

SWORD MANUFACTURE IN BIRMINGHAM.

The manufacture of swords is one requiring great skill in all its departments. Success in this work depends upon the acquired skill, the long experience, the educated eye, the manipulative power, which seem to require many generations of workmen before they are attained in the higher excellence. The slightest mistake in working would make a sword-blade useless, and this applies to each of the three great processes through which it has to pass—forging, tempering, and grinding. From the necessity of all the work being skilled work, each part of a sword—the blade, the grip, the hilt, the scabbard—is made by hand, and the witnessing of the manufacture is thereby rendered especially interesting. For the excellence of his swords and for the skill displayed in every part of the work, no name in the history of the trade surpasses, and few, if any, rival, that of Mr. C. Reeves, of Birmingham, over whose works we shall now conduct our readers, in order that they may witness the making of a sword under the most favorable circumstances.

The first process is the forging of the blade. The steel comes from Sheffield in double moulds (the length of two blades), as it is called, and is the best steel, and is in strips, each strip being the length of two swords. The workman takes the strip, and first breaks or cuts it across the middle. The handle end of the blade is of iron, as this metal bears more knocking about, and can be used in a manner which would be fatal to steel. The iron end is then put into the fire, and the tang, or part to fit into the hilt, is forged. The blade is then passed through the fire a large number of times, and beaten out on the anvil in order to distribute the metal equally in every part. At the same time the furrow is worked up the centre of the blade, wide or narrow according to the pattern and size required. In those known as Scotch blades two furrows are beaten. This is a work requiring great care and skill. The future worth of the blade depends upon the skill of the forger. The slightest defect or inequality in the distribution of the metal makes the blade to that extent imperfect. With a skillful workman that is, of course, of rare occurrence. He knows precisely the amount of hammering required. It may be noted here that every blade passes through the fire no fewer than twenty-five times before it is completely forged.

After forging follows the most delicate and important part in making a sword-blade—tempering. On this process depends the perfection of the weapon, and it is quite pleasant to listen to Mr. Reeves while he descants on this part of the work. The object of tempering being, of course, to give the steel the required elasticity, it must not be too hard, or it will break, and it must not be too soft, or it will bend; but must be so equally tempered that, when its point is pressed on the ground, the blade will, when free at once take its natural shape without hurt or detriment in the slightest degree. The mode by which this great, this necessary quality is secured is as simple as it is effective. Before the blade can be tempered it must be made extremely hard. This is done by first passing it through the fire, and then, while hot, it is plunged into water. The first plunge hardens the blade to such an extreme hardness that it is as brittle as glass, and if thrown down would break into pieces. Again it is passed through the fire and then beaten straight, for the effect of the action of the water on the hot metal is to make it of all shapes. Just at the point at which the blade takes a particular color known at once to the practised eye, it is again plunged into the water, which, in technical language, "prevents it going down lower," and is tempered. It can now be bent backwards and forwards without any fear of its breaking, and is ready for the grinder.

The grinding is done on the best Leeds stone, the blade being placed in a frame of wood, and its surface pressed on the stone until the work is done. This also depends upon the skill and eye of the workman. In grinding the furrows a stone of a peculiar construction is used. The face is cut into raised flutings of the size and shape of the furrows of different swords, and on these the blade is pressed, and the furrow effectually ground. This is called the hollowing-stone. Each blade takes from an hour and a half to two or three hours' grinding, according to its quality. We saw one blade ground, and also some machetes, a kind of scimitar knife used for cutting down sugar-canes, etc., in India.

The blade is now ready for polishing. This is done on lathes worked by steam. Different-sized wheels are fitted on the spindle, and lard-oil and double-washed emery are used in the operation. The blade is often put into lime-dust during the process, and on the latho-brush used a crocus dust, of deep purple tint and ground very fine, is thrown, and a most brilliant polish is the result. Scabbards and hilts, and other ornamental parts of the sword, are also polished in much the same manner. In the case of scabbards a larger wheel is used instead of the ordinary latho-brushes. When polished, the blade is ready for the hilt and scabbard, so we will now see how these are made.

And first for the scabbard. In making a scabbard the workman takes a piece of flat steel cut to the required size. He first places it on the top of an open vise, and beats it with a wedge-shaped wooden mallet, bringing the two edges closer together each time it passes along the vise. It is then beaten on both sides until they almost meet; a mandrel is then put down it, and the steel beaten closer around the mandrel, both edges being hammered over. The edges are then soldered. It is next beaten on an anvil all round, the mandrel is withdrawn, and the scabbard is ready for the drag, which is a piece of iron fitted to, and fastened to, the bottom of the scabbard. The bands are then put on, and the scabbard, after being filed and smoothed is ready to be polished. The making of the grip is also a very interesting bit of work. These are the handles by which the sword is gripped, hence the name. A grip at first is a bit of walnut, oblong in shape, but narrower at the end than the top. The back, which is made of metal, is placed on it, and the wood is worked into the required shape by files. A large number of different shapes, sizes, and cutting powers are used in this work. When the top has been cut, the grip shaped, and the tenon for the ferrule made, it is then "balled." For this purpose it is fastened in a vise, a three-sided file cuts a deep indentation at regular intervals, each division is rounded or balled by a file, and the indentations connected by slanting interstices cut by a hand-saw. The grip is then drilled through in a lathe, for the purpose of receiving the tang. When this has been done, a piece of the skin of a dog-fish, which has been a long time soaked in water, is cut off. Every bit of flesh on the inside of the skin is then carefully removed, and a piece of pure skin is left. This is put round the grip, a piece of string or wire is fixed by a loop to a piece of steel fastened in the vise, and the workman binds the skin tightly round the grip by winding the string or wire round the space between each ball. It is then filed and the back fitted on again. In making a grip it passes through the workman's hands no fewer than thirteen times.

A hilt is at first a flat bit of metal of a peculiar shape, and may be cut to any pattern. A large number of these are used, which are all made to a regulation size. The pattern used is placed on the metal, which is then marked. They are then filed and cut by hand, beaten on blocks and knobs into the shape of the hand, and afterwards polished and made ready to be fixed to the sword. This is called mounting. In the cheaper swords the blade is bought from one person, the hilt from another, the scabbard from a third, and so on. But in this manufactory every part is made in the works, and each piece is prepared to suit and fit the other parts, so that when fitted together the sword is firm and sound; and the parts never give way or become loose, as they do when stuck on to the tang of a blade without any reference to their weight and suitability for each other and the blade to which they are attached. In such cases the parts with little wear become loose and rickety, and depend only upon the small rivet at the top for their security. In ordinary swords the blades and hilts, after having been ground, filed, and polished, are taken into the mounting shop. There the tang is placed in the grip. The hilt is fastened on by passing a rivet into the top of the grip, and fastening it to the tang. The hilt is drawn over this rivet, which passes through a hole at the top. It is then filed and broken off at a short distance from the hilt. The rivet is then melted by being filed and smoothed until it has the appearance of an ornamental knob, forming an integral part of the hilt. These swords are now complete. In the mounting of best work great care and skill are required. In the mounting shop a very ingenious tool is used, called a float. It is a long bit of steel, shaped almost like a tang, with a series of blades along its surface. The grip is worked to and from the float until it is cut to the exact size and shape of the tang on which it is to be fixed. Great skill is required in this delicate opera-