)	35/0261	. . . {Rods, electrodes, wires}
31/003	. {relating to controlling of welding distortion}	35/0266	. . . . {flux-cored}
31/006	. {relating to using of neural networks}	35/0272	. . . . {with more than one layer of coating or sheathing material}
31/02	. relating to soldering or welding (dip or wave soldering in the manufacture of printed circuits H05K 3/34)	35/0277	. . . . {of non-circular cross-section}
31/022	. . {Making profiled bars with soldered or welded seams}	35/0283	. . . . {multi-cored; multiple}
31/025	. . {Connecting cutting edges or the like to tools; Attaching reinforcements to workpieces, e.g. wear-resisting zones to tableware}	35/0288	. . . {Welding studs}
31/027	. . {Making tubes with soldering or welding}	35/0294	. . . {Consumable guides}
31/10	. relating to cutting or desurfacing	35/22	. characterised by the composition or nature of the material
31/12	. relating to investigating the properties, e.g. the weldability, of materials	35/222	. . {Non-consumable electrodes}
31/125	. . {Weld quality monitoring}	35/224	. . {Anti-weld compositions; Braze stop-off compositions}
33/00	Specially-profiled edge portions of workpieces for making soldering or welding connections; Filling the seams formed thereby {(B23K 11/14 takes precedence)}	35/226	. . {Non-corrosive coatings; Primers applied before welding}
33/002	. {Crimping or bending the workpieces at the joining area}	35/228	. . {Selection of materials for cutting}
33/004	. {Filling of continuous seams}	35/24	. . Selection of soldering or welding materials proper (B23K 35/34 takes precedence)
33/006	. . {for cylindrical workpieces}	35/26	. . . with the principal constituent melting at less than 400 degrees C
33/008	. . {for automotive applications}	35/262	. . . . {Sn as the principal constituent}
35/00	Rods, electrodes, materials, or media, for use in soldering, welding, or cutting	35/264	. . . . {Bi as the principal constituent}
35/001	. {Interlayers, transition pieces for metallurgical bonding of workpieces}	35/266	. . . . {Cd as the principal constituent}
35/002	. . {at least one of the workpieces being of light metal}	35/268	. . . . {Pb as the principal constituent}
35/004	. . {at least one of the workpieces being of a metal of the iron group}	35/28	. . . with the principal constituent melting at less than 950 degrees C
35/005	. . {at least one of the workpieces being of a refractory metal}	35/282	. . . . {Zn as the principal constituent}
35/007	. . {at least one of the workpieces being of copper or another noble metal}	35/284	. . . . {Mg as the principal constituent}
2035/008	. . {at least one of the workpieces being of silicium}	35/286	. . . . {Al as the principal constituent}
35/02	. characterised by mechanical features, e.g. shape	35/288	. . . . {with Sn or Zn}
35/0205	. . {Non-consumable electrodes; C-electrodes}	35/30	. . . with the principal constituent melting at less than 1550 degrees C
35/0211	. . {for use in cutting (B23K 35/0205 takes precedence)}	35/3006	. . . . {Ag as the principal constituent}
35/0216	. . . {Rods, electrodes, wires}	35/3013	. . . . {Au as the principal constituent}
35/0222	. . {for use in soldering, brazing (B23K 35/0205 takes precedence)}	35/302	. . . . {Cu as the principal constituent}
35/0227	. . . {Rods, wires (B23K 35/0244 takes precedence)}	35/3026	. . . . {Mn as the principal constituent}
35/0233	. . . {Sheets, foils (B23K 35/0244 takes precedence)}	35/3033	. . . . {Ni as the principal constituent}
35/0238	. . . . {layered}	35/304	. . . . . {with Cr as the next major constituent}
35/0244	. . . {Powders, particles or spheres; Preforms made therefrom}	35/3046	. . . . {Co as the principal constituent}
		35/3053	. . . . {Fe as the principal constituent}
		35/306	. . . . . {with C as next major constituent, e.g. cast iron}
		35/3066	. . . . . {with Ni as next major constituent}
		35/3073	. . . . . {with Mn as next major constituent}
		35/308	. . . . . {with Cr as next major constituent}
		35/3086	. . . . . {containing Ni or Mn}
		35/3093	. . . . . {with other elements as next major constituents}
		35/32	. . . with the principal constituent melting at more than 1550 degrees C
		35/322	. . . . {a Pt-group metal as principal constituent}
		35/325	. . . . {Ti as the principal constituent}
		35/327	. . . . {comprising refractory compounds, e.g. carbides}
		35/34	. . comprising compounds which yield metals when heated

35/36	. . Selection of non-metallic compositions, e.g. coatings, fluxes (B23K 35/34 takes precedence); Selection of soldering or welding materials, conjoint with selection of non-metallic compositions, both selections being of interest (selection of soldering or welding materials proper B23K 35/24)	37/0229	. . . {the guide member being situated alongside the workpiece}
35/3601	. . . {with inorganic compounds as principal constituents}	37/0235	. . . {the guide member forming part of a portal}
35/3602	. . . . {Carbonates, basic oxides or hydroxides}	37/0241	. . {Attachments between the welding or cutting element and the carriage}
35/3603	. . . . {Halide salts}	37/0247	. . {Driving means}
35/3605	. . . . . {Fluorides}	37/0252	. . {Steering means}
35/3606	. . . . {Borates or B-oxides}	37/0258	. . {Electric supply or control circuits therefor}
35/3607	. . . . {Silica or silicates}	37/0264	. . {magnetically attached to the workpiece}
35/3608	. . . . {Titania or titanates}	37/027	. . {for making circular cuts or welds}
35/361	. . . . {Alumina or aluminates}	37/0276	. . {for working on or in tubes (B23K 37/0211 takes precedence)}
35/3611	. . . . {Phosphates}	37/0282	. . {Carriages forming part of a welding unit}
35/3612	. . . {with organic compounds as principal constituents}	37/0288	. . {Carriages forming part of a cutting unit}
35/3613	. . . . {Polymers, e.g. resins}	37/0294	. . {Transport carriages or vehicles}
35/3615	. . . . {N-compounds}	37/04	. for holding or positioning work
35/3616	. . . . {Halogen compounds}	37/0408	. . {for planar work}
35/3617	. . . . {B-compounds}	37/0417	. . {for spherical work}
35/3618	. . . . {Carboxylic acids or salts}	37/0426	. . {Fixtures for other work}
35/362	. . . Selection of compositions of fluxes (B23K 35/365 , B23K 35/368 take precedence)	37/0435	. . . {Clamps}
35/365	. . . Selection of non-metallic compositions of coating materials either alone or conjoint with selection of soldering or welding materials	37/0443	. . . . {Jigs}
35/368	. . . Selection of non-metallic compositions of core materials either alone or conjoint with selection of soldering or welding materials	37/0452	. . . {Orientable fixtures (B23K 37/0461 takes precedence)}
35/38	. . Selection of media, e.g. special atmospheres for surrounding the working area	37/0461	. . {Welding tables}
35/383	. . . {mainly containing noble gases or nitrogen}	37/047	. . moving work to adjust its position between soldering, welding or cutting steps (B23K 37/053 takes precedence)
35/386	. . . {for condensation soldering}	37/053	. . aligning cylindrical work; Clamping devices therefor
35/40	. Making wire or rods for soldering or welding (processes involving a single technical art, see the relevant subclasses, e.g. B05D, B21C)	37/0531	. . . Internal pipe alignment clamps
35/402	. . {Non-consumable electrodes; C-electrodes}	37/0533	. . . External pipe alignment clamps
35/404	. . {Coated rods; Coated electrodes}	37/0535	. . . Longitudinal pipe seam alignment clamps
35/406	. . {Filled tubular wire or rods (B23K 35/402 takes precedence)}	37/0536	. . . for maintaining flanges on tubes
2035/408	. . . {with welded longitudinal seam}	37/0538	. . . for rotating tubes, e.g. rollers
37/00	Auxiliary devices or processes, not specially adapted for a procedure covered by only one of the other main groups of this subclass ({laser protective screens B23K 26/706}; eye-shields for welders worn on the operator's body or carried in the hand A61F 9/00; applicable to metal-working machines other than soldering, welding, or flame-cutting machines B23Q; other protective shields F16P 1/06)	37/06	. for positioning the molten material, e.g. confining it to a desired area
37/003	. Cooling means for welding or cutting	37/08	. for flash removal
37/006	. Safety devices for welding or cutting	2101/00	Articles made by soldering, welding or cutting
37/02	. Carriages for supporting the welding or cutting element	2101/001	. {Turbines}
37/0205	. . {guided by hand}	2101/002	. {Drill-bits}
37/0211	. . {travelling on a guide member, e.g. rail, track}	2101/003	. {Pistons}
37/0217	. . . {the guide member being fixed to the workpiece}	2101/005	. {Camshafts}
37/0223	. . . . {the guide member being a part of the workpiece}	2101/006	. {Vehicles}
		2101/007	. {Marks, e.g. trade marks}
		2101/008	. {Gears}
		2101/02	. Honeycomb structures
		2101/04	. Tubular or hollow articles
		2101/045	. . {Hollow panels}
		2101/06	. . Tubes
		2101/08	. . . finned or ribbed
		2101/10	. . Pipe-lines
		2101/12	. . Vessels
		2101/125	. . . {Cans}
		2101/14	. . Heat exchangers
		2101/16	. Bands or sheets of indefinite length
		2101/18	. Sheet panels
		2101/185	. . {Tailored blanks}
		2101/20	. Tools
		2101/22	. Nets, wire fabrics or the like
		2101/24	. Frameworks
		2101/26	. Railway- or like rails

- 2101/28 . Beams
- 2101/30 . Chains, hoops or rings
- 2101/32 . Wires
- 2101/34 . Coated articles {, e.g. plated or painted; Surface treated articles}
- 2101/35 . . {Surface treated articles}
- 2101/36 . Electric or electronic devices
- 2101/38 . . Conductors
- 2101/40 . . Semiconductor devices
- 2101/42 . . Printed circuits
- 2103/00 Materials to be soldered, welded or cut**
- 2103/02 . Iron or ferrous alloys
- 2103/04 . . Steel or steel alloys
- 2103/05 . . . {Stainless steel}
- 2103/06 . . Cast-iron alloys
- 2103/08 . Non-ferrous metals or alloys
- 2103/10 . . Aluminium or alloys thereof
- 2103/12 . . Copper or alloys thereof
- 2103/14 . . Titanium or alloys thereof
- 2103/15 . . {Magnesium or alloys thereof}
- 2103/16 . Composite materials {, e.g. fibre reinforced}
- 2103/166 . . {Multilayered materials}
- 2103/172 . . . {wherein at least one of the layers is non-metallic}
- 2103/18 . Dissimilar materials
- 2103/20 . . Ferrous alloys and aluminium or alloys thereof
- 2103/22 . . Ferrous alloys and copper or alloys thereof
- 2103/24 . . Ferrous alloys and titanium or alloys thereof
- 2103/26 . . {Alloys of Nickel and Cobalt and Chromium}
- 2103/30 . {Organic material}
- 2103/32 . . {Material from living organisms, e.g. skins}
- 2103/34 . . . {Leather}
- 2103/36 . . {Wood or similar materials}
- 2103/38 . . {Fabrics, fibrous materials}
- 2103/40 . . {Paper}
- 2103/42 . . {Plastics ([B23K 2103/16](#) takes precedence)}
- 2103/50 . {Inorganic material, e.g. metals, not provided for in [B23K 2103/02](#) – [B23K 2103/26](#)}
- 2103/52 . . {Ceramics}
- 2103/54 . . {Glass}
- 2103/56 . . {semiconducting}