

Without stopping any longer to consider the bronze pieces of this epoch, we now come to the iron culverins, of which one deserves particular attention. It is loaded by the breech, its calibre is four centimètres, and its length is 4.90 mètres, or 109 calibres. In giving it this great length, the designer no doubt thought that he would obtain a considerable increase of its range. Unfortunately the breech mechanism is wanting; but as far as one can judge from the arrangement of the opening for it, it must have been very complicated, and somewhat similar to the actual wedge system. Another iron piece, but more finished than the one just mentioned, has got its breech apparatus. It consists of a moveable chamber, which is lodged in the bore, and is kept in its place by means of a wedge. This piece was found in the Island of Hortitz, in the Dnieper. Most probably it formed part of the armament of the vessel which defended the passage of the river.

Several other iron culverins are also exhibited, which show the great improvements which have been effected in the manufacture of a metal which even in our day we find so difficult to handle in the manufacture of artillery. Amongst the pieces of the sixteenth century, we find prototypes of the mitrailleuses of the present day. They are of different natures. Some consist of several cannon arranged like the spokes of a wheel, and moving round a horizontal axis. In others, small mortars are arranged in rows one above the other, on a large sort of general bed, or they are placed in a circle and moved round an axis.

Among the cannon of the seventeenth century there is one of bronze, which is rifled and is loaded at the breech. This piece, which dates from the reign of Michael Feodorowitch, refutes the idea prevalent amongst the English that the first rifled piece dates from the middle of the eighteenth century, and was made in England.

The dimensions of this gun are nearly similar to those of the present day. The breech closing arrangements, which unfortunately is no longer in existence, was adjusted with care. The calibre of the chamber was slightly larger than that of the bore. There are traces of five vents. These vents are spiked, which proves that the piece has been actually used.

Two other rifled pieces of iron must also be noticed, which date from the reign of Alexis Michaelowitch.

The greater part of these culverins have a calibre of from four to six centimètres; they have sixteen grooves, the section of their helix being semicircular, making one turn in 1.80 mètres, or about six feet; they are remarkable for the finish of their work.

Besides these and other iron pieces, we find amongst the guns of the seventeenth century there are both bronze and cast iron smooth-bore guns loading at the muzzle. The cast-iron guns and mortars are of small calibre, whilst those of bronze are of large and small calibre, and ornamented with inscriptions and chasings.

Second Period.—Upon the accession of Peter the Great, the chaos which had hitherto existed in the calibres, and the construction of artillery ceased, and made way for a regular organisation.

Fantastic inventions were laid aside, it was endeavoured to assimilate the different calibres, and above all to render the artillery capable of following the movements of infantry and cavalry.

With this in view, the loss of all the old Russian Artillery at the battle of Narva may be considered as a blessing. After this defeat, Peter, who reorganised his artillery, de-

cidated on the following calibres for them, viz., 12lbs., 6lbs., and half pound (8lbs.) He did did away with howitzers, and replaced them with unicorns, which he made as light as possible, in order to give them more mobility. It was also at this time that horse artillery made its first appearance, pieces being attached to dragoon regiments. At the same time the artillery was divided into field artillery, garrison artillery, and artillery of position.

Unfortunately the guns of this armament have almost entirely disappeared. The Exhibition only possesses a few bronze field pieces and three iron guns of position. Some guns dating from the first half of the eighteenth century are however exhibited, which are remarkable for their construction, but which formed no part of the regular armament—for instance, a 3 pounder of damascened iron, a muzzle loader, and constructed in 1709 by the workmen of Ioula. This piece is inlaid with silver ornaments and the way in which it is finished speaks very highly for the brilliant state to which working in iron had been brought in the eighteenth century at Ioula. By the side of this piece there is another one, a 4 pounder, even more elaborately ornamented, which was also made at Ioula during the reign of Elizabeth.

Amongst the pieces we have just mentioned there is one of bronze, presenting the appearance of an immense revolver. It is placed upon a carriage of primitive construction, and weighs fifty two kilogrammes.

It is supposed that this model owes its origin to Sicily, and this was the subject of a correspondence between Peter the Great and the Prince Kourakine, his ambassador in Paris, and of which he speaks as being an most interesting novelty.

Third Period.—From the time of Peter the Great to that of Elizabeth the Artillery experienced no fundamental modification, but on Schuwalow's being nominated to the post of Master-General of the Ordnance a series of reforms was commenced, of which he was personally the promoter and organiser, but which did not realise the expectations which he had formed.

The howitzers, called after him, the construction of which was kept secret, and bell-shaped field pieces called "Bluzniat," were amongst those which he introduced. The pieces of this nature in the Exhibition enable us to become acquainted with these engines of war, whose reign, however, was ephemeral. One show howitzer, of which the metal is of very second-rate quality, but whose interior shows remarkable finish, is especially noticeable. On the breech the following inscription is engraved—

"This piece was proved, examined, and fired in 1753, before the College of War and the 'généralité,' and was considered better than all the others pieces hitherto used against the enemy." After death of their originator all these inventions were laid aside, but, nevertheless, to Schuwalow is still due the merit of having lightened the material, of having introduced unicorn mortars, "licarnes," which have been preserved up to the present day.

During the reign of Paul I. the field-pieces were made still lighter, and their carriages were lightened; and lastly, in the time of Alexander I. the Artillery received the organisation which it retained, with some slight changes, during the whole of the reign of Nicholas I.

Fourth Period.—In order to represent at the exhibition the present state of the Artillery, a piece, representing each of the actual calibres now in use has been sent.

We find three field-pieces.

- 1st. The rifled canon de 9, breech loader.
 - 2nd. The rifled canon de 4, breech loader.
 - 3rd. The Gatling gun,
- Three siege-pieces.
- 1st. The 6-inch rifled mortar, breech loading.
 - 2nd. The cast iron rifled canon de 2 breech loading.
 - 3rd. The 9 inch rifled stool gun, breech loading.

Last of all the mountain gun, which is a rifled breech-loading canon de 3.

Amongst the objects which should be more particularly noticed is the 6 inch mortar and its carriage, the design of Colonel Semenow of the artillery of the Guard. Its carriage is made of plate-iron, and by no means of a pinion which works on a toothed are fixed under the piece, a depression of five degrees can be given to it.

The 9 inch steel gun should also be noticed; the breech is reinforced by two steel rings struck on, and the breech is closed on the Trouille de Beauve system. This piece was constructed at the Form steel foundry and weighs about 14,500 kilos. Its carriage, also of iron, is like the preceding one from the design of Colonel Semenow. This carriage is supplied with compressors, by means of which the recoil is checked, as with a charge of 52lbs. of powder it would be too great. All the visitors stop before this piece and regard with astonishment the effect produced upon iron armour plates eleven inches thick, which are either pierced or broken.

From a technical point of view we cannot pass over the mountain gun de 3, which is one of the first specimens of phosphoric bronze casting. The resistance of this metal and its homogeneity greatly surpass those of ordinary bronze. Thus in the comparative experiments, the gun of ordinary bronze burst when the bore had been subjected to a pressure of 2,250 atmospheres, whilst the one of phosphoric bronze was only greatly bulged under the same amount of pressure, and was afterwards fired twice without bursting.

With the ordinary charge the normal pressure is only 400 atmospheres for the mountain gun.

Amongst the projectiles we notice one recently introduced, called the "Scharoch," of which the front, which is spherical in shape detaches itself at the moment of explosion, and acts as a bullet.

The Bill on the Recruiting of the Italian Army, submitted to the Chamber Deputies by Signor Ricotti, proved that all the citizens shall be personally liable to military service from their eighteenth to their fortieth year. The contingent, to be levied annually, is to be divided into three categories, of which the first and second would comprise those persons who are to serve successively in the permanent army, the mobilised militia, and the sedentary militia. The third category would include those who are incribed on the recruiting lists, but who, from family considerations, are dispensed from service in the permanent army and the mobilised militia. The system of one year's volunteers will be maintained. The bill comprises regulations respecting the recruitment of students who have been sent home on leave as well as other matters of local interest.

Contrary to information given by the Naples journals, the war ships *Vedetta* and *Governolo* have not gone to Borneo, but to the Red Sea on a voyage of instruction and commercial interest. They will probably proceed to the East Indies.