teries, and are able to carry a heavier gun. Ours are now armed, with few exceptions, with 12-pounder breech-loading rifled guns of 8 cwt., weighing, with carriage complete, 38 cwt. These batteries also, before the adoption of rifled ordnance, were mixed batteries, being armed with 9 pounders of 12¼ cwt., and 24-pounder howitzers of the same weight. Their constitution, organization, &c., are similar to horse artillery. There are some 20-pounder batteries in store in this country.

Position Artillery—the third-class of field artillery—being design for the defence of posts, entrenched camps, lines, and for the occupation of important positions in the field, requires a gun of superior powers of fire to the other two; and as it is not intended to manœuvre, we can afford to sacrifice somewhat of mobility to its equipment. The advantages obtained by the employment of rifled ordnance will doubtless be very apparent in position batteries, for in these, the guns being fired at long range, they can, therefore, be carefully laid, and sometimes provided with platforms and even with small parapets for cover. The 40-pounder breech-loading rifled gun, weighing 35 cwt., or with carriage complete nearly 82 cwt., is the gun now used for their armament, and this requires 12 horses. The old smooth bored armament consisted of four kinds of guns: 12-pounder brass gun, 32-pounder brass howitzer, 18-pounder iron gun, and 8 inch howitzer. A position battery of 40-pounders has only four guns. Its carriages are, of course, much heavier than either those of the horse artillery or field battery, but are assimilated to them in construction. They have two sets of trunnion holes, one for firing the gun from, and the other for carrying it in.

These are briefly the guns required for the three kinds of batteries that accompany armies in the field. Mountain batteries form a fourth kind of field artillery, but may be looked upon as exceptional, as they are only intended for mountainous countries where all other batteries are too heavy; their guns, therefore, have to be lighter than either of the three before enumerated, and they and the carriages belonging to them are generally carried on mules. We have lately got a new gun for this service—a 7-pounder muzzle-loader, weighing 224 lbs. rifled, with three grooves having one turn in 20 calibres; its charge is little more than ½ pound.

Siege Artillery requires a different armament from field artillery; mobility is here not so essential. The weight and nature of the gun, employed in a siege, depends upon the means of transport we have at command, as well as upon the siege and strength of the fortress to be attacked. The heavier calibre we can get into position the more likely are we to succeed in crushing the works of a place; but heavy guns, with their weighty projectiles, cannot be carried far inland. At the siege of Sebastopol we were enabled to arm our trenches, in part, with 68 pounders and 13 inch mortars, but this was a most exceptional case; probably among the smooth-bores 32-pounder, 8-inch gun, 10 and 8 inch mortars, and 5½, 4⅕ mortars—brass—may be considered the most advantageous for this purpose. I have alluded to the advantages of the mortars in sieges; they are mounted on what are termed travelling beds, the wheels of which have to be taken off previous to firing the mortar. Our future siege trains will, of course, be much more powerful, as they will, to a great extent at any rate, be armed with rifled guns, and these being lighter in proportion to their calibre than smooth-bores, will enable us to bring larger guns into position. Possibly the 84-pounder of 7-inch, and 40-pounder gun will form our rifled siege ordnance. The accuracy too of their fire will shorten the time occupied in making a breach feasible, and the smaller quantity of ammunition thus required will tend to diminish the transport of the train, and lighten the work of arming our trenches. The elongated projectiles too, have great advantages for sieges: as shot, their penetration is greater, and as shell they contain more powder, being longer, and thus are more powerful when bursting in earthworks.

Siege guns then being heavier than field guns, and being fired with comparatively large charges are mounted on much stronger carriages. The great object we want here to attain is, to have one carriage suitable for conveying our guns on, and for firing them from, and to avoid all shifting of carriages. Those of you who have been shifting heavy ordnance in the school here will know the trouble it is, we cannot use a gyn, as its peeping over the parapet would soon bring down the fire on our party at work.

Garrison Artillery.—The armament of fortresses and garrisons depends on the size and extent of the works as well as upon the nature of the locality they are situated in; transport and mobility, which regulate the armament of siege and field artillery, being of little or no moment. There is no fixed principle in our service on which to base the number of ordnance or quantity of ammunition require for the defence of a fortress. The French divide theirs into three classes and apportion the number of ordnance accordingly. The quantity required for the immediate security of a place, is laid down at 10 pieces per bastion—this number providing for the armament of salients and flanks, and also allowing for the heavy mortars. But that required to sustain a siege must depend on the extent of the works generally, and thus fortresses of 1st class require 110 pieces. Fortresses of 2nd class 70, and those of 3rd class 30 in addition to above number. Guns ought to be so placed that the heaviest guns occupy those positions which command the greatest extent of range. In garrisons then, as we neither have to consider the matter of transport or require mobility, we are enabled to use very heavy guns, and thus obtain very much longer ranges, and fire very weighty and powerful projectiles. The shells from our muzzle-loading guns will prove, as I said before, most formidable in the defence of fortresses. We have, at present, of the following smooth bored guns mounted in our works at home and abroad—

68-pounders	.....	891
10 do.	.....	160
5 do.	.....	1017
56 do.	.....	10
42 do.	.....	41
32 do.	.....	1517
24 do.	.....	902
18 do.	.....	195
Carron	.....	398
Howitzer 10-inch	.....	55
do. 8-inch	.....	155
Mortars 13-inch	.....	155
do. 10-inch	.....	55
do. 8-inch	.....	40

These will, in part, be replaced from time to time by rifled muzzle loaders of 13-inch, 9-inch, 7-inch, and 7-inch breech-loaders and 40-pounders. Another place where we require very powerful guns is in coast batteries, i. e., batteries that are used for the defence of harbours and posts to defend dockyards, to prevent an enemy's landing on any part of a coast, and to stop the approach of his vessels. A smooth-bored armament was laid down for these in 1860, but, of course, the adoption of iron-clad vessels will force us to arm our coast batteries even more powerfully than our garrisons. Here we shall have in addition to the heavy muzzle loaders also 100 and 150-pounders smooth bores, and 68-pounders, and, possibly, 13 inch mortars, for defence of our principal dockyard. We employ 40-pounder breech loaders as guns of position to connect the different batteries and forts erected along our coast in England. In firing on moving objects, such as ships, the accuracy of rifled ordnance will prove an advantage; and, of course, their enormous power of penetration is here required. It has been said by Capt. Harrison, who acted as secretary to the Committee on Iron Shields in England, that for all ordinary purposes, experiments tend to show that a gun of about 12 tons, capable of firing shot about 200 lbs. weight, with a charge of 45 lbs., is quite powerful enough to give a good account of any iron-clad vessel that is ever likely to be brought against us. Our 9-inch gun is capable of this: and there is, no doubt, that we can build guns strong enough to perform all the work that has been set for artillery, so far in the way of penetrating iron-plates, if we use the proper material and shape for our projectiles. A few words about these; of which we have an enormous variety. They divide themselves into two large families—the spherical and the elongated. The first are fired from smooth-bore guns, the second from rifled guns.

In the 1st class we have solid shot, common shell, Diaphragm shell, Shrapnell shell, Carcasses, Case, Grape, Martin's shell, and we may add, light balls, smoke balls, lane shot and Manby's shot. The 2nd class comprises solid shot, common shell, segment shell, Shrapnel shell, case, hollow bodied and hollow headed shot, and steel shell. I propose to divide them into the following classes, and say a few words about the use of each: 1st—solid shot (including hollow bodied and hollow headed), 2nd—common shell; 3rd—Shrapnel shell (including Segment and Diaphragm); 4th—case and grape; 5th—Martin's shells; 6th—miscellaneous. Of solid shot we have two great families—the round and the elongated. The round shot is made of cast-iron, and is familiar, in appearance to every one. It is fired from all smooth-bored guns, except the 10 and 8 inch. The old practice of double shooting guns was generally confined to the navy when the ships were at very short ranges from each other. For this purpose they had to reduce their charges, as with full charges the strain would have been too great for the gun thus loaded the: practice obtained was irregular.

Solid shot for rifled guns are elongated, and are made of cast-iron, of chilled cast iron and of steel. The former are for breaching brick or stone work; and the latter for destroying iron shields or iron-plated ships. Those for the breech-loaders are coated with lead and antimony, and those for muzzle loaders have soft studs on them.

Chilled cast-iron shot are cast in a thick iron mould which rapidly conducts the heat from the molten metal, and causes the casting to become excessively hard. These projectiles are an invention of Major Palliser, and have now been adopted for our heavier rifled ordnance. They have established their superiority over steel shell for penetration, and are infinitely more reliable, as breaking up after passing through the target they form so much langridge, as it is called, or missile matter, the effect of which on the interior of ships or other defences, approaches to that which is obtained by the bursting