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OUR WORKSHOPS HAVE SAVED THE ARMY.

Last summer we gave an account of the rapid manufacture of artillery that was going on in many of the Northern workshops, and remarked that the next great battle would be at least a noisy one. It has been not only noisy but awfully bloody; the losses on both sides having been surpassed in few, if any battles recorded in history. Nothing is plainer than that our army was saved from utter annihilation by our superiority in artillery. The number of guns in the army of the Potomac is stated at upward of 400, and the enemy, with all their energy in melting church and cow bells, have not been able to provide nearly as many. By means of our cannon we were able to repulse all of their attacks. The rebel officers drove their troops forward upon our batteries in the most reckless and determined manner, but our trained artillerists stood steadily to their guns, and mowed down the advancing foe in long lines, literally piling the ground with dead. The only successes which we have yet achieved have been due to our superiority in the mechanic arts.

With sadness, however, which we cannot express, we fear that the skill of our mechanics, the self-sacrifice of our people, and the devoted heroism of our troops in their efforts to save the country, will all be rendered futile by the utter incompetency which controls the war and navy departments of the Government.

MANUFACTURE OF DAMASCUS SWORDS.

In olden times the city of Damascus, in Syria, was renowned for its cutlery, and particularly for the manufacture of sword blades. The fame of these swords extended throughout Asia and most of Europe. They were so elastic that they could be bent like hoops, without breaking, while at the same time their cutting edge was as keen as that of a razor. Damascus blades possessed a wavy surface of regular bright and dark lines, and the mode of manufacturing them was kept a profound secret by the armorers of that city. Reese, in his Cyclopedia, states that they were made of a peculiar kind of steel, and it was the character of the metal, not the mode of making them, which gave them such superiority. The same idea is conveyed in the interesting article on the subject in the "New American Cyclopedia." From information which we have received on the subject—and which we shall hereafter cite—such statements do not appear to be reliable. Reese says of Damascus swords :—"About the beginning of the 14th century, Timeur Leng, on his conquest of Syria, conveyed all the celebrated manufacturers of steel from Damascus to Persia. Since that period its works in steel are little memorable. They were formerly of the highest reputation in Europe and the East. The famous sabres appear to have been constructed by a method now lost, of alternate layers, about two or three times thick, of iron and steel. They never broke, though bent in the most violent manner, and they retained the utmost power of edge, so that common iron, and even steel, would divide under their force."

The method of manufacturing Damascus blades was undoubtedly lost for centuries, but the "New American Cyclopedia" states that the Russian General, Anossoff, rediscovered the process of producing Damascus steel by smelting 11 lbs. of charcoal iron in a crucible with $\frac{1}{12}$th of graphite, $\frac{1}{32}$d part of iron scales and about $\frac{1}{24}$ths of a fusible flux such as dolomite. These substances are submitted to intense heat, in a blast furnace, for about five hours, when the scoria is scummed off, and the molten ingot of steel thus formed, is drawn under the hammer, and submitted to several heatings and hammerings. Of steel thus made, it is asserted that General Anossoff made several blades like those of Damascus, having the same dark and light wavy lines, which were produced after the blade was formed by pouring dilute sulphuric acid over it. General Anossoff died in 1851, and it is stated that his successors have not been able to produce such like swords. We do not wonder at this, for assuredly swords of the Damascus appearance, with wavy lines, cannot be made from bars of pure steel. The waving lines on such swords nearly resemble the minute and graceful shadings of the fine watered silk of which ladies' dresses are made, and they are due to the method of fabricating the blade, and also the combined metals of which it is composed. Blades resembling the old Damascus cimeters are not uncommon in this city, and they equal them in temper and elasticity. We are indebted to Mr. Herman Vasseur, No. 9 Maiden Lane, this city, sword mounter and scabbard manufacturer, for a description of these blades. They are made at Solingen, in Germany, the only establishment of the kind in the world. A faggot is first formed of alternate fine bars or wires, of iron and steel. Such a faggot is then drawn out, doubled and twisted several times, and formed into a ribbon. Two of such forged ribbons of iron and steel are then welded together, inclosing a thin blade between them of the best cutting English steel, and thus a Solingen Damascus blade is formed. The interior thin blade of English steel gives the sword a desirable and perfect cutting edge, and the combined twisted iron and steel, outside layers, impart to it peculiar toughness as well as the beautiful wavy surface for which it is also much prized. When ground and polished no wavy lines are recognized but by dipping the blade for a short period into dilute sulphuric acid, a portion of the iron on the surface is dissolved, while the carbon of the fine steel bars is unaffected, and appears in dark wavy lines contradistinguished from the white wavy surfaces of the iron bars. These blades are imported plain, and mounted in this city. Mr. Vasseur has lately mounted some of them in a splendid manner, to order, as presentation swords for several officers of our army and navy. The scabbards are made wholly of silver, and highly ornamented, while the hilts are tastefully mounted, with appropriate designs, partly cast and partly engraved. A silver scabbard is made by hammering rolled plate silver upon an iron mandrel of the proper form, and thus the plain sheath is produced. The ornaments, consisting of neat designs in silver, are cast from patterns, then trimmed and soldered to the sheath. A considerable portion of these silver scabbards are also gilt. They are certainly splendid specimens of sword mounting.

The inlaying of iron and steel with gold and silver is called Damaskeening, because this art was carried on upon a great scale when Damascus was the armory of Syria. It is executed by cutting burr grooves with a cold chisel, in the steel before it is hardened, and then hammering gold or silver wire in these grooves. This art is of great antiquity. We have read and heard it frequently stated that the superiority of Damascus swords was due to the mode of tempering them. This consisted in heating the hardened blade to a blue color, and handing it to a rider sitting on horseback, who instantly started off at a gallop, waving the blade against the cold north wind, which was required to be blowing at the time, or the operation could not be performed. We put no credence in such stories, because it is scarcely possible to temper a piece of very thin steel by waving it in the atmosphere, at a high velocity, during the coldest days in winter. The beauty and superiority of the Solingen blades must be credited chiefly to the skill of the artisans who fabricate them.

STEAM HAMMERS.

The London *Engineer* gives a description of the steam hammers in the Exhibition, from which we have condensed much of the following article :—

There are different classes of steam hammers; one has a fixed vertical cylinder with the hammer block secured on the outer end of the piston rod. The steam acting upon the piston inside of the cylinder raises it the full length of the stroke, then the steam exhausts and the hammer falls down by force of gravity upon the article to be forged. Another kind of steam hammer is quite the reverse of this. The piston in the inside of the cylinder is stationary, and is secured to a fixed rod; the cylinder forms the hammer, it is lifted by the pressure of steam, and then it falls by its own gravity. In both of these cases the hammers are single-acting, the steam being only employed to raise the piston, or the cylinder. In another class of steam hammers the steam pressure is used to act upon the hammer as it descends, thereby communicating to it a higher velocity than it could obtain by the action of gravity alone. This is a double-acting steam hammer. In the arrangement and construction of various parts of such hammers much difference exists.

A history of the progress of steam hammers will throw much light on their construction and application. Like the modern steam engine itself, they are of Scottish origin. The first that is mentioned in the history of inventions is that of James Watt, described in his fifth patent, dated April 28, 1784. In that patent he claims "applying the power of steam engines to the moving of heavy hammers for forging iron without the intervention of rotation wheels, by fixing the hammer to be so worked either directly to the piston or piston rod of the engine, or upon or to the working beam of the engine."

The next patented steam hammer was that of William Deverill, of London, in 1806. He claimed securing the hammer to the end of the piston rod, raising the piston by the steam, and then exhausting, when the hammer descended by its gravity.

Neither of these patents were ever put into practical operation. It is to James Nasmyth, of Edinburgh, that the engineering world is chiefly indebted for the