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ST. JOHN, N. B., SATURDAY, DECEMBER 23, 1899.

MODERN GUNNERY TERMS.

There are many terms and phrases used in the description of the war in South Africa which convey little or no information to many of those at home who are deeply interested in making out what is happening to their loved ones engaged in the field. An immense number of people are now deeply interested in the events of the war who want simple common-sense explanations about the terms they read, such as 'Creusot,' 'Krupp,' 'Shrapnel,' 'Common Shell,' '94 pounders.' '4·7-inch guns,' 'Mausers,' 'Lee Enfield,' and so on.

We have been told that the Boers have brought up some very heavy guns to fire upon Ladysmith and on Mafeking, but there is a dispute as to whether these are 'Krupp' guns or 'Creusot' guns, and I want first to explain what the discussion means. Creusot or 'Le Creusot' is a place in the Department of Saone-et Loire in France, which has long been famous for its extensive iron works. It does not follow, however, that a 'Creusot' gun was made at Creusot, because that name is now applied to all the guns that are manufactured by the great French firm of Schneider & Co., who in 1835 became possessed of the works at Creusot, which, after being employed by the State under the Revolutionary Government for the manufacture of guns, were under the Empire handed back to private owners. In 1867 Messrs. Schneider made themselves famous by being the first firm fully to apply and adapt to the manufacture of both plates for armored ships and guns various inventions, chiefly English, notably the great invention of Bessemer for the cheap manufacture of steel. From that time onward their works have been steadily developed. They have applied new processes to manufacture, including the use of various alloys —notably nickel, of which in its raw state the British Empire possesses almost a monopoly—to the improvement of the quality of the steel of which they make their guns. They have become the owners of a vast area of ground in the neighborhood of Havre, and have there created gigantic workshops almost on as large a scale as their works at Creusot. Thus, when we speak of a 'Creusot' gun, we mean a gun of whatever size made by the great French firm of Schneider & Co., whether it has in fact been made at Creusot or at Havre.

On the other hand, a 'Krupp' gun means that the gun has been made by the great Prussian firm of Herren Krupp, whose works are at Essen. An 'Armstrong' gun means that the gun has been produced by the firm of Sir William Armstrong & Co., the chief seat of whose work is near Newcastle, though they have large factories elsewhere—in Italy, for instance. A Maxim' gun means, as far as its name is concerned, that it is the invention of Mr. Maxim, an American, many of whose patents have been bought by Messrs. Vickers & Co. A 'Maxim-Nordenfeldt' is a combined product of the inventions of Mr. Maxim and of those that were brought to this country by Mr. Nordenfelt, a Swede. A 'Shrapnel' is the name given to a particular form of 'shell.' It takes its name from a Gen. Shrapnel, who during the Peninsular War invented a form in which it was applicaple to the spherical shells which were fired from the guns we then used.

When, by the force of gunpowder or other explosive fired behind it, a body, which we have placed in a space like the barrel of a gun, large or small, with only one opening, that toward the muzzle, is driven forward first through the barrel and then through the open air, the resistance that it meets with is due to the opposition of the air, while it is all the time under the influence of the force by which it has been propelled and of the attraction of the earth known as gravitation. Obviously, the resistance is diminished if the same weight of metal can be put into an elongated body presenting a relatively very small surface to the air as compared with a round shot. If, however, we were to fire out of a smooth bore gun an elongated body without any other precaution, the body, or, as we call it, the projectile, would at once begin spinning about its shorter axis according to a well known law of nature which any child can verify for himself. Experiment has proved that when once a projectile has been started with a good spin round its longer axis, the position taken by the body though the action of the air upon it is subject to certain remarkable laws which are irrelevant for my purpose yet remains very constant. Now if, by any one of many methods, we impart such a shape to the gun and to the projectile that as this later passes up through the bore of the gun, it has to turn round on its longer axis a certain number of times, it is obvious that it will leave the gun with an imparted tendency to spin round at the same rate with which it had to spin during the brief time it was in the gun. 'Rifling' takes many forms and has many varieties, but essentially it consists in the modification of the shape of the gun or projectile, or both, by which we thus make it spin in the bore in order that it may afterward have this spin as it goes through the air, and, therefore, here a relative fixedness of position during its journey on which we make calculations. We send it out of the bore of the gun at a certain pace of motion, and this pace as it leaves the muzzle we call its 'initial velocity.' The effect of the rifling in enabling us to send it through the air with less resistance than was met with by the round shot on the same weight keeps this 'initial velocity' from diminishing nearly as fast as it did with the round shot. Therefore, we are able to get very much greater ranges with rifled guns than we did with the old round shot. Furthermore, we get much greater accuracy because the old round shot as it went through the bore was accidentally set spinning in some way that we could not at all calculate upon, and all sorts of irregularities of flight resulted from this.

Most of the varieties of projectile which were used with the old smooth bores have been adapted to suit our present guns. A 'shell' is a projectile which is intended by means of some explosive matter inside it to break up into fragments. Before Sharpnel invented his shell, which was loaded with a number of large bullets intended to scatter among the troops at which it was aimed, the 'common' form of shell was charged was a mass of powder, and had two effects. It broke up into such large fragments that these, retaining most of the velocity remaining in the shell at the moment it opened, and having a certain fresh force imparted to them by the charge within the shell, struck with great effect against any solid bodies with which they came in contact and materially damaged them. The shells were thus very destructive to the carriages on which guns are carried in the field, and even, if they hit it fairly, damaging though not so often, to the gun itself. They were particularly effective against buildings, earthworks, and against walls in which it was desirable to make a hole or breach. They also, from the large quantity of powder within them, produced a body of flame which tended to create violent conflagrations wherever they struck any bodies easily ignited.

There was also another form of projectile, then called 'Canister' and now 'Case, without any serious difference in their essential characteristic. This was and is the great defensive weapon of artillery. The case or canister very soon breaks to pieces after leaving the muzzle of the gun, scattering the bullets it contains in a great cone of dispersion. It is thus only effective for short ranges against bodies of either cavalry or infantry actually closing on the guns to attack them; but at these close ranges it literally sweeps over all the ground in front of the guns, and is appalling in its destructive power. The shrapnel required much more careful adaptation to the rifled gun shell. To the best of my knowledge and belief, the man from whom all nations have borrowed the invention of the rifled shrapnel is Col. Hope, V. C. He, waiving that England should have the exclusive use of his invention, did not patent it, but sent it to one who had the power to introduce it into the English service. The recipient did so introduce it, and the rifled Shrapnel so introduced remains the great projectile of of our horse and field artillery. For the experience of the war between France and Germany led to the conclusion that a projectile which dealt out destruction among men was more effective for general purposes than one which only smashed material things. Hence both the Germans and we at the end of the campaign gave up the use of the 'common shell,' and now fill our wagons and limbers with shrapnel, while for defensive purposes we keep a few rounds of case.

Nevertheless, we have recently adopted an exceedingly powerful weapon that more than replaces the common shell. During the Peninsular War the guns that were then used chiefly employed, for the short ranges at which they were fired, solid shot, which did not break up like a shell; but we had also another form of weapon, the 'howitzer' which was only fired with shell the solid shot of the gun. In order to reduce the weight of the piece, and to enable it to be drawn easily by horses or mules in the field, it was made very much shorter than the gun, and this would have caused a great recoil from the reaction when the shot was discharged, the howitzer, instead of being laid, like the gun, approximately horizontal, was only fired at high angles, so that it shells travelled in very high curves, coming down on the enemy from above, while the recoil was largely downward and was received on a bed prepared for the purpose. When shell came to be so uniformly employed by the ordinarry field guns, howitzers gradually droppod out of use, and ceased to be any part of the ordinary equipment of field batteries. Circumstances have, however, restored them to favor. All nations have for a great many years been trying whether they could not introduce a more powerful explosive than gunpowder as a means of bursting their shells. It happens that there is a very powerful agent, long known to chemists, which if it only could be made practically availadle, seemed to promise to give very decisive results. This was picric acid Its compounds were very powerful and effective as long as they were quite fresh, but so fickle was the creature that the compounds rapidly changed their character deteriorated, and became dangerous. Neverthless both Germany and France set to work to create a compound, of which a picric should be the basis, such as could be safely used in the field. France uses a composition of picric acid known as 'melinite.' I do not know whether it is the case now or not, but a few years ago France met the difficulty of its rapid deterioration by making up fresh melinite and refilling the shells with it every year. For us, more especially for our ships, liable always to be recalled from distant stations to form fleets at home, it was exceptionally important to get over this difficulty of rapid deterioration involving danger in storage. After long experiments a form of picrate was devised which we call 'lyddite,' because the experiments were carried out at Lydd, one of our great practice grounds. From trial in various climates and long periods it was found that, on the one hand, it was possible with this material to secure adequate permanence, and, on the other that it was not safe to make it up for small shells. Yet it was necessary, if possible, to have weapons employing these shells with us in the field—that is to say, light enough to be drawn by horses, so that they could be moved about to a reasonable extent with other troops. It was for this purpose that recourse was again had to the old method of the howitzer. A 'battery' is six of these howitzers, short pieces firing at high angles of elevation, each drawn by six horses, and able to move along roads and on good ground at a trot, but usually obliged on difficult ground to move up into position at a walk. We have now three of these batteries, eighteen howitzers in all, on the way to the Cape. Meantime by the ingenuity of a naval officer, Capt. Scott, a substitute for them has appeared at Ladysmith. The navy have on board ship a number of guns which are not placed on carriages for moving about with horses, and being fired from the carriages on which they thus move. Though not broadside or turret guns, they are intended to be fired from fixed platforms. They, though somewhat heavier than the field howitzers, fire a shell of about the same size. These are the 4, 7 inch guns, the arrival of which at Ladysmith made at one time so great a difference in the situation.

We call these guns 4·7 inch because the measurement of the diameter or length taken across the mouth of the gun is four inches and seven-tenths of an inch. It is evident that for a projectile of given length this diameter represents the weight of the shell which the gun can throw as well as if we said, what is the fact, that the weight of the shell is about fifty pounds. There is a possibility that yet more powerful naval guns are being used, namely 6-inch. They would throw a shell of over one hundred pounds weight. We are told that the heavy Boer gun called 'Long Tom' is a '94-pounder.' That would mean that it throws a shell ninety-four pounds in weight. It is of much the same character as the 6 inch, not easily movable. The shells are made to burst by means of two kinds of 'fuses.' A fuse is an independent body put into the shell and travelling with it through the air. One kind, the 'percussion fuse,' is filled with a composition and mechanical arrangement, such that when the shell strikes any object sufficient to bring it to a stop, the shell is exploded by the fact of impact. The other kind, known as a 'time fuse,' is a much more delicate instrument. It contains a composition which burns at a fixed rate, and the amount of composition placed ready to burn being indicated by figures outside the case of the fuse, it is possible for the gunner, who 'sets' the fuse before it is put into the gun, so to regulate it that it will explode the shell after it has travelled for a certain number of seconds or parts of seconds through the air. Tables have by careful experiment been made out which enable us to know how many parts of seconds a fuse should be adjusted to burn in order that when the shell is fired at a given range the fuse should cause it to explode at a given height over the enemy and a given distance in front of him. Thus the shell with a percussion fuse always bursts on striking with sufficient

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GEN. LORD KITCHENER,

Chief of Staff to Lord Roberts, the New Commander in the South African Campaign.