

thus exposing the powder, and the arm was capped and fired in the usual way.

As before stated Koster, of Nuremberg, in 1520 adopted spiral grooving. In 1742 Robins, the father of English gunnery, ascertained that one of the greatest causes of error was the imperfect rotation of the bullet, and he found during the course of his experiments that where the bullet became moulded, as it were, to the grooving, the greater was the accuracy of the rifle. Following out this idea the "Baker Rifle," before referred to, was brought into use, but it was found that though the bullet partook of the required rotatory motion, it was ill adapted for piercing the atmosphere. When it left the muzzle the belted side went foremost; but it quickly obeyed the ordinary mechanical laws and revolved in its shorter axis, thus presenting a larger area, or flat side to the air. To equalize this defect a four-grooved rifle was introduced, with two belts around the bullets, at right angles to each other, but it was not successful. In another system a bullet smaller than the bore was used, which was wrapped in an envelope or patch which filled the grooves and gave a rotatory motion. But this too was imperfect, and it is said that the rifle as a military arm would have fallen into disuse in Europe, had not a French officer, Mons. Delvigne, suggested the construction of a barrel with a breech chamber of a slightly less diameter than the barrel, in which the powder would be deposited, and a projection or shoulder upon which the cartridge could rest. This cartridge was composed of a *sabot* of wood, flat on the bottom and hollowed out on the top to receive a spherical ball, the whole enclosed in a patch of greased serge. The *sabot* allowed the ball a fixed support, and a few taps of the rammer were sufficient to flatten it slightly, thus forcing the lead into the grooves. Mons. Thouvenin and Minie improved this rifle by placing an iron stem (*tige*), screwed into the breech, about which the powder was placed, and upon which the ball rested while receiving the blows of the rammer. The *spherical* ball was abandoned and the conical one adopted, and by forcing it down on to the stem its base was expanded into the grooves. Many experiments were made with this system, and out of them grew the Enfield rifle in which the *tige* is dispensed with, and the bullet is expanded into the grooves by the action of a plug forced forward by the explosion of the powder.

(To be Continued.)

THE DUTIES OF THE PERSONNEL OF A BATTERY OF
FIELD ARTILLERY IN ACTION, FROM THE TIME IT
TAKES UP A GIVEN POSITION UNTIL "CEASE
FIRING" IS SOUNDED.

BY LIEUT.-COLONEL W. KEMMIS, R.A.

"England expects that every man will do his duty."

THE SILVER MEDAL PRIZE ESSAY.

The arm artillery, as a whole, or any particular branch of it—field artillery, for example—may be regarded as a powerful machine: one which, in its primary parts, is becoming, day by day, more developed, and therefore more perfectly adapted towards fulfilling its rôle.

In the application of any machine to the performance of work we well know that, to do its task efficiently and economically, not only must the machine itself be as complete and perfect as possible, but it must be applied with skill, the workman, or men, performing his or their, particular part in the right way, at the right spot and at the right instant; and if this be not so, the advantages to be gained by the use of the machine cannot be realized. The same truth holds good in principle in the case of field artillery, though the results are incomparable in magnitude from the mightiness of the machinery of the latter, the multitude of its motors and the grave issues involved.

It is therefore a very pertinent enquiry, and particularly so at the present time, when a notable advance is being made in the power of ordnance, "whether the personnel of field (or other) artillery, in itself, its organization, tactics and training, is fitted to utilize to the utmost degree possible that *matériel* with which its work is performed."

A very cursory glance at the records of our modern wars should satisfy anyone inclined to be sceptical on the subject,—if there be such,—that our officers and soldiers in the present day are no way inferior, in fighting and enduring qualities, to those, of whom it was said at the beginning of this century, that "they never knew when they were beaten," and we may safely conclude that the raw material at our disposal is in itself as fitted as ever for conversion to the skilled gunner. True, the standard to which he must be brought, in order to meet modern requirements and to make proper use of the now more perfected *matériel*, is much higher than formerly; but, even so, if the man

only possesses the spirit and physique proper for a soldier, his being made to come up to that standard can be but a question of organization and training. The discussion of these subjects it is not our province to enter upon, in passing we may, however, be permitted to express a doubt as to whether the grave changes of recent years are conducive to obtaining in the personnel that high standard of proficiency, self-reliance, readiness to obey and to command, which might and therefore ought to be reached.¹

The definite purpose for which guns in the field are brought into action varies: it may be for the attack, or defence, of a position, or in forming part of an advanced or rear guard, or again, upon outpost duty; and according to the general circumstances prevailing, or it may be, to the manner in which events of the moment fall out, the pieces may be brought into action deliberately and with more or less preparation, or, on the contrary, without opportunity for improving the position to be taken up, without much time for the exercise of judgment, and not unfrequently even upon the spur of the moment. But whatever the grand end in view may be, however events may influence the plan sketched out and the actual method employed, what though the minor tactics of a battery must vary to meet particular circumstances, yet its rôle from the time of taking up a position for action until "cease firing" sounds may be said to be "to deliver its fire with maximum effect;" consequently the individual duties of the personnel must, in the main, stand constant, though circumstances may at one time add slightly thereto, or at another diminish a little therefrom. From this it follows, that our purpose will be served by setting out the duties of the personnel with respect only to what may be considered as a commonly prevailing state of affairs.

In order, partly, to the right grasping of our subject at the outset and to its proper completeness and, partly, to the absence of recognized rule on certain points, some notice of the dispositions, which lead up to the commencement of the duties of the personnel in action, seem called for.

It is always desirable, though not always possible, to select with deliberation the position which artillery is to occupy for action. When this can be done and a definite spot has been assigned to a battery commander for his guns, he should have the opportunity of riding forward to examine the place, the bearing of the objective from it; etc., with a view to bringing his guns into it in the readiest manner and disposing them, when there, to the best advantage. This duty of examining the position, for the proper and effective application of the power in his hand, the battery commander should never delegate to another; in riding forward to examine it, he should be accompanied by one of his staff N.-C. officers² and by the battery range-takers:³ these latter, however, need not be brought actually into the position but left, until required, as near to it as regard to exposure of purpose permits. The staff N.-C. officer is required with the commander in order that, having been instructed as to the spot to be occupied by the guns and limbers in action, he may return, while the commander remains occupied with the range-takers, to the second in command with the information and with any special directions the commander may think well to send respecting the road to the position,⁴ halting anywhere previous to final movement into it, etc.; also, if the second in command has not already had instructions on the point, with regard to the intended post for the wagons and the best line for them to take to it;⁵ having conveyed these, or such like, orders, the staff N.-C. officer may be useful in guiding the leading gun along the route, or afterwards a particular gun in taking up the exact position determined for it. Meanwhile the commander, knowing exactly what he requires from his examination of the position, etc., and being for the moment free, gives instructions to the range-takers and to the officer commanding the escort of the battery, if there is one, or, if he has to rely upon his own vedettes, he points out to them their individual posts and gives them their orders; he then rejoins his battery either at the place where he directed its halt, or, at latest, before it comes into the position for action, so that this final movement may be under his own direction.

¹We have a standing committee to take cognizance of, and to advise those in authority upon, questions relating to artillery *matériel*, with a view to improvement: why should we not have a similar committee to weigh all matters connected with the *personnel*, such as organization, training, etc.?

²The senior, or battery sergeant-major.

³Not by the trumpeter. The commander of the battery escort, if there is one, should be at hand to receive his instructions as soon as the battery commander has made up his mind as to his dispositions. If there is no escort, and the battery is not immediately supported by other troops, the commander should take with him a few of his own spare men to post as vedettes for the proper safety of his guns in action.

⁴When it can be done previous to the guns taking up their final position, it is well for the battery commander to assemble, for a few minutes, his officers and Nos. 1 and give them such insight into the object to be attained by the battery fire and the tactics meant to be pursued, as may enable them to grasp the whole and so, afterwards, work their guns not only the more readily but the more intelligently.

⁵When the battery is acting in conjunction with others, this, in the same manner as the position for the guns, would be determined by the commander of the whole.