

ranted by facts. The *Pall Mall Gazette* has the following:

"The War Office has within the last few days received a memorandum voluntarily delivered to the Secretary of State by a British officer of high rank, representing the present condition of the army as tolerably bad, and Lord Cardwell's system of short service as a hopeless failure under existing circumstances. The main grounds for this assertion are statistics carefully drawn from the returns to show that the deaths, discharges, and above all the desertions, will, at their present rates, equal in six years the average number of recruits enlisted, and that therefore any hope of founding on this system a permanent reserve is and must be an utter delusion. It is pointed out, moreover, that, although the total numbers of enlistments are kept up by the supineness with which undergrown boys and worthless characters are accepted, the Guards are 400 under their strength and the Royal Artillery 2,000, owing doubtless to their fixing a reasonable standard before accepting recruits. Under these circumstances, the writer points out, the army must at present be looked on as simply a police force for home use and nothing more. All this may be gleaned, with appropriate comments on the facts, from the letters of German correspondents dating from London to journals in their own country; but we are able to correct their reports in one important particular, and to state that the writer of this startling paper is not, as they suppose, the Commander-in-Chief. It is understood to proceed from the pen of a well known general officer distinguished both for military service and for scientific knowledge."

Our readers will recollect, how exhaustively the subject of "Modern Artillery," has been treated in the pages of the *VOLUNTEER REVIEW*, and how emphatically the faults of existing systems were pointed out. It would appear that this question is about to be reopened, in as far as the system of rifling, and, as a consequence, the mode of construction are concerned. The proposed improvement was tried during the Crimean war on cast iron ordnance, with the practical result of blowing off about a yard in length of the muzzle of the gun; but at that time no improvement in construction warranting the slightest approach to rifling had appeared. As far as we understand the Lancaster system, it is a *two grooved rifle*—formed by the abscissa of the oval which defines the shape of the bore of the gun. The alloyed iron in construction was said to be the too rapid twist of the oval; and it is quite possible that this difficulty has been provided against. It has the advantage of presenting no arrises to the motion of the projectile or the action of the studs if used.

At the eleventh ordinary meeting of the Institution of Civil Engineers for the session 1874-75, held on the 16th of February, the paper read was on "The Erosion of the Bore in Heavy Guns, and the means for its prevention, with suggestions for the improvement of muzzle loading projectiles," by Mr. C. W. Lancaster, Assoc. Inst. C.E.

One of the greatest difficulties in the practical working of the muzzle-loading guns of the British Service had been the rapid

and injurious erosive action on the bore, due to the heated gases, generated by the ignition and explosion of the powder, finding vent on the upper side of the projectile, by the windage or difference of diameter between the calibre of the piece and the projectile, an allowance absolutely necessary to render muzzle loading feasible. The magnitude of this evil was demonstrated by the fact, that the gun was disabled after a comparatively small number of rounds, and consequently had to be inverted, in order that what was previously the lowest part of the periphery of the bore should be turned uppermost, the eroded part assuming the lowest position; and subsequently, after the new portion had in its turn undergone erosion, the gun could only be rendered available for further service by being retubed, with a new A-tube or steel lining. From official returns relative to the endurance of eleven 10 inch 400 pounder 18-ton guns, it appeared that after having been fired a certain number of rounds the whole of them were disabled, and required relining with new A tubes. The average or mean effective endurance of ten of these guns was equivalent to firing 177 rounds per gun, viz, 65 with full charges, and 112 with battering charges. Discouraging as this state of things was, it did not represent the full extent of the evil; inasmuch as, long before the necessity arose for turning the gun, or relining it with a new steel tube, its shooting power and accuracy had been materially deteriorated, by the erosion of the bore and the concomitant wearing away of the arrises of the grooves or angles of the rifling, which were the first parts attacked by the heated gas, and by the friction of the studs in centring the projectile, and in imparting the spin or rotation on its polar axis. The nature and extent of this prejudicial effect by erosion had excited the serious consideration of the British authorities. The remedial devices and appliances hitherto proposed had assumed, in the main, two distinct forms:—(1.) The coating of the projectile, wholly or partially, with a soft metal envelope, such as lead, which would, when subjected to the explosive action of the powder, be squeezed out, so as to fill the bore and take the rifling; and (2.) The application of certain accessories, attached to, or separate from, the projectile, such as discs, gas-check rings, or wads of metal or other suitable material. Experience had demonstrated that, with muzzle-loading lead coated projectiles, the powder must be limited to 1-10th the weight of the projectile. Since 1851, various devices, which were described in order of date of invention, had been tried, with more or less success, by the author, Capt. Blakely, Major Bolton, Major Lyon, the Elswick Ordnance Company, Major Maitland, and again by the author, with the view of preventing the escape of gas over the projectile by metallic wads or other material. Trials at Shoeburyness in 1873 gave promising results, as was subsequently testified by Sir William Armstrong, C.B., M. Inst. C.E. Still, whatever appliances might be employed at the base of the projectile only, the head remained at a tangent to the axis of the bore; not thoroughly concentric as in the breech loader, though, by the plans proposed, it was thought this difficulty might be met.

But however efficacious these various contrivances might be, the primary and radical defects of grooved guns and studded projectiles would always remain. Accepting such ordnance as being for the present established in the British Service, the author had sought to provide the means of diminishing, as far as might be practicable, their

attendant defects. All reasoning on the known premises led however to the inference, that the fundamental requirement was a simpler system of rifling the bore of the gun, whereby the smoothness and continuity of the interior surface might be preserved, while at the same time the necessary spin or rotary motion might be effectually imparted to the projectile. This, the author submitted, had been attained only by his own invention, known as the oval-bore gun and projectile; and his belief was that, when fully developed and fairly tried, this system would completely satisfy and fulfil all the conditions of the problem, combining a perfect gas-check and efficient centring with unsurpassed accuracy, high initial velocity, low trajectory, long range, and satisfactory powers of endurance. A careful examination and comparison of the official photographs sufficed to show that, from whatsoever cause, the erosive action of the powder on the oval bore was trifling; whereas, under precisely similar conditions, it entirely disabled the ordinary Woolwich rifled gun. If, then, the principle of muzzle-loading projectiles, which had been persistently approved by the authorities in this country, was to hold its own, and if muzzle-loading guns were to retain their place as the equals of breech loading guns, the existing faulty and unmechanical system of rifling, with a grooved bore and studded projectiles, on which in the end the whole question turned, must be discarded in favour of a simpler and better system of rifling for gun and projectile, such as the oval bore, a conclusion which could be established on grounds both of economy and efficiency.

We are glad to see that attention is again being directed to Mr Charles Lancaster's most valuable system of the oval bore, which is certainly in theory the nearest to perfection of any system of rifling, and in the future, with probably some very slightly varied appliance, may take the position which its talented inventor has so assiduously worked for.

We publish (by request) two articles this week on Major General SMYTH's report—one copied from the *Toronto Nation*, the other from the *Fredericton N. B. Reporter*. We propose commencing the publication of the Report next week, with some remarks of our own thereon.

On Tuesday last, the annual meeting of the Ontario Rifle Association was held in Room 11, Parliament Buildings, Toronto; the President, Mr. JOHN GORDON, in the chair. The following members were present:—

Lieut. Colonel Durie, D. A. G.; Lieut. Col. Denson, Brigade Major; Lieut. Col. Gilmor; Lieut. Col. Otter, Secretary; Major W. N. Alger, Treasurer; Major Arthurs; Sergt. Major Cruik, and Corporal Stanley.

The Secretary submitted the annual report, which, after considerable discussion, was amended, and adopted as follows:—

After alluding to the annual match on the Association ranges, Garrison Common, Toronto, on the 1st September, the report said that the actual receipts for 1874 have been about \$400 in excess of 1873, while the expenses have been some \$800 less, but as the balance brought forward in 1873 was \$2,288, that of 1874 was only \$512, leaving \$1,700 less of a margin to work upon. The number of Affiliating Associations was increased by