Glossary
of
Ironwork Terms

NHIG
National Heritage Ironwork Group

Cover:
Detail of recently restored 18th Century Hampton Court 'screen' (which see in this glossary) by Jean Tijou.

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Peter Parkinson is a retired artist blacksmith, now living in Cornwall and still making small pieces of work. He studied at the Royal College of Art and worked as a designer in London Transport Architect's Department, and Allied Ironfounders, before becoming a Senior Lecturer at the University College of the Creative Arts in Farnham, for 25 years, latterly developing and teaching on a BA (Hons) course involving studies in blacksmithing, silversmithing and jewellery.

He left Farnham in 1992 to run his own business in Hampshire, designing and making forged architectural metalwork and public art, installed in many cities in Britain, including Basingstoke, Blackburn, Bradford, Crawley, Dorking, Guildford, Leicester, Leatherhead, London, Middlesbrough and Portsmouth. He has been involved in teaching, judging and lecturing at blacksmithing events in the UK, Belgium, Italy, Sweden and America.

He has written books on blacksmithing and sculptural metalwork and continues to write articles for Artist Blacksmith magazine, the journal of the British Artist Blacksmiths Association.

About the contributing author

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He set up as a self employed blacksmith having completed an HND at Herefordshire College of Art, specialising in reproductions of period ironwork for museums, heritage sites and exhibitions in Europe and America.

He taught blacksmithing at Hereford for 13 years before retiring in 2016.

About the NHIG

The National Heritage Ironwork Group (NHIG) was formed in 2009 to raise awareness and promote understanding of heritage ironwork in the historic environment.

Traditional forged and cast ironwork is an important and integral part of the historic environment, used widely in structural, architectural and functional applications.

The NHIG intends to set up a nationally accredited training and development programme to ensure that the skills of the Heritage Ironworker and Blacksmith are recognised, preserved and promoted.

It is the duty of all professionals and practitioners to promote good conservation practice in order to safeguard the long term survival and integrity of heritage ironwork. This document has been developed to help owners, professionals, blacksmiths, and conservation metalworkers to uphold best practice in the care of heritage ironwork.

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Preface

The purpose of this Glossary is to provide a reference, defining words to make it possible for more precise and relevant conservation tenders to be written; and assisting conversations between blacksmiths, architects, commissioners and others by offering clearly defined terminology. It may also enable others to better appreciate and understand what is involved in the work.

The Glossary is available on the NHIG website, at nhig.org.uk, and it may be consulted by anyone involved in commissioning, tendering or specifying conservation and restoration work, or simply interested in blacksmithing.

The words and terminology necessary to the Glossary cover a number of distinct specialisms. These include terms relating to blacksmithing practice, conservation, art history, engineering, metallurgy, welding, corrosion treatment, metal-finishing and architecture. So the Glossary is something of a language mongrel. Each of those specialisms has its own more detailed vocabulary.

Metalworking and art and architectural history for example, span millennia so it is no surprise that terminology has changed over time, or that the same word has come to mean many different things. For example the word 'Forge' has at four distinct meanings. As it stands, this Glossary is work in progress – and it always will be, as the craft develops and new processes and terms come into use.

Peter Parkinson, November 2017

NOTE: *'Hist.' indicates a historic term, no longer in common usage.*

Acanthus leaf A classic ancient decorative motif deriving from the leaf of the Mediterranean acanthus plant.

Alloy A mixture of metals, or a mixture of metal and nonmetallic elements. In practice, most metals are used as alloys.

Anchor points Connections between the ironwork and the ground or stonework.

Andirons Stands, used in a hearth to support a fire grate or to support burning logs.

Angle grinder A hand electric tool with detachable discs for grinding, cutting, shaping and refining surfaces, wire brushing, and paint stripping.

Angle iron An iron or steel section rolled to a right angle.

Anneal Heat treating metal to reduce its hardness and relieve internal stresses.

Anthemion A classic decorative motif derived from the opening honeysuckle flower.

Anvil The massive iron or steel tool on which a blacksmith hammers hot metal to shape. Most anvils have a long conical 'bick' or 'beak' at one end and a long flat working 'face', with a square hardie hole. In Britain a 'London pattern' anvil has a long rectangular flat face, with small flat 'table' between this and its tapered beak. A 'Portsmouth pattern' has a long face tapering to a narrow end, and a tapered beak.

Anvil tools Tools with a square shank, designed to fit the hardie hole of an anvil. Collectively these are known as 'bottom tools'. *See 'Top and bottom tools'.*

Arcade or arcading A decorative device involving repeated arch forms, either structural and decorative as in a freestanding covered walk, or purely decorative as a flat pattern.

Arris The sharp corner of a metal section, where two surfaces meet. Square section railing uprights, made with this corner facing out, are described as 'set on the arris'.

Back bar *See Back stile.*

Back stay A stay or bracket, often used to provide rigidity to a fence or a run of railings, providing an angled bracing piece between the railing and the ground.

Back stile The vertical bar of a gate frame, on which it hinges. Since this carries the weight and pivoting load of the gate, it is usually the heaviest bar in the structure. *See also Stile.*

Baluster One of a series of vertical supporting elements of a balustrade.

Balustrade A series of balusters topped by a rail, guarding the edge of a staircase or drop.

Bandsaw A workshop machine employing a continuous flexible saw blade. Capable of making both straight and curved cuts.

Banister or Bannister *See Balustrade.*

Bar A length of solid metal of a particular section – e.g. round bar, square bar, rectangular bar, flat bar, hexagonal bar, octagonal bar etc. *See also Rod and Strip.*

Baroque An elaborate decorative style rather than a historic period. Originating in Italy in the early 1600s, it used curving lines and architectural elements applied as ornament.

Bead 1) A narrow continuous edging applied to a plate or panel, often in the form of a semi-circular section.

2) The visible run of weld metal in a joint is referred to as a 'weld bead'.

Beading A decorative moulding with the appearance of a row of beads.

Bearing The component in which a pin or shaft rotates or slides. If the pressure on the bearing is at right angles to the axis of the shaft, it is a 'journal' bearing, If the pressure is parallel to the axis of the shaft and the end of the shaft sits in the bearing, it is a 'pivot' bearing. *See Journal and Pivot.*

Bench vice Vice bolted to a workbench with parallel jaws operated by a screw. Sometimes called an engineer's vice.

Bench work Work carried out cold at the bench, filing, drilling and sawing, for example.

Best Iron Puddled iron bars having been twice refined from muck bar. Usually stamped 'best' with a crown.

Bevel 1) An angled face, often at 45°, refining a sharp, right-angled edge.

2) A tool with adjustable, pivoted arms used to set out an angle.

Bezel A frame or rim used for example, to retain the glass over a clock face.

Bick or beak The round, tapering projection at one end of an anvil.

Billet 1) The initial mass of metal to be processed to size and section, in a rolling mill. This may also be known as an Ingot.

2) A short compact piece of metal.

Bird's mouth The concave shape formed in the end of a bar or tube to accept the profile of a round bar fitted to it at right angles.

Bit The jaws of blacksmithing tongs. For example the tongs with plain flat jaws are described as 'flat bit tongs'.

Black mild steel Low carbon steel, hot rolled to the required section. The heat leaves a dark grey or 'black' oxide coating. Widely used by blacksmiths. *See also Bright mild steel.*

Blacksmith A skilled, creative craftsperson, who hot forges iron, steel and other metals. Often shortened to 'smith'. *See Smith.*

Blast furnace A large furnace in which iron ore is reduced to iron metal in contact with burning coke, or historically with charcoal. Heat is achieved by blowing large volumes of air into the furnace. Ore, coke and limestone flux are fed into the top, and metal and slag are tapped periodically out at the bottom. The product is pig iron containing up to 4% carbon.

Blockings The swelling at the edges of a bar produced when metal is displaced by hot punching a hole. This usually rounded form may be forged to produce 'square blockings'.

Bloomery, Bloom *Hist.* Works or hearth where wrought iron was manufactured by direct reduction from iron ore, using charcoal as fuel, operating at below the melting point of the metal. The 'bloom' is the incandescent mass of raw wrought iron from the furnace prior to forging into a billet. *See also Finery and Chafery.*

Blower Mechanical fan used to blow blacksmith's fire.

Bolster A tool usually used over the hardie hole of an anvil to avoid undesirable distortion when a drift is driven through a hole in a workpiece.

Bolt 1) A fixing comprising a headed shank, threaded part way to accept a nut, or to fit a threaded hole. The plain length of the shank is intended to match the thickness of the material being fixed. A similar fixing threaded for its entire length is called a Machine screw.

2) A sliding latch, used horizontally or vertically, to secure doors and gates to a post, a frame or each other. A 'drop bolt' slides vertically to engage in a ground socket, to secure a door or gate in an open or closed position. *See Drop bolt.*

Bosh Water tank for cooling the tuyere of a side-blown forge. *See Tuyere.*

Bracket A linking element between components. A bracket may be used to reinforce a right-angled joint, or link components at other angles. A right angled bracket fixed to a vertical surface provides the support for a horizontal shelf. A bracket may be a single piece of metal or an elaborate decorative construction serving the same purpose. *See also Hanging bracket.*

Brass Strictly defined as an alloy of copper and zinc. A good forging grade of brass is 60% copper and 30% zinc. Gilding metal, 'red brass', is 90-95% copper and 10-5% zinc. Some brasses are confusingly called 'bronze'. Manganese bronze is an example.

Brazing A form of hard soldering using a brass (copper/zinc alloy) filler rod, and an appropriate flux, melting at between 800°C- 900°C, to join other metals, particularly steel. The term is now applied to a wide variety of different, non-brass alloys, formulated to solder a variety of metals.

Bright mild steel Black mild steel with the oxide coating removed and the section cold rolled or drawn through a die. The result is work-hardened metal with a more precise section and a bright surface. Once heated in a forge fire, the bright surface returns to a 'black' colour.

Bronze Strictly an alloy of copper and tin, but a variety of copper alloys may be called 'bronze', some containing no tin at all. Silicon bronze and aluminium bronze are examples.

Burr A thin, undesirable rough or sharp edge left after filing, cutting or drilling metal.

Calliper A tool for measuring either internal or external lengths, employing two pivoted legs. *See also Vernier calliper.*

Candelabra A multi-branch candleholder.

Candelabrum A holder for a single candle.

Candleholder A holder for candles.

Candlestick As candelabrum.

Carbon A nonmetallic element. Small percentages are critical to the strength of steels.

Carbon steel All steels contain carbon, but in common usage 'carbon steel' refers to medium to high carbon steels, without additional alloy elements. Low carbon steel contains up to 0.25% carbon; medium carbon steels contain 0.25% to 0.45% carbon; high carbon steels contain 0.45% to 1.5% carbon.

Carbide tipped tools These employ small, hard tungsten carbide 'tips' providing the cutting edges, to improve performance when working hard and abrasive materials including masonry, and to extend tool life when cutting other materials. Tools include drill bits, circular and straight saw blades and lathe tools.

Cartouche A plaque with rolled edges, sometimes used on gates and overthrows to frame coats of arms.

Caryatid *Hist.* A column, of which the upper part reflects the human form, used as a support.

Case hardening A heat treatment process to produce a higher carbon skin on low carbon steel or iron. Quenching, hardens this layer, producing a thin hard skin, leaving the body of the metal still soft.

Cast iron A family of iron and carbon alloys with 2 - 4% carbon. Used for casting. Heat treatment allows some cast iron to be converted to malleable iron, capable of being bent.

Casting 1) *noun* – An object produced by a casting process – molten metal formed in a mould. Iron is cast in various kinds of sand mould. Lower melting point metals, such as aluminium or zinc alloys may also be cast in steel dies. A process known as 'die-casting'.

2) *verb* – The act of making a casting.

Caulk *(verb)* The act of ramming and consolidating material into a gap or joint. Lead wool may be consolidated in a joint to secure a component in place. Molten lead poured into a cavity in masonry to secure a fixing, is caulked to consolidate the lead after cooling.

Caulking *(noun)* Material used to caulk a joint.

Caulking tool Or 'caulking iron'. A hand tool, similar in appearance to a cold chisel but with a flat end. Used to caulk lead into a joint. The shank may be offset to assist access.

Centre punch A hand tool with a hardened steel point, driven with a hammer and used to mark the location for a drilled hole or other detail in a metal component. Automatic centre punches are driven by a spring mechanism, using hand pressure.

Chafery *Hist.* Works or hearth where charcoal iron bars were forged to shape from billets, for use or re-sale for further forging. *See Charcoal iron.*

Chalk Blacksmiths use French chalk for workshop purposes, in part because it is stable on hot metal. *See French chalk.*

Chamfer A bevelled edge. *See Bevel.*

Charcoal iron Wrought iron manufactured in intimate contact with charcoal fuel. Describes all malleable irons manufactured by the methods in use prior to the invention of the puddling process. *See also Wrought iron, Bloomery, Finery and Chafery.*

Channel A rolled steel section which is 'U' shaped.

Charlin *Hist. See pin.*

Chevron A zigzag pattern, used as embellishment or decoration. Frequently used in Norman architecture, and seen in ironwork to tombs in cathedrals.

Chisel For blacksmiths, a solid metal tool to be driven by a hammer for cutting metal, hot or cold. *See also Hot set, and Hardie*

CHS Circular Hollow Section. Structural steel tube.

Chop-saw An electric machine employing a large thin rotary grinding disc mounted over a vice, and pivoted down by the operator to cut off lengths of iron or steel bar.

Circular saw A saw with a rotating circular blade, used to cut off lengths of metal bar.

Clamp A tool to hold and secure components, often temporarily, to facilitate assembly. Most involve a screw mechanism, but clamps vary widely in size and configuration.

Clapper bar *Hist. See Slam bar.*

Clevis pin *See Pin.*

Clip *See Collar.*

Cloth of estate *Hist.* A tasselled and fringed cloth in folds, usually present in ironwork as a repoussé panel.

CNC Computer Numerical Controlled. Applying to machine tools of various kinds. A term less often used today than 'digital' or 'computer controlled'.

Coach bolts A usually heavy and secure fixing, threaded part way to take a nut, often with a blank mushroom head with a square shoulder underneath. Used for fixing timber. The square shoulder bites into the timber, preventing rotation. Due to the blank mushroom head the bolt can only be unscrewed with access to the nut.

Coach screws Usually heavy fixings threaded part way for screwing into timber. Traditionally with a square head form, but today usually hexagonal.

Coatings Numerous protective or cosmetic coatings are applied to metals, particularly iron and steel. These include metal primers, numerous paint types, electroplating, powder coating, zinc spraying and galvanizing. Waxes and lacquers are applied to metals for indoor protection. *See also Corrosion.*

Cold chisel A hardened steel chisel shaped and sharpened to cut cold steel.

Cold rolled *(adjective)* Metal sheet and plate rolled cold between polished or textured rollers to impart a particular surface. The cold rolling of steel bar can be used to impart a bright, smooth surface. *See also Hot rolled and Rolling mill.*

Collar Also called a 'clip'. A forged metal band pre-shaped to hold two or more components together, side by side. The collar is heated, opened to enable it to be fitted, then clenched in position red hot, using clip or bow tongs and/or tightened in place with a hammer. As the collar cools it contracts, creating a firm joint.

Cone mandrel A sometimes large conical cast iron former, over which different size rings and curves can be dressed to shape.

Conservation Measures and actions aimed at safeguarding cultural heritage items, while ensuring their accessibility to present and future generations. Measures should respect the significance and the physical properties of each item. *See also Preventive Conservation, and Remedial Conservation.*

Copper The familiar, heavy, reddish metal, widely used for electric wiring, water pipes and roof sheeting. Its colour and malleability lends it to decorative applications.

Coquillage *Hist.* A shell ornament.

Core rail The flat bar which follows the line of the string of a staircase. A core rail provides the template and support for a timber or metal handrail. *See String.*

Corrosion The conversion of metal into metal oxides, sulphides and salts, eating away the metal, when exposed to both atmospheric air and water. The corrosion products of iron and steel are physically larger than the metal they replace, so they expand and fall off, allowing more metal to corrode. Conversely, the oxides created by corrosion on stainless steels and aluminium form a protective layer, inhibiting further corrosion. *See also Galvanic corrosion.*

Cotter pin A tapered pin usually used to lock a component to a shaft (e.g. a bicycle crank) or driven transversely through a larger pin such as a clevis pin or shaft to secure it.

Corrosion protection A broad category covering many different systems. Many involve coating the metal with waxes, paints, lacquers, plastics, or metals less likely to corrode. Since corrosion occurs when both water and oxygen is present, the avoidance of water traps, joints and crevices, is also important.

Countersink The bevelled mouth of a hole, corresponding to the head of a countersunk screw, allowing it to be fitted flush. A Countersink is also the shaped drill bit, used to bevel the hole.

Creasing *(verb)* Making a long sharp bend, usually in sheet metal.

Crenellation *Hist.* A repeated pattern of square blocks and indentations, similar in form to battlements. The solid section is called a 'merlon' and the open section an 'embrasure'.

Cresting *(noun)* A decorative element attached to the tops of gates or overthrows.

'C' Scroll A forged element comprising a pair of scrolls forming the shape of a letter 'C'.

Crimping tool or Stake An anvil tool with a rounded concave form, used to forge a wavy edge or crimp.

Crowning Decorative elements attached to the top of a pilaster, post or standard.

Crown Iron Puddled wrought iron having been once refined from a muck bar, usually stamped with a crown. Another refining by piling, welding and rolling produced best iron. Still further refining resulted in double best or best best iron. *See Muck bar and Best iron.*

Crucible Refractory container of fireclay or graphite used to transfer molten metal from furnace to mould.

Cutting oil A special oil and water mixture widely used for lubricating the cutters of machine tools, to improve their performance and cool the workpiece.

Cypher A monogram comprising initial letters designed to form a decorative ironwork element. Often used to record a family name in the overthrow of a traditional gate.

D

Damascening *(noun)* A technique for decorating the surface of iron or steel with a fine wavy pattern often inlaid with precious metal.

Damascus steel A confusing term. Not steel from Damascus, or damascened steel. Now often used to describe what might better be known as 'pattern welded steel'. Layers of iron and steels fire-welded together, to produce a pattern which runs through the thickness of the metal. Now used for decorative purposes, this originally served to provide the hardness of steel and the resilience of iron in edge tools and weapons.

Die 1) A concave tool used as a mould to create a particular form in hot metal. For example, tools used to form balls, beads, acorns and other decorative shapes.

2) A precision tool used to cut a particular external screw thread in cold metal.

Direct reduced iron Wrought iron produced in a bloomery furnace in which the ore and charcoal were intimately mixed. *See Bloomery*

Dividers A hand tool with two pivoted legs, ending in sharp points. Used to scribe circles, measure distances and set out repeated measurements.

Dog bars the short vertical bars, set in between the main uprights of a traditional gate, narrowing the spaces through which a small dog might otherwise escape.

Dovetail joint A wedge shape formed on the end of a bar, attached by the narrow end, fitting into a corresponding hollow form to create a connection. The dovetail will tighten under longitudinal loads, but may be undone by pulling sideways.

Dowel pin *See pin.*

Drawing down Tapering. The act of progressively reducing the size of a metal section along a bar, by hammering.

Draw filing Filing by holding the file in both hands at right angles, for example to the flat face of a square bar, working it back and forwards to achieve a fine surface.

Drift A tapered tool of a particular section hammered through a punched or cut hole to refine its shape and size. The drift may be hardened or is often made from mild steel. *See Punching.*

Drill A rotary cutting tool for making holes, hand or power operated. A Drill bit provides the cutting action.

Drip pan The part of a candleholder designed to catch any overflow of wax.

Drop bolt *See Bolt.*

Drum A large shaped jig or former used to set out the stairs, balustrading or handrails, of a circular or elliptical staircase.

E

Emery paper & cloth An abrasive paper for metal finishing. Emery cloth is tough and flexible more easily pulled from side to side around curves.

Engraving Decorating the surface of metal, by cutting into it with hammer and chisel; using an engraver's burin, pushed by hand; or with a cutting tool in an engraving machine. Often used to apply lettering.

Escutcheon 1) A shield shaped plaque, often carrying a coat of arms, on gates and overthrows.

2) A plate around the keyhole or behind the rotating handle of a door.

Etching A chemical process, using acids to dissolve metal. For decorative purposes, a suitable resistant coating is used to mask out a pattern or lettering.

Etch Primer Usually required to 'key' paint to metals such as zinc or aluminium, either as a primer paint or a chemical solution, known as a 'mordant'. *See Mordant.*

Expansion bolt A bolt system providing either male or female connections in masonry, The fixing is inserted in a drilled hole and expanded to lock it in place. Some expand as the fitting is screwed in, others are expanded by a hammer blow, driving in an internal, wedge.

Eye A ring formed by bending part of a bar into a circle.

F

Faggot weld Two bars laid parallel to one another and forge welded.

Fanlight A type of decorative window over a door, often semi-circular in shape, which became popular in the eighteenth century.

Farrier A specialised blacksmith who has veterinary skills in shoeing horses.

Feather edge A very thin, delicate edge.

Fence A barrier dividing areas of land.

Fettle (*verb*) To 'clean up', by removing sharp edges or rough areas of metal, usually in preparation for applying a finish.

File A hard steel hand tool for removing metal to smooth or refine its form.

Finery *Hist.* Works or hearth where charcoal iron was made from cast iron pigs, using charcoal as fuel.

Finial The decorative detail terminating a pinnacle, or the vertical element of a gate frame, post or railing.

Finish The visible treatment of a piece of ironwork, the final coat or surface.

Finishing *(verb)* All the processes used to fettle, clean, prepare and apply a preservative or decorative finish – or both – to a piece of work.

Fire welding (Forge welding) The blacksmith's traditional way of welding iron and steel, using the forge fire to raise the temperature of the metal components until the joining surfaces are molten and 'sticky'. The two pieces are quickly brought into contact, and welded by swift hammer blows. Sometimes a flux is used to assist the process.

Fishtail A flat, flared termination or 'nib' to a bar or scroll.

Fixing 1) *verb* – The activity of installing a piece of work on a site.

2) *verb* – in American English, fixing tends to mean 'repairing'.

3) *noun* – A connecting device such as a bolt or screw.

Fixture A device to locate a piece of work on a workshop machine. For example a 'v' block. *See also jig.*

Flame tuft A flat pointed and twisted finial, representing a flame.

Flange A projecting rim or plate used either to stiffen an object or for fixing purposes. An example is the integral, circular projecting plate with fixing holes, used to bolt together lengths of pipe.

Fleur de lis A decorative motif derived from a lily, often used as the finial of a railing. Fleur de lis is the French for lily flower.

Flight A series of steps between landings.

Flatter A hand held tool, used on an anvil and driven by a sledge hammer, to dress hot metal to achieve a flat surface.

Flux a chemical solution or powder used in soldering or welding to coat the surface of metal in and around a joint. The flux covers the hot surface to exclude oxygen and dissolve oxides, facilitating the wetting and flow of the molten metal. For example borax may be used as a flux for fire-welding.

Fly press A screw press operated by hand. A heavy 'G' shaped arm, supports a ram driven vertically down onto an integral bed, by a large, fast screw thread. A cross bar and handle control the movement of the ram. The ram and bed can be fitted with numerous tools for particular purposes, often made by the smith.

Forge 1) *verb* – The plastic deformation of metal by hammering. In blacksmithing the term refers to the hot working of the metal.

2) *noun* – Both the building in which forging takes place – the blacksmith's workshop – and the fire in which metal is heated, whether coal, coke, gas or more rarely oil fired.

3) *verb* – The act of faking or counterfeiting. Nothing to do with blacksmithing.

Forged corner Usually a right angle bend in a bar, enhanced by upsetting to increase the thickness of metal in the corner, enabling a crisp, right angle corner to be forged.

Forge welding *See Fire welding.*

Forging 1) *verb* – Forming the metal to shape by hammering. Blacksmiths forge iron and steel hot. Silversmiths forge softer metals cold.

2) *noun* – An item made by hammering.

Former or Form A tool to enable a particular shape to be produced repeatedly. Formers are often used to create particular bends, such as scrolls or wavy bars.

Foundry A workshop where metal castings are made.

Frame The outer structure which provides the 'skeleton' and essential strength and form of a piece of ironwork such as a gate, screen or panel.

French chalk The workshop chalk widely used by blacksmiths. Known in America as 'soapstone'. *See also Chalk.*

Fretwork A form of decoration produced by cutting perforations, usually through sheet metal.

Fringes Repeated decorative details - tufts for example - placed at regular intervals, as 'pendant fringes' projecting below a horizontal rail, or as 'upright fringes' projecting above the rail.

Fullers Top and bottom tools usually with a rounded convex working surface, either as a top tool with a handle, driven with a sledge hammer, or a bottom tool fitted in the hardie hole of an anvil.

Fullering Notching, stretching, spreading metal or creating a step using a fuller, or with the cross pein end of a hammer.

Furnace An enclosed fire, for heating metal for forging or heat treatment. Usually gas or, more rarely, oil fired.

G

Galvanic corrosion This occurs when dissimilar metals are in contact, causing a small electric current to flow in the presence of air and water, preferentially corroding the metal lower in the galvanic series. The galvanic series arranges metals in order of the small voltages they generate. It follows that copper in contact with iron or steel will promote rusting, while zinc in contact, will corrode preferentially protecting the iron or steel.

Galvanizing *(noun and verb)* A very effective corrosion protection for steel, but is not recommended for wrought iron. More properly called 'hot dip galvanizing', it is provided as a service by specialist workshops, and involves the creation of a protective zinc coating by immersing the de-greased, acid-cleaned and fluxed metalwork assembly in a bath of molten zinc. This produces a strongly adherent zinc coating, which will seal crevices and penetrate internal surfaces.

Gas welding Welding metals using an oxyacetylene gas flame and a hand held filler rod Applicable to thin materials up to around 4mm thick.

Gas cutting Using a special oxyacetylene or oxypropane torch to cut through wrought iron and steel. The process may use a hand-held torch or be machine operated, usually computer controlled. Widely used for profile-cutting. *See Profile-cutting.*

Gate A frame and infill designed as a barrier which opens and closes. A hinged panel, providing security to a building or garden. A gate may be similar in appearance to other panels of decorative metalwork, such as railings or balustrades, but it is more structurally demanding to design and make, since it is subject to asymmetrical loads.

Gilding The application of gold leaf to a surface, for decorative purposes. Gilding may also provide some corrosion protection.

Gilding metal A particular brass alloy of 5-10% zinc and 95-90% copper. A hot forgeable low zinc brass.

Going The horizontal distance between the front edge – the nosing – of successive steps in a staircase.

Gouge A chisel with concave cutting edge.

Grain Caused by the admixture of slag in wrought irons. Equivalent to the grain in timber.

Grille A panel of metalwork often fitted over a well, or into an opening in a building to provide security or a visual screen. *See Screen.*

Grinder A machine employing a revolving disk or synthetic abrasive 'stone' to cut, shape and remove metal. A bench grinder is often used in a workshop to sharpen tools. Grinding is most commonly applied to iron and steel. *See also Angle grinder.*

Grout, Grouting-in Cement or resin based, semi-liquid material, poured or injected into drilled holes in masonry, to secure posts or fixings.

Grub screw A short headless screw, turned using a screwdriver slot or hexagon socket in one end. Often used to secure a pin in an assembly, or a pulley to a shaft by applying sideways pressure. Called a 'set screw' in America.

Guardrail A railing or barrier designed to guard a drop, or prevent people or vehicles from accessing dangerous areas.

Hacksaw A hand hacksaw is a metal cutting saw, using narrow detachable blades tensioned in a frame. A power hacksaw is a workshop machine used for cutting lengths of metal bar.

Halving joint A joint made by cutting half way into two pieces of bar, so they fit flush when assembled, usually at right angles.

Hammer The essential tool of the blacksmith. The hammer head usually has a square or round face. The end opposite the face is called the Pein. *See Pein.*

Hammerman 1) *Hist.* The blacksmith's assistant who tends the fire and uses a sledge hammer, directed by the smith. *See Striker.*

2) The blacksmith who operates the hand controls of a very large power hammer, as part of a team.

Hand hammer A hammer designed for use in one hand.

Handrail A rail, which may form part of a balustrade, designed to offer support when ascending or descending stair.

Hanging bracket A decorative bracket designed to support a flower basket, lamp or other item.

Hardening Steel with over 0.3% carbon may be hardened by heating above a critical red heat, and quenching quickly in oil or water. This produces a 'dead hard' hard condition, making the metal undesirably brittle, requiring further heat treatment to temper the metal to the desired level of hardness. *See 'Tempering'.*

Hardie In effect an inverted chisel, held in the hardie hole and used to cut hot metal.

Hardie hole The square hole through the face of an anvil, used to secure a variety of tools including the hardie.

Heading tool A tool with holes to accept a prepared shank, enabling a head to be forged, to produce a bolt or rivet.

Heading up The action of creating a head on the end of a rivet or tenon to complete the joint.

Hearth The blacksmith's fireplace.

Heat Blacksmiths refer to heating a piece of metal as 'taking a heat'. A 'heat' also describes the period of time during which the metal remains hot enough to be workable.

Heat treatment The heating of metal to alter its condition, hardening, tempering or annealing the metal.

Heel The often heavily upset end of a bar, integral with a tenon joint in the frame of a gate or other structure. The heel provides a deep shoulder to the tenon, enhancing the rigidity of the joint. The bottom bar of a gate made in this way, is referred to as the 'heel bar'. Any bar with a tenon may include this detail.

Heel bar *See above.*

Helical *See Spiral.*

Hinge The joint which enables a gate or door to turn.

Hinge bar *See Back stile.*

Hinge pivots Circular sections machined or forged in the back stile of a gate to allow it to swing. The upper section provides a Journal bearing and the bottom of the bar becomes a pivot pin. *See also Pivots.*

Honeysuckle *See Anthemion.*

Hood The wide skirt over a blacksmith's coal or coke fire, attached to the bottom of the flue, to funnel smoke.

Hoop A flat bar formed into a circle, the bar bent the 'easy way', like a short slice from a cylinder. *See also Ring.*

Hot To blacksmiths the word 'hot' applied to metal, usually means hot enough to be forged. Far from 'hot to the touch'.

Hot chisel A hand held chisel designed to cut hot metal. Superficially similar to a builder's cold chisel but usually longer with a more slender cutting edge, ground to a more acute angle.

Hot rolled *(adjective)* Metal worked hot, between rollers in a rolling mill, to reduce its size from the initial ingot or billet, and shape it to the required sheet, plate, bar or section. Iron and mild steel bars after hot rolling have a dark grey oxide coating, called 'mill scale'. *See Cold rolled and Rolling mill.*

Hot set A chisel set on a handle, to be driven by blows from a sledge hammer.

Hot short; **Red short** Wrought iron or steel unsuitable for hot forging, since it cracks when hammered at a red heat, usually because the metal contains sulphur. A small percentage of manganese in mild steel avoids the problem.

HSS High Speed Steel. A very hard steel alloy containing tungsten and chromium, widely used for drills, milling cutters, taps, dies and other metal-cutting tools.

Husk *Hist.* A termination stylistically based on a seed husk. Popular in 18th century ironwork.

Infill The metalwork within the frame of a gate, screen or grille. Although primarily decorative, the infill usually also serves to add rigidity to the structure by providing diagonals, bracing the frame.

Ingot The initial, very large, usually cast mass of metal fed though a rolling mill to produce the required section of material.

Iron A metallic element. The principle constituent of steel. *See also Cast or Wrought iron and Steel.*

Ironwork This today is a loose term, widely used to describe any hot forged, decorative metalwork made in iron or steel. *See Mild steel and Wrought iron.*

Jig A device which both holds a piece of work and guides the tool in relation to it. For example a drilling jig, which enables an identical pattern of holes to be reproduced many times.

Joints Connections between components, some hidden, others adding a visual feature. These include Halving, Mortise and Tenon, Collared, Wrapped, Riveted, Screwed, Bolted and Welded. *See under these headings.*

Journal, Journal bearing A bearing where the load is at right angles to the axis of the shaft. Often used as the top hinge of a traditionally constructed and usually heavy gate, the journal is part of the back stile of the gate, machined or forged to a circular section, rotating in a plummer block secured to the post or wall, and retained by a strap. *See Hinge pivots.*

Jumping up *See Upsetting.*

Landing The level area between flights of stairs.

Laser A device that generates an intense, narrow beam of light of a single wavelength. Many surveying tools now incorporate lasers, to project a levelling line or dot.

Laser-cutting Metal cutting, usually of sheet and plate profiles, using a high powered laser. Usually a computer controlled machine.

Latch A moving component to fasten but not lock a gate, door or window. A pivoted latch lifts and falls into a notch in the post as the gate is shut. A sliding latch moves in a line to engage in a hole, and is often called a 'bolt'. *See Bolt.*

Lathe A precision machine tool which operates by manipulating a cutting tool against a rotating workpiece. The activity is called turning, not 'lathing'.

Lead A heavy soft metal, traditionally used for building flashing and roofing. *See Leading-in* below.

Leading-in The process of grouting metalwork into masonry, using molten lead.

Leaf hammer A special hammer with a long head, and ball-shaped peins., typically used for making water leaves.

Leaf stake Leaf tool. A 'Y' shaped stake, usually fitting in the hardie hole. Used for forming leaves.

Leaf work Metalwork involving leaves as a decorative motif.

Leg vice A heavy vice, with long pivoted jaws, supported by a leg in a floor socket to absorb heavy blows.

Often used in blacksmithing.

Lock or Locking rail Generally two parallel horizontal rails in a gate, between which a lock is fitted. The remaining space between the rails is often filled with scrolls or other decorative work.

Lug A small projection from a structure, often to provide a location or connection.

Lyre Ironwork panel that consists of scrolls, bars and decorative features arranged to form the outline shape of a lyre, a stringed instrument used in Ancient Greece.

Machine screw A metalworking screw threaded along its entire length. A bolt is partly threaded for a distance at the end. Both may be fitted through materials to be joined and secured with a nut, or used in a tapped hole.

Machining The shaping of metal by cutting away material, using a drill, lathe or milling machine.

Machine vice A vice designed to hold a workpiece on a machine, such as a drill or milling machine.

Mandrel A rod or shaped spindle over which hot metal may be wound, for example to make a helical spring. *See Cone mandrel.*

Mask A repoussé or cast metal image of a human, mythological or animal face, used as a decorative element.

MIG welding Metal Inert Gas welding. An arc welding system using inert gas shielding and a mechanical wire feed to provide filler metal. The filler metal is of the same chemical composition as the metal being joined.

Micrometer gauge Also called a 'micrometer screw gauge'. A precision tool for making small measurements.

Mild steel An alloy of iron with less than 0.25% carbon, often also with a small percentage of manganese, containing too little carbon to be easily hardened when quenched. 'Mild' meaning soft.

Mill scale Oxide layer left on the surface of iron or steel after hot rolling or forging to its finished shape. Light grey in colour.

Milling machine A precision machine tool which shapes workpieces using rotating cutters.

Monkey tool A blacksmithing tool to square up the shoulder of a forged tenon. Usually a rectangular steel block with a hole at one end, to accept the tenon, square to the end face. The tool is driven over the hot metal with a hammer.

Monogram *See Cypher*

Mordant A chemical etching solution. A mordant known as 'T' wash, is widely used to etch zinc galvanised surfaces, to prepare them for painting.

Mortise The hole through a component, shaped to take a tenon.

Mortise and tenon joint A joint historically deriving from woodwork practice. The tenon passes through the mortise and the projecting end is either hot forged to create a riveted head, or is provided with a transverse hole enabling a retaining wedge or pin to be driven through.

Motif An established decorative design element. Particular types of scrolls, the water leaf and the quatrefoil form are examples.

Moulding 1) *noun* – A shaped section of material used as a decorative 'trim', but not necessarily made in a mould.

2) *verb* – Making the mould for a casting.

Muck bar Bar produced by the first rolling of puddled iron. Subsequently piled, welded and rolled to create crown iron. *See Crown iron.*

Mullion The vertical member dividing windows.

Newel post 1) The central column around which a spiral stair winds.

2) The main post supporting either end of a stair, handrail or balustrade.

Nib 1) The end detail of a scroll. *See Scroll.*

2) A small pointed projecting part.

Nosing The front edge of the tread of a stair, often rounded and projecting over the riser below it.

Nut An internally threaded fixing, used to secure a screw or bolt. Now usually hexagonal, but historically often square.

Offering up Trying a component in position, or over a layout drawing to check it, or to mark from it for example to locate holes.

Overthrow A panel of ornamental ironwork running above an gate, bridging from one pier to another, often including the initials or coat of arms of the family.

Overthrow base frame *See Stretcher frame.*

Pales, palings, pickets or palisades The repeated upright bars in fences and gates.

Palmette A classical decorative motif, loosely based on a palm leaf. Sometimes almost indistinguishable from an anthemion. *See Anthemion.*

Panel An area of decorative metalwork forming an element in a larger structure such as a screen or grille, or between the posts of a railing or balustrade.

Pattern 1) A decorative arrangement of elements, either two or three dimensional.

2) The three dimensional form of an object to be cast in metal. In sand casting, sand is rammed around and over the pattern, which when removed leaves a cavity of the required shape.

Pattern maker The skilled craftsmen who make patterns in a foundry.

Pediment A decorative motif deriving from the low triangular gable of classic Greek and Roman architecture.

Pein, Pane or Peen The end of a hammer head opposite to the face. A ball pein hammer has a hemispherical pein; a cross pein hammer has a fullering pein set at right angles to the hammer shaft; a straight pein hammer has a fullering pein, set in line with the hammer shaft. *See also Hammer*

Picket Often American usage. The repeating upright of a fence or railing. *See also Pales.*

Pickling Cleaning a metal by immersion in acid. Forged mild steel may be stripped of oxide scale in sulphuric or phosphoric acid solutions. Forged stainless steels are pickled to remove iron particles contaminating the surface, picked up from the tool used to forge them.

Pier A pillar with all four faces decorated, often the post on which a gate is hung. This may be masonry, cast iron, or a forged construction.

Pig iron A high carbon iron as tapped directly from a blast furnace into 'pig' moulds in a sand floor. Contains up to 4% carbon. Used as the feedstock historically for wrought iron production, later for cast iron and steel production.

Pilaster This has the appearance of a pier or pillar but has little depth. In ironwork it is a single, narrow flat panel.

Pillar Masonry or ironwork upright, to which a gate or side panel is attached.

Pin Usually cylindrical in section, large or small pins are used to secure, pivot or locate.

Clevis pin – Has a shank with a head at one end and a cross-drilled hole at the other. It is used as a pivot to connect components which can rotate relative to each other.

Dowel pin – A parallel pin fitted in a holes to locate but not retain two components.

Roll pin – A cylindrical, hollow, 'C' section pin of spring steel, designed to flex to retain it in a drilled hole.

Split pin – A pin made from half round wire, with one looped end and the other projecting through a hole, passed for example though the cross-drilled hole in a Clevis pin or screw and splayed out to retain it.

Taper pin – Tapered to fit in a hole reamed to a corresponding taper, to lock two parts together. *See also Pivot.*

Pintle hinge A hanging suitable for a light gate, consisting of top and bottom wall or post fixings, with vertical hinge pins, engaging with holes in stub bars projecting from the back stile of the gate. These hinges carry the entire weight of the gate.

Pitch A black viscous resin, traditionally obtained from a pine tree. Used in a tray as a 'pitch block', to support metal sheet formed by repoussé.

Pivot An engineering term for a bearing carrying a load parallel to the axis of the shaft, but commonly used for any shaft or pin on which something turns. A traditionally constructed gate often uses an integral pivot pin at the bottom of the back stile, rotating in a socket set into the ground to take the weight of the gate.

Planish To refine and polish the surface of a sheet metal form by hammering.

Plate Thick sheet metal, above some 3mm in thickness.

Plasma cutting A process involving a superheated, ionised, compressed air stream to cut metal sheet and plate, either as a hand-held torch or a computer controlled machine. Often used for computer controlled profile-cutting.

Plummer block The static, semi-circular grooved block, forming part of a Journal bearing, which see above. *See also Journal bearing.*

Pop rivet 'Pop' or 'blind' rivets are small hollow rivets, fitted into holes, to make joints in sheet metal structures. They are designed to be applied from one side only, and are set with a tool which pulls on an internal steel mandrel, upsetting the end of the rivet and snapping off at a prearranged load.

Power hammer A hand or foot controlled machine, which provides a controlled blow between a hammer head and

an anvil, enabling large sections of hot metal to be forged. Power hammers were originally powered by a water wheel, then by steam, and finally by electric motors. Power hammers are rated by the weight of the hammer head, which may range from a few kilograms to tonnes.

Press A press provides pressure, rather than impact, enabling metal to be bent, punched and formed. Fly presses do this using hand power, which allows the operator to 'feel' the movement of the workpiece. Hydraulic presses are power tools, which lack 'feel' but produce a far greater pressure.

Preventive conservation Measures and actions aimed at avoiding and minimizing future deterioration or loss. These measures are indirect, do not interfere with the materials and structure of the item, and do not modify its appearance. Examples include: registration, storage, handling, security, and environmental control. *See also Remedial conservation.*

Pritchel The narrow square section tapered punch used by farriers to punch holes in horse shoes, to fit a horseshoe nail.

Pritchel hole The small, round hole usually through the end of the face of an anvil, used by farriers for punching holes.

Profile-cutting Cutting a particular shape from sheet or plate, either by band-sawing, oxyacetylene cutting, laser or plasma cutting. Much profile cutting is now computer controlled.

Puddled iron Wrought iron produced using a coal or oil fired reverberatory furnace. This was the malleable iron used throughout the nineteenth century and was progressively replaced by mild steel after about 1870. *See Wrought iron.*

Punch A hardened steel tool, driven by a hand or sledge hammer, used to make holes or imprint patterns or lettering in hot metal. A punch may be directly hand-held or fitted with a handle; both are used on an anvil.

Punching The act of using a punch. In blacksmithing, holes are punched hot, essentially displacing metal, rather than removing it. Usually a hole is punched, then refined in form using a 'drift' driven right though the hot metal. *See Drift.*

Pure iron High purity iron, often used for its electrical and magnetic properties. Softer and more easily worked, hot or cold, than mild steel or wrought iron.

Quatrefoil A traditional four-lobed decorative form.

Quenching Rapidly chilling hot metal in oil or water, often to harden carbon steels. Water chills metal quicker than oil. Iron and mild steel may be quenched for convenience to chill metal as necessary, but steels with more carbon will be hardened if quenched from red heat, and can subsequently crack if not tempered. *See Temper.*

Rag or Ragging A pattern of cuts or projections forged in a metal bar to be set into masonry, as an anchor or fixing. The indentations serve to lock it into the grouting material to prevent withdrawal.

Rag bolt A bolt with its shank forged with hollows and projections, designed to be grouted in.

Rail A horizontal structural bar in a gate, railing or other panel.

Railing A barrier, designed to guard an area or change in level, consisting of panels between posts, often constructed as top and bottom rails supporting close spaced uprights, to prevent access.

Raising Forming sheet metal into a three-dimensional shape by hammering over the anvil or other tool.

Rasp A coarse file, sometimes used on hot metal.

Reamer A fluted hand tool to enlarge and refine a hole to an accurate size or shape.

Red short *See Hot short.*

Reins The long handles of blacksmithing tongs.

Remedial conservation Actions applied to an item, aimed at arresting current damaging processes, or reinforcing its structure. Only carried out when the item is in such a fragile condition, that it would be lost in a relatively short time. Examples include stabilisation of corroded metals and removing soils and weeds causing corrosion. *See also Preventive Conservation.*

Repoussé A decorative metalworking technique for forming three-dimensional imagery in sheet metal, mostly by hammering various shaped punches, and in part by working it from the back surface. From the French 'pushed back'.

Reredos A decorative screen or facing at the back of an altar. The term is also used in respect of the cast iron 'back' of a fireplace.

Resin anchor A fixing in masonry, designed to be grouted into a drilled hole with a fast curing resin. Both male and female resin anchors are available as proprietary items. Since their security does not rely on expanding the fixing, there is no pressure on the adjacent masonry, avoiding bricks or stone being jacked apart, and allowing holes to be drilled close to corners or edges.

Restoration Actions applied to an item aimed at facilitating its appreciation and use, after the item has lost part of its significance or function through past alteration or deterioration. Examples include reassembling a broken structure, straightening damage, or replacing missing components.

Reveal The side of an opening in a masonry wall such as that for a window or door.

RHS Rolled hollow section. Round, square or rectangular tube formed by rolling.

Ring A bar bent in a circle.

Rise The vertical height from the nosing of one step of a stair to the next.

Riser The upright part of a step.

Rivet A metal pin with a shaped head, used to join two or more components. The rivet is inserted, and the head solidly supported, while the plain end is hammered or crushed to form another head. The process is called 'setting'. Iron and steel rivets are usually set hot; copper or aluminium rivets may be set cold.

Rococo An art historical period and form of decoration originating in France in the early 18th century, characterised by the extensive use of 'C' and 'S' scrolls, forming the framework from which other decorative motifs emerge.

Rod A thin metal bar. The term, lacks a precise definition, but usually applies to a metal bar over 3mm, but less than 20mm diameter. Sometimes used to mean round bar.

Rodded tools Blacksmithing tools such as swages, chisels or fullers, set on an iron or steel rod handle. They are driven using a sledge hammer.

Roke A fault in a bar of wrought iron caused by incomplete forge welding.

Roll pin *See Pin.*

Rolling mill A term applying to both the building and the heavy machinery which reduces large metal billets or ingots to particular sizes and sections. Iron and steel are rolled to size hot, leaving the metal with a dark grey surface. Such metal is called 'black' iron or steel. *See also Bright mild steel.*

RSJ Rolled steel joist, usually a heavy structural 'I' section.

Rust The corrosion products of iron and steel.

Rust heave, rust jacking A build up of corrosion products resulting in the pushing apart of two or more closely fitted bars of iron or steel.

Sandbag A sand filled leather 'cushion' used to support sheet metal to form or shape it.

Scarf An oblique angle forged or cut at the end of a pair of bars, in preparation for joining them end to end. The scarf increases the area of contact between the two surfaces. For fire welding this overlap allows the blacksmith to use one piece to trap the other for a second, until hammer blows complete the weld.

Sconce 1) *Hist.* A candleholder on an ornamental bracket attached to a wall.

2) A candleholder with a handle.

3) Sometimes used to indicate the drip pan of a candleholder.

Screen A decorative metalwork panel or grille, indoors or out. The panels of decorative metalwork dividing a chapel from the body of a cathedral, or surrounding a tomb, are usually called a 'screen'. Outdoors the fixed panels of metalwork flanking a grand country house gate may be called a 'screen' or 'side screen'. Even longer runs, which might otherwise be described as a 'fence' or 'railing', may also be referred to as a screen, perhaps because of their elaboration and decorative value. The Tijou 'Fountain Screen' at Hampton Court is an example.

Screw A metal fixing with a threaded shank, and various shapes of head, with various types of slot or socket for a screwdriver or wrench. Metalworking screws are called Machine Screws, Bolts or Self-tapping screws; screws for wood are called Woodscrews, Coach screws or Coach bolts. *See under these headings.*

Screw thread There are many different, forms of metalworking screw threads used in Britain, some now historic. For example today, the most commonly used are Metric Fine and Metric Coarse. Historic thread forms include Whitworth, BSF (British Standard Fine) and BA (British Association).

Scriber A sharp pointed hand tool, a stylus for marking out on metals, either hardened steel or carbide tipped.

Scroll A bar formed to a volute or spiral, and a crucial part of the vocabulary of traditional ironwork. There are many different patterns, defined by the scroll ends or 'nibs'. For example: ribbon-end, fishtail, solid snub-end, fishtail snub-end, halfpenny snub end, bolt-end, blown over leaf and bevelled. The overall shape is often described as an 'S' scroll or a 'C' scroll.

Scroll former, Scroll iron, Scroll tool The former or jig around which a scroll is shaped to ensure consistency.

Scroll wrench A hand tool with two projecting 'fingers', used to lever hot metal around a scroll former, or other former; or used freehand, sometimes in pairs to bend a bar.

Section 1) The transverse profile of a bar angle, hexagonal, square, round, flat etc.

2) A drawing showing a view cut through an object or assembly.

Self-tapping screws Hardened steel metalworking screws, often with a tapered end. Used to join sheet metal assemblies, or to tap their own thread in thicker, softer metals.

Set *(verb)* To indent hot metal by means of a set tool. To set down.

Set hammer A hammer on a rod or timber shaft, designed to be driven by a sledge hammer, while positioned on the work by the blacksmith.

Set screw *See Grub screw.*

Set square A gauge for checking right angles.

Set tools Blacksmithing tools 'set' on a steel rod or timber handle, usually driven by a sledge hammer, for cutting, punching, fullering or swaging metal. These are 'top tools'. *See Top and bottom tools.*

Shadow bar or plate Additional flat bars attached slightly proud to rails or stretcher frames, to cast a shadow for visual effect.

Shears Tools operating like scissors, designed to cut metal sheet or plate. Hand shears cut thin sheet metal. Bench shears are attached to a bench and employ a long blade and handle to provide leverage, enabling thicker metal to be cut. Power shears will cut thicker metal still.

Sheet metal Metal rolled wide and flat, in thicknesses of less than some 3mm. Thicker than this is 'plate'.

Shim A metal packing piece, often very thin, used to fit between elements of an assembly to take up a discrepancy or make an adjustment.

Shutting; Shutting together *See Fire welding.*

Shop Colloquially a workshop.

Side panel A decorative narrow vertical panel between a gate and a masonry pillar.

Side set A blacksmithing tool set on a timber or steel rod handle, driven with a sledge hammer. It has a thick blade with an angled end face, used to create and refine the shoulder of a tenon or other change in section.

Silver solder *See Solder.*

Slag Silica impurities developed during the smelting of iron. In wrought iron the slag is mixed in with the iron and forms a vital component of the finished metal. Slag is not present in cast iron, mild steel and pure iron.

Slamming post; Slam bar A length of projecting flat bar attached to the front stile of a gate to provide double gates with a stop. *Hist. See Clapper bar.*

Sliding bolt A sliding latch, used horizontally to secure doors and gates to a post, frame or each other. Drop bolts operate vertically to secure doors and gates by shooting into the ground to secure them in an open or closed position. Sliding bolts may also operate upwards.

Slot tenon A tenon of rectangular section destined to fit in a slot (a mortise). A common feature of eighteenth century work.

SMAW Shielded Metal Arc Welding, also called Manual Metal Arc or Stick welding, employs a short, chemically coated metal rod or 'stick'. The electric arc is struck at the end of the stick, melting the flux coating which forms a shield over the weld, excluding atmospheric oxygen. The oldest form of arc welding and still widely used. It is effective out of doors where wind degrades the gas shield of MIG and TIG welding.

Smith A person who works metal. Often used as short for 'blacksmith'.

Smithy A blacksmith's workshop. A term now perhaps falling out of use, though sometimes erroneously used in place of 'smith'.

Snarling iron Essentially a silver or coppersmith's tool, a shaped head on a long springy steel shaft, enabling it to reach inside a deep vessel or form, to hammer it from the inside.

Snips *See Shears.*

Soffit The underside of an arch, or the eaves of a building.

Solder, soldering Joining metal components using an alloy of a lower melting point, and an appropriate flux. Traditional tin/lead 'soft' solders use an alloy, melting between 180° - 270° C, now largely replaced, by tin/silver/copper alloys to avoid lead contamination. 'Hard' solders are copper or silver based, with working temperatures from 600°C - 700°C.

Spacer Short, sometimes tubular components used between parts of a structure, or between for example a grille and a wall, to create a space between.

Spark test Touching an iron or steel sample against a rotating grinding wheel and examining the sparks provides a means of distinguishing wrought iron from steel, or stainless steel and gives some indication of the carbon content of the steel.

Spear The spear head provides a decorative motif often used for the heads of railing uprights.

Spiral & helical The dictionary defines both these terms as:

1) A line in two dimensions, winding round a centre and gradually receding from it, as for example a line on paper.

2) A line winding round a central axis and gradually receding from it in three dimensions, lying on the theoretical surface of a cone or cylinder.

Spring swages or fullers Swages or fullers aligned in pairs and connected by a spring handle. Often used under a power hammer.

Sprue The point where the molten metal feeds into a casting mould. This is cut off the solid metal after pouring, as part of the fettling process, together with the waste metal contained in the necessary runners, risers, vent holes and pouring holes.

Split pin *See Pin.*

'S' Scroll A unit comprising a pair of scrolls forming a letter 'S'.

Stainless steel A family of rust resistant steel alloys including nickel and chromium. Some are hardenable, some are not. Those high in chromium and nickel are nonmagnetic.

Stake A bottom tool used in a hardie hole, swage block or vice to provide support for a workpiece while hammering metal to shape.

Standard A heavy post or decorative panel to which railing panels are attached.

Stay bar; Stay *See Back stay.*

Steam hammer An early power hammer powered by steam. Invented by James Nasmyth. *See Power hammer.*

Steel An alloy of iron and carbon often with other metallic additions such as manganese, chromium, molybdenum, and vanadium. *See also Carbon steel.*

Step 1) The tread of a stair.

2) A change in level in a forged bar or structure.

Stick-in piece *Hist.* A dowel pin. *See Pin*

Stick welding *See SMAW.*

Stile The vertical framing bars of a gate. The back stile is the heavy, usually square section bar, from which the gate is hung. The front stile is the lighter bar carrying the latch.

Stock A tool to hold a die to cut a screw thread.

Stretcher *Hist.* A horizontal bar that supports a gate overthrow, or performs a similar function.

Stretcher frame *Hist.* A decorative horizontal frame that stretches from pillar to pillar, or between two side panels to frame a gate, as a stand alone element or as a support for an overthrow or cresting.

Striker The blacksmith's assistant who uses a sledge hammer as directed by the smith.

String or stringer The inclined supports to the treads and risers of a stair. The line of the strings determines the geometry of the stair, essential information when making stair balustrades or handrails.

Strip A narrow, thin, flat metal bar or piece of sheet.

Stud A screw fixing without a head. Either threaded for its entire length or, with a plain shank, threaded at both ends.

Studding Continuously threaded rod. Called 'all thread' in America.

Swag A traditional decorative motif involving flower or other forms, arranged as if hanging in a curve between two points.

Swage Top and bottom blacksmithing tools. The bottom tool is a block, typically with a semi-circular section groove in its working surface, and a square shank to fit a hardie hole. The top tool is fitted with a handle and shaped to correspond with the form of the bottom tool, so that the grooves come together in a circle, enabling a bar to be hot forged to that diameter. Swages may be shaped to other profiles.

Swage block A large, heavy cast iron block, with various holes and swage profiles in its edges, to hold, swage or support different metal sections. Usually used on a stand, enabling it to be located on edge or lying flat.

Swaging Using a swage to shape metal.

Sweaty descriptive of the appearance of the heated surface of iron when it is ready for forge welding (sweating like a pig). *See Pig iron.*

Swing *(noun)* The line described by the opening of a gate, door or window.

Table 1) The small horizontal surface between the face and beak of a London pattern anvil. *See Anvil.*

2) Horizontal 'steps' leading to the central cresting of an overthrow.

Tap A tool for cutting internal screw threads in a drilled hole. A particular tap or die is required to make each size and form of screw thread.

Tapering Reducing the section of a metal bar over a length. Also called 'drawing down'.

Taper pin *See Pin.*

Tapping Using a tap to cut a screw thread in a hole. A 'tapped hole' is one with an internal thread.

Temper colours Different 'interference colours' are produced on bright iron or steel surfaces, relating to temperatures, ranging between 175° and 350°C. They provide a workshop method of judging particular temperatures, necessary to 'temper' steel – that is to reduce the brittle quality of hardened steel to the required combination of hardness and toughness.

Tempering The process of heat-treating steel to a particular temperature, as described above.

Template Usually a flat profiled piece of sheet metal, used as gauge to enable a particular shape to be set out or checked.

Tenon A round or rectangular 'tongue' projecting from a shoulder, usually on the end of a bar to fit a corresponding mortise, to achieve a joint. *See also Mortise.*

Thread The helical groove cut in a nut or bolt. There are numerous standard thread forms. *See Tap and Die.*

Thunder and lightning *Hist.* Colloquial term for a series of alternating straight and wavy vertical bars.

Tie rod A rod passing through a structure under tension, either diagonally or from one side to another, to stabilise the structure. Also used to restrain bulging or unstable masonry in buildings, often featuring decorative 'S' or 'X' shaped end plates.

TIG welding Tungsten Inert Gas welding. A form of arc welding employing a nonconsumable tungsten electrode operating under an inert gas shield. Since the arc functions like a flame, joints may be achieved by fusion alone or by using a filler rod, which the operator manipulates in the other hand. The filler metal is of the same chemical composition as the metal being joined.

Tinplate Not sheet tin, but thin sheet steel, coated on both sides with tin, to provide safe contact with foodstuffs and general corrosion protection.

Tin snips Not specifically designed to cut tin, but to cut thin metal like tinplate. *See Shears.*

Tongs Blacksmithing tools with two identical, long handled components pivoted together to grip workpieces, used to hold and manipulate hot metal. There are many types identified by their purpose and jaw shapes.

Top box and Bottom box Used in the sand casting of metals. Metal frames, within which a sand mould is made. Located together by pins and also known as the cope and drag.

Top and bottom tools Matched pairs of tools for diverse purposes, the bottom tool has a shank to fit the hardie hole of the anvil, the top tool is hand held by a timber or steel rod handle and is usually driven with a sledge hammer. Also called 'Anvil tools'. *See also Swage.*

Tracer A small punch used in repoussé work to outline a form.

Transom The horizontal bar over the top of a gate, supporting an overthrow; a horizontal bar dividing windows, or elements of a decorative screen; or the bar between a door and a window or fanlight above.

Transom panel *See Stretcher frame.*

Trefoil A traditional three-lobed, decorative form.

Tread The flat, standing surface of a stair. A step.

Turret post *Hist. See Pier.*

Tuyere The nozzle though which the air blast enters a forge hearth.

Turned; Turning *See Lathe.*

Twist A self-explanatory term. For decorative reasons, iron and steel bars can be twisted when hot, using a twisting wrench designed for the particular section. *See also Water twist.*

Upsetting A technique for locally thickening a bar, by driving metal along its axis, either by hammering, or ramming the bar down on to the face of the anvil. Also called 'jumping up'. The metal is heated locally to determine where the thickening will occur.

Vane *See Weather Vane.*

Veining tool A special top and bottom tool to crease lines in sheet metal 'leaf' forms, to represent the veins.

Vernier calliper A precision tool for measuring internal or external dimensions and depths.

Vice American 'vise'. A device to hold a workpiece securely, usually having two jaws operated by a screw. *See also Bench vice, Leg vice. Machine vice.*

Washer A usually round, flat, sheet metal ring, with a hole to fit a particular size of screw, used to spread the load, protect the surface underneath and assist the tightening of a nut or bolt.

Water leaf A long leaf with a curled tip and gently waved edges, similar to a Hart's Tongue fern. The base of this traditional, decorative motif wraps around the bar to which it is attached, and is fire-welded in place.

Water twist Or reverse twist. A twist with segments rotated in alternate directions.

Wattle-work *Hist.* Inter-weaving of iron bar, horizontally and vertically, usually encased in an iron frame. Similar to a grille but different in construction. More evident in Europe; examples in England are rare.

Weather vane or Windvane A decorative metal arm mounted on a pivot to turn easily in the wind, indicating its direction usually with the cardinal points of the compass. *See also Weather-cock.*

Weather-cock A weather vane in the shape of a cockerel.

Web A thin metal plate or strip, for example connecting the upper and lower flanges of a rolled steel joist.

Welding The process of joining metals by fusion, either using heat to melt and fuse two pieces directly together, or by melting the parent metal and introducing metal from a filler rod of the same metal to achieve a joint. The defining characteristic of welding is that the joint is precisely the same metal as the components joined. Compare Soldering. *See also Fire welding, MIG, SMAW, and TIG.*

Wet and dry paper Abrasive paper capable of being use both wet and dry.

Winders The triangular or tapering stair treads necessary to carry a staircase around a corner.

Wire Very slender metal rod, up to around 3mm diameter, often flexible.

Woodscrew Screws for securing wood, with various types of head and thread forms, and a pointed end. A length under the head is often not threaded.

Work-hardening The effect of hammering, twisting, rolling or bending metal cold, is to harden it. This may be useful to increase rigidity, but taken too far can cause the metal to fatigue and crack. Work-hardening is removed by annealing. *See Anneal.*

Wrapped joint A joint created by winding a heated bar several turns around a cold bar or bars. As it cools the hot bar contracts, gripping the bar or bars underneath holding them together. The wrapping bar is usually smaller in section, and heated using a gas torch, as it is applied.

Well The gap between one flight and the next, where the stairs turns through 180°.

Wrought iron The traditional blacksmithing metal. A malleable iron containing a mixture of iron and fibres of glass-like slag, resulting from the forge welding of a 'bloom' of iron and slag at a high temperature but below the melting point. Wrought is the Middle English word meaning 'worked'. *See also Charcoal Iron and Puddled iron.*

Wrought ironwork Not necessarily work made from wrought iron metal. This today is a loose and ambiguous term, widely used to describe any hot forged, decorative metalwork made either in mild steel or wrought iron. *See Mild steel and Wrought iron.*

Zinc A soft metal, usually alloyed with copper, aluminium and magnesium, for structural purposes as small die-castings. The metal is widely used for roofing sheets and galvanising. *See Galvanising.*

Zinc rich paint A paint containing finely powdered zinc metal, applied to bare iron and steel surfaces as a primer and a good protection against corrosion.

Zinc spraying An anti-corrosion treatment for iron and steel, which may be achieved on site, or undertaken as a service in special workshops. The metalwork is grit-blasted to remove forge scale, paint or other contaminants, and molten zinc is sprayed by hand to adhere mechanically to the surface. It offers excellent corrosion protection, but cannot coat internal surfaces and crevices. The granular surface will take paint, but is better after etch-priming. *See also Galvanic corrosion, and Galvanizing*

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