How they are Made and Something about Curious Ones.

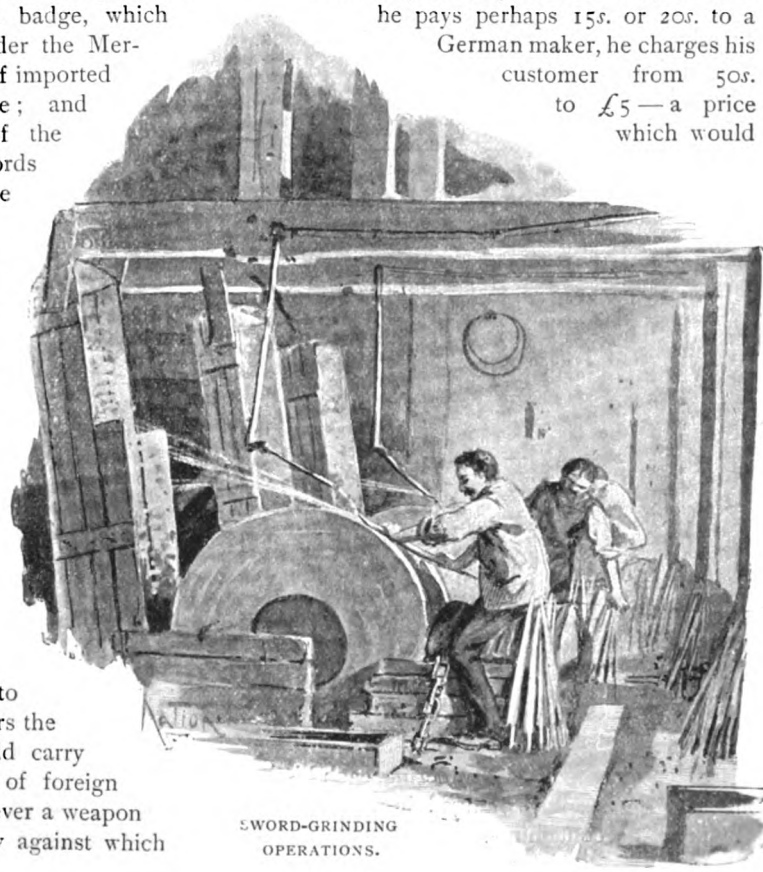
By Frank Lamburn.

There was a time, within the memory of the youngest among us, when the swords and bayonets and cutlasses with which the men of the British army and navy were equipped, found their origin in the manufacturing towns of Germany, forged from German steel, fashioned by German hands. Even at the present time, fully half of the scabbards and sword blades worn by the Militia officers are made in Germany, the hilts being fitted here on account of the regulation that makes it imperative for them to be stamped with the V.R. and Crown badge, which would bring them under the Merchandise Marks Acts, if imported in the complete state; and quite 90 per cent. of the volunteer officers' swords are German made throughout, for, not being ornamented with the badge, they are not rendered liable to be marked.

It is comfortable, however, to reflect that the majority of the swords for officers of the regular army, and the whole of those used by cavalry troops, as well as the bayonets of the infantry, are of British steel and made by British workmen.

This is as it ought to be. No man who wears the Queen's uniform should carry about him an article of foreign manufacture, less than ever a weapon produced by a country against which he may one day have to turn it. Nor would volunteer officers find themselves equipped with untrustworthy blades—blades that bend and twist and break under a test far less severe than that undergone by the British sword—did they trouble to purchase them from a sword merchant.

As it is, the tailor supplying the uniform in the vast majority of cases also supplies the sword. It saves the officer a certain amount of trouble, and that it is profitable to the tailor is proved by the fact that, whereas he pays perhaps 15*s.* or 20*s.* to a German maker, he charges his customer from 50*s.* to £5—a price which would



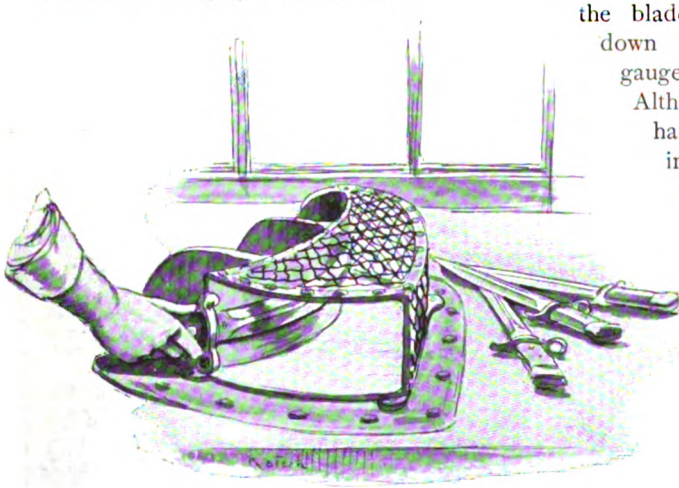
SWORD-GRINDING OPERATIONS.

secure an English weapon of the finest quality steel.

It may possibly come to pass that public indignation will be aroused, as it was about ten years ago, over the inferior quality of our soldiers' and sailors' blades, when a War Office Committee was appointed to investigate the matter with such satisfactory results to the nation; and that it will be made compulsory for volunteer officers to arm themselves with British steel.

During these investigations, which extended over several months, one of the principal witnesses examined was Mr. John F. Latham, of the Wilkinson Sword Company, and it was Mr. Latham whom I interviewed recently at this company's works in Chelsea—during the execution of a large Government order for several thousands of sword-bayonets—and discussed the manufacture of swords and bayonets.

The early stages of the process are essentially similar in a broad sense to those passed through by most other pieces of cutlery. The steel, of Sheffield make, is drawn into strips, equal in length to two blades, cut in half, heated in a furnace, and hammered out until it resembles roughly a sword blade.



BAYONET-TESTING.

An iron tang, designed eventually to receive the hilt, is welded on to the steel, and the blade is tempered. In tempering, each blade is made hot singly, plunged into a bath of tepid water containing certain chemical ingredients, drawn out—at this stage it is glass hard, being so brittle that if dropped it would break in a dozen pieces—and slowly heated over the fire until sufficiently tempered.

This operation can only be performed at its best when the day is bright. During the winter months, on account of the poor light, the average time available for hardening is only two days a week.

THE BRITISH BAYONET.

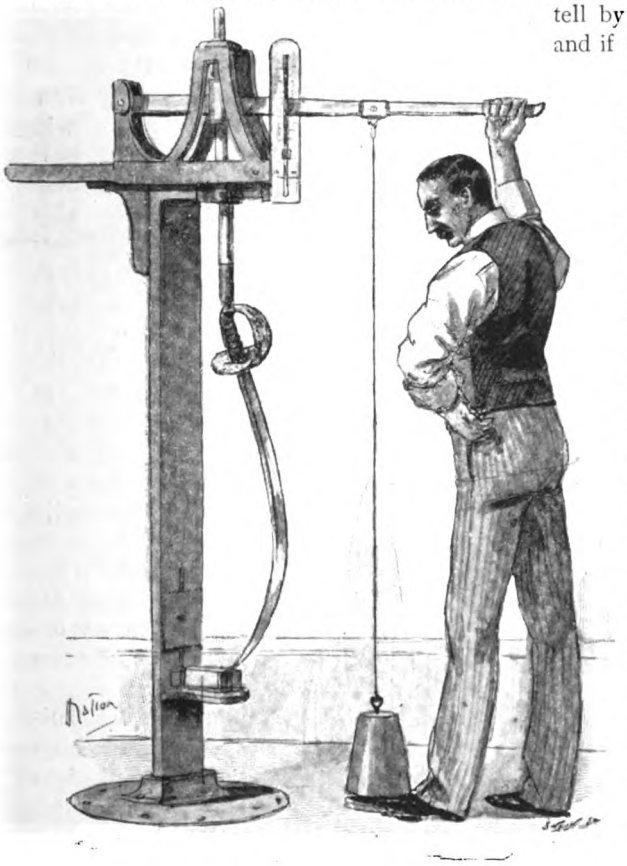
Beyond this point the blade may not again be worked in the forge; further heating would decarbonise it. In converting blades from one shape to another they are reheated, with the result that too great a quantity of carbon is extracted, and the steel becomes soft and of inferior quality.

After the blade has been cut and trimmed to the regulation size, it passes to a man at one of the enormous Newcastle and Leeds stones constituting the grinding department. During this operation five or six ounces of metal are removed from the blade before it is finally brough down to correspond with the rough gauges of thickness and width. Although the stone is particularly hard, the steel causes it to fly off in thin, wet streams, and wears it away to a degree that results in a stone seven feet in diameter being reduced to two feet in diameter in about six months.

When the blade comes from this room it is a dull bright, and requires to be polished, but it is never sharpened before it leaves the factory unless in compliance with a special order. Before going on active service, the bayonets and swords of all the soldiers and officers ordered away are returned to Enfield to have a cutting edge put on them.

Before the hilt and guard are fixed to Government blades, they undergo a number of severe tests on the premises at the hands

ot a Government inspector. So far as the bayonet is concerned, the polished blade is laid in a trough—a length of solid, three-inch thick steel, with the exact shape of the blade cut in the surface—and it has to fit this at every point along its edge.



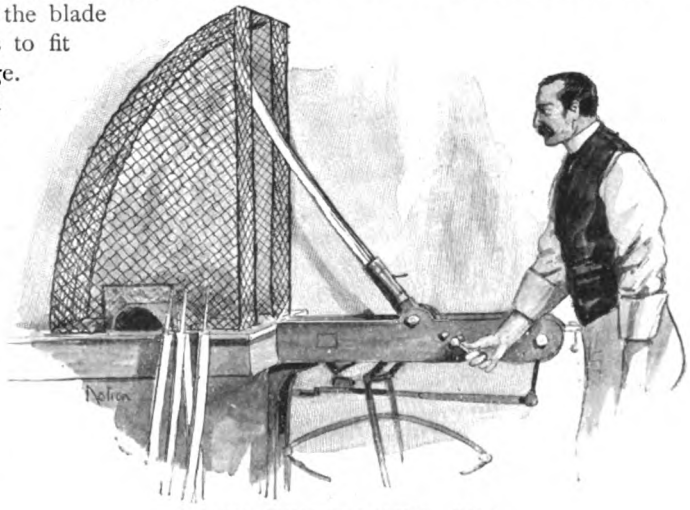
TESTING CAVALRY SWORDS. NO. 1.

Next, the blade is bent round a semi-circular sheet of steel, covered with a wire-netting to protect the operator in the event of breakage, after which it is placed in a machine that causes it to strike with its edge a block of oak with a force of 160 pounds, and on its flat sides a sheet of iron with a force of 80 pounds. In another machine it has to bear a vertical pressure of 180 pounds without bending. When the handle is fixed, the weapon is struck by hand on a solid block of oak, and the operator can tell by the ring whether the blade is sound and if the grip is securely attached.

The tests for the component parts of the bayonet handle are most severe, for, being interchangeable, it is necessary that each should fit accurately. Every conceivable portion capable of being gauged and measured is so treated by the inspector, and the greatest deviation allowed from the pattern weapon is the 2000th part of an inch. An error in the length or breadth of any piece beyond this limit, results in the condemnation of the weapon. In all, a sword-bayonet undergoes seventy tests, and it is saying much in praise of the skill of the British workman, when it is known that only one per cent of the handles are rejected, and three per cent of the blades.

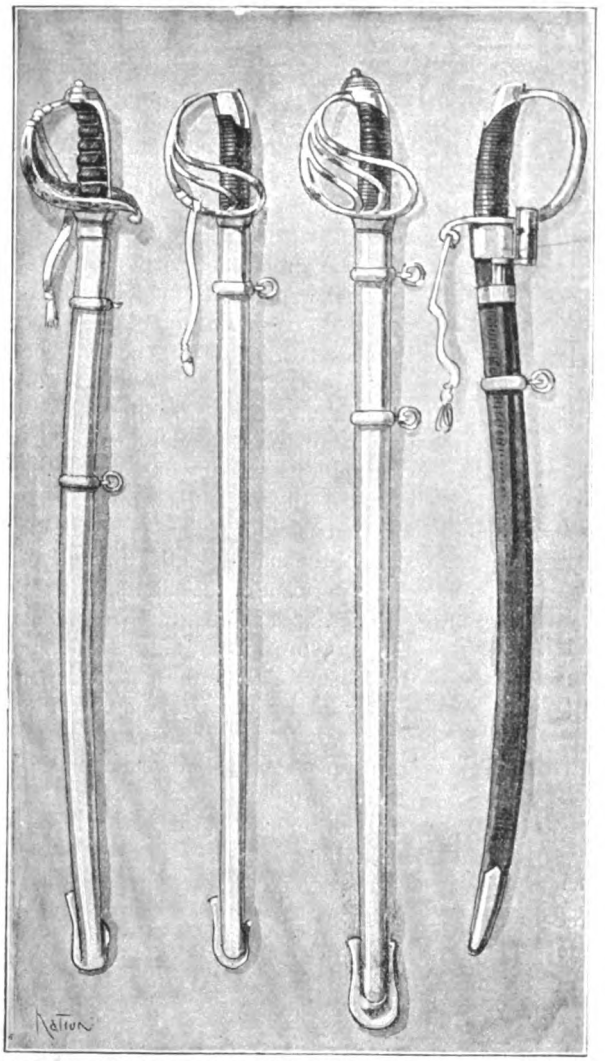
These tests, insisted on by the British Government, are considerably more severe than those adopted by either France or Germany, with the result that, so far as cutting and thrusting weapons are concerned, the British army is better equipped than that of either of these two great military powers.

In testing cavalry swords, the blade is struck under the same conditions



TESTING CAVALRY SWORDS. NO. 2.

as the bayonet (No. 2), is placed in a machine and pressed on the top while in a vertical position, until it is shortened four inches (No. 1), and must bear a 28lb. vertical pressure without bending. As the result of a scientific investigation instituted by the Government, it was recently discovered that in pressing on a blade so that it bent first on one side, then on the other—a common practice among infantry officers—the fibre of the metal was injuriously strained; when, therefore, the vertical pressure test is applied and the blade sprung, a small cross is stamped on the convex side to denote that the sword may be sprung only on that side.



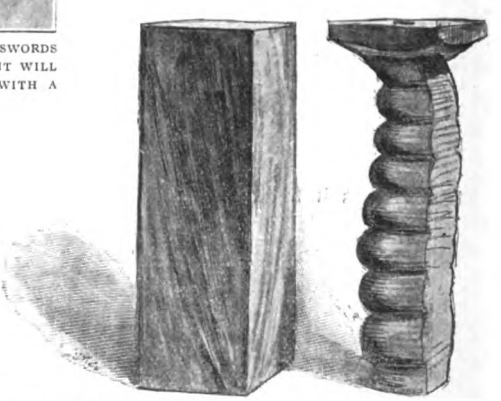
THE ABOVE SHOWS THE RELATIVE SIZES AND SHAPES OF THE CAVALRY SWORDS USED BY THE BRITISH, FRENCH, GERMAN, AND RUSSIAN ARMIES. IT WILL BE NOTICED THAT THE RUSSIAN SCABBARD IS EQUIPPED ALSO WITH A SMALL BAYONET.

The sword-grip is automatically carved from a block of hard Italian walnut. A block of wood is placed in the machine and left for three minutes, when it is taken out in its completed form. This grip is covered with the skin of a Japanese fish—the only suitable material—and bound with silver wire, after which the guard, stamped or cut, according to the quality, from a flat sheet of metal, is attached.

Numerous experiences in the past have proved the superiority of thrusting weapons over cutting. During the Peninsular War most of the British dragoons wounded were suffering from slight punctures in the chest or abdomen, and almost invariably died; while the French dragoons, whose bodies were cut even more seriously from an external point of view, in most cases recovered.

Similar cases have been experienced in India. Natives have been known to die of comparatively slight wounds resulting from bayonet thrusts, while the British have recovered from the severe slashes inflicted by the terrible tulwars of the Hindoos.

The tulwar is a most fearsome weapon when wielded by a competent



SWORD GRIP AND BLOCK FROM WHICH IT IS CARVED.

man. The handle, to an Englishman, is extremely small, not only because the hands of the natives are under our average size, but also because it lends itself to a firmer grip.

The blade is curved, and the weapon is carried with the edge upwards, so that the Oriental will draw it from its scabbard and cut open his opponent's head with one sweep; whereas the European first draws, edge downwards, then raises the weapon over his shoulder and strikes. There is no commercial competition among the native sword-makers of India, and consequently there is no particular hurry. A man will frequently spend six months in getting a satisfactory edge to a sword; and the owner is so careful of its razor-like quality that he will not injure the edge by contact with a scabbard, but will frequently wrap it up in well greased linen until the moment comes for using it.

THE TULWAR, WITH SCABBARD.

GHOORKA KNIFE.

Although a native armed with this weapon is capable of cutting off a man's arm or head at one blow, the European opposed to him, if he knows his business, has the advantage, inasmuch as the smallness of the tulwar hilt allows of no free wrist play, the man striking from the shoulder only, with the result that when once the weapon is above his head he has no guard, exposing himself to a thrust that would probably be fatal before his blow took effect.

Again, in the Eastern method of attack very little science is introduced, whereas the Englishman depends entirely upon his familiarity and skill with the sword in defending himself. Although the average weight of the British officer's sword is only a pound and three-quarters (this is heavier than the French and United States sword, but lighter than those of other nations), it is quite possible for him to avert a blow delivered from a heavy tulwar, provided he catches it on that portion of the blade nearest the hilt, and is sufficiently skilful in the art of fencing. It is essential, of course, in a case of this kind that the steel should be of the finest possible temper, and for this reason British blades are sent out to the Indian Army, where they are fitted by regimental armourers with hilts of regulation pattern.

The knives used by the Goorkhas of the Indian Army are curved and sharpened on the inside edge. The two *patás* or gauntlet-hilted swords, shown in the accompanying sketches, are specimens of the weapons used by the Sikhs and Mahrattas. The cross-bar is grasped by the hand, and the projecting bars form a guard for the arm.

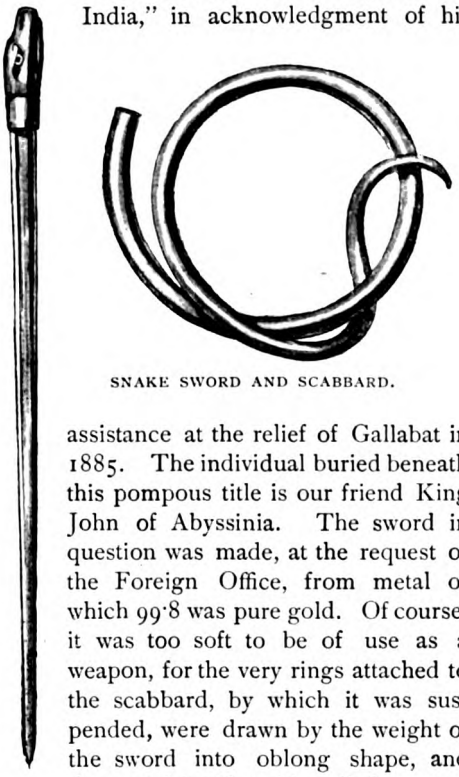
SIKH PATÁ.

A large number of other blades leave the Wilkinson works for many of the police bodies of India, while orders are constantly being executed by them, at the request of the British Government, for presentation swords, as acknowledgments of Her Majesty's appreciation of the services rendered by our dusky allies in India and Africa. Some of the magnificently jewelled weapons worn by the native princes of India at the present moment have found their origin in this large Chelsea factory.

SIKH PATÁ.

Among the most valuable swords un-

adorned with gems ever made in this country was one "presented to Yohannis Negus, Negast of Ethiopia, by Victoria, Queen of Great Britain and Empress of India," in acknowledgment of his



SNAKE SWORD AND SCABBARD.

assistance at the relief of Gallabat in 1885. The individual buried beneath this pompous title is our friend King John of Abyssinia. The sword in question was made, at the request of the Foreign Office, from metal of which 99·8 was pure gold. Of course, it was too soft to be of use as a weapon, for the very rings attached to the scabbard, by which it was suspended, were drawn by the weight of the sword into oblong shape, and the sword itself could easily be scored by the finger nails.

Another interesting gift sword was one presented by Her Majesty to King Coffee shortly before the first Ashanti War. It was afterwards found amongst the loot taken from the royal palace by the officers of the expedition, and presented to Lord Wolseley.

MAHRATTA WADKAH.

King Jaa Jaa of Opobo is also the happy possessor of a presentation sword given in return for his fidelity to the Queen by furnishing fifty men to assist the British during one of the numerous little African expeditions in which native chiefs have fought for or against us.

Most of the swords awarded as prizes by the heads of the Indian Army for military sports, all those used by the officers in the Chinese navy during the late Chino-Japanese war, and those carried by the men of the Argentine navy, were made amid the peaceful surroundings of Chelsea.

Swords designed for use as well as appearance are invariably made of steel. Aluminium has been experimented with, but with unsatisfactory results. To one weapon of this description, however, a certain interest attaches. When Prince Edward of Saxe-Weimar occupied the position of Gold Stick-in-Waiting to the Queen, he was also an officer in the Life-guards. In his former capacity it was necessary for him to hand his sword to Her Majesty on the occasion of her knighting her subjects. But a Life-guardsman's sword is no light weight to wield single-handed, therefore a special weapon of aluminium, in every detail resembling that carried by the Prince, was made for Her Majesty's use.

INDIAN CHAIN SWORD.

MAHRATTA WADKAH WITH HANDLE.

Mr. Latham, himself a keen connoisseur of steel arms, possesses a fine collection of ancient and mediæval weapons intermingled with types of the latest British patterns.

Among those of particular interest is a scabbard in the form of a curled snake, containing a Toledo blade of such excellent temper that, although it had remained in that wound-up condition for more than two years, when drawn out for my inspection it immediately sprang to its original straightness.

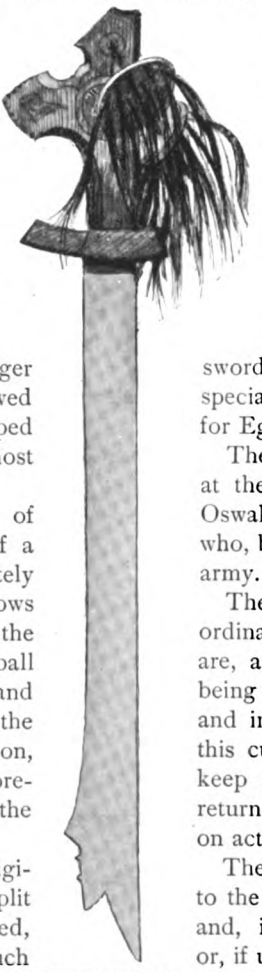
More diversity of style and originality of design is shown by the native hill tribes of India in the manufacture of their weapons than by any other section of the human race, and in all their fighting tools the desire to inflict the greatest possible amount of torture on their victims seems to predominate, in combination with that cunning subtleness characteristic of the Hindoo.

HINDOO SPLIT SWORD.

Take, for example, the gruesome Mahratta wadkah, the weapon of the assassin. It is shaped like a tiger's claws, and fastened to the fingers of the right hand by rings; with a treacherous embrace the murderer clasps his victim and tears him open, leaving him mutilated in a condition that leads the discoverers of the body to believe a tiger or some other wild beast has clawed the man to death. When equipped with a handle it becomes a most fearful weapon.

There is a certain amount of security in resisting the attacks of a stiff weapon, but there is absolutely no scientific guard to foil the blows of the Indian chain sword. At the end of a heavy chain is slung a ball spiked with sharp iron points, and unless the chain can be broken or the ball caught on the defender's weapon, the chances are far removed of preventing the spikes from entering the skull.

Another example of Hindoo originality in these matters is the split sword, in which the blade is bisected, on the flat, down the centre in such a way that when the double points are driven into the body they will spread and cause a wound almost certain to be fatal.



DYAK SWORD.

Alongside this weapon are a number of Dyak swords adorned with human hair brought over to this country by Rajah Brooke. The locks of the male victims are allowed to remain in their natural state, but those of the women are dyed a brilliant red.

Coming back to the swords of our own army, I was shown a sabre weighing 6lbs., specially made for the use of a big cavalry officer, whose views on the subject of attack coincided with those of the Orientals, and who believed a heavy weapon could play more havoc in a fight than a light one. Certain it is, that a light weapon in the hands of a strong man is seemingly inadequate for his defence. Colonel Burnaby's sword weighed about 2½lbs., and was specially made for him before he left for Egypt.

The biggest sword in the British army at the present time is that of Captain Oswald Ames, of the 2nd Life Guards, who, by the bye, is the tallest man in the army.

The fate of old swords is very ordinary. Those belonging to officers are, as a rule, preserved in the family, being handed down to father and son; and in order to assist in carrying out this custom, the Wilkinson Company keep a record which enables them to return the sword of any officer killed on active service to his relatives at home.

The swords of privates, when returned to the Government Stores, are retested, and, if serviceable, are again issued, or, if unserviceable, are cut in half, the proof marks effaced, and sold as scrap metal. They are then sent to Belgium, where they are welded together again and returned to this country and offered for sale.