

wide open the door for hypercritical condemnation. We are only deceiving ourselves when we try to make ourselves believe that the volunteer force of Canada is as effective as it is generally represented to be, or even as it ought to be, and we are only encouraging the profligate waste of the public funds when we approve of the manner in which much of the appropriations for militia purposes is expended. Many of the corps are lamentably weak and ineffective, and so far as our observation extends the infantry suffers in comparison with other arms of the service.

It must be borne in mind that the report of General Herbert is for the year of 1892. Why it has taken so long to get the views of the Commandant before the public must be left to the red-tapists of Ottawa to explain. It would have served a more useful purpose had the report been published a year ago, when matters referred to by the General were fresh in the minds of the people. Whether in the interim the Commandant has had occasion to modify his views, or whether he has seen, as the result of his efforts, any improvements in the force, we are not aware, and we suppose shall not know until another year shall have rolled away.

Speaking of the permanent force of the country, General Herbert institutes a comparison between the artillery and the infantry, to the detriment of the latter, and he attributes the superiority of the artillery to the fact that the batteries were organized by a competent officer of the imperial army (Col. Strange), while the R.R.C.I. at its inception lacked the guidance and fostering care of a similar competent and experienced officer. It is not for us to pass judgment on this delicate point. As a matter of fact we are not qualified to do so, but it is quite apparent from what we hear and read that the declaration of the General in this particular will be sharply questioned. It is openly charged, both by members of the force and by politicians, that the Commandant is biased in favor of imperial officers, that he would like to see all the highest positions in the Canadian militia filled by men who have served in the English army, and that his preference now for the artillery over the other arms of the service is simply a result of this bias of opinion.

However this may be, and however this report in other particulars may be challenged and criticized, one cannot ignore the fact that General Herbert is a good soldier, and is a man who possesses the courage of his convictions.

(As a matter of course the MILITARY GAZETTE is not committed to an endorsement of its contemporary's opinion.)

Lieut.-Col. d'Orsonnens, D. A. G., is now making an inspection of his military district.

The rifle competitions at the Bisley ranges begin this year on July 9, and preparations for the meeting are in active progress.

## Martini-Metford Cartridge.

By CAPT. FRED. C. WURTELE, R.L.

Now that the long wished for change in the S.A. armament of the Canadian service may be deemed a fixed fact, and the adopted rifle, the Martini-Metford, which may be said to be that used in the Imperial service, minus the magazine, a few words on the ammunition used in this '303 rifle and a description of the contents of those cartridges may at this time prove interesting.

Our rifle "to be" is the Metford barrel, with the Martini stock and breech action, slightly altered to fit the new requirements. The twist of the rifling is one turn in ten inches, and is in the opposite direction to that of the Martini-Henry, but the trajectory is so flat that there is no safe place for infantry to 500 yards. The penetration is very great, a bullet fired at 100 yards is said to have passed through the centre of a pine tree 22 inches in diameter, and had force enough left to go through a couple of men had they been sheltering behind it, thus showing that trees are now no protection from rifle fire. The cartridge is a solid drawn brass shell, bottle-shaped and very prettily proportioned; it is three inches long over all, and roughly speaking, seven-sixteenths of an inch in diameter at the base inside the flange, tapering to three-eighths of an inch at the neck, one and thirteen-sixteenths of an inch from the base, and three-eighths inch more in length for seating the bullet. This bullet, which is one and one-quarter inch long, is made of lead cased with nickel, and flush at the base, the casing being turned in over the lead; it weighs 215 grains, and is of the diameter of the bore of the rifle at the widest point, which is measured across the bottom of the grooves, thus being of sufficient thickness to be forced into the grooves when fired. Half a million of these nice little cartridges are now in store on the Citadel of Quebec, and are numbered Mark II., loaded with black pellet powder. The highly-trained mechanical staff of our cartridge factory are doubtless now prepared to proceed with the manufacture of this ammunition.

The powder pellet is made of the ordinary black rifle powder of the required density, but instead of being granulated is compressed into a pellet of the size of the shell, having a fire-hole in the centre through its length to insure thorough and instantaneous ignition throughout the charge. The cartridge case is necked or bottled over the pellet, the bullet seated, and finally capped. The cartridge weighs, ready for use, 438 grains, being 42 grains lighter than the *Martini bullet*. The powder pellet weighs 70½ grains, plus or minus 3½ grains, the variation allowed in the charging, which should be reduced to a limit of half a grain. The initial velocity is 1830 feet per second, being 500 more than that of the Martini-Henry. Mark I. is loaded with *cordite*, which gives an initial velocity of 2000 feet per second. What is *cordite*? This question cannot

be better or more clearly answered than in the words of Lt.-Col. Barker, R.A., in his lecture given before the Royal Artillery Institute, 23rd January, 1893, and published in the journals of that institute.

*Cordite* is a smokeless propellant of the combined (insoluble) nitro-cellulose (or gun cotton) and nitro-glycerine type. Its composition was determined by a committee (the Explosives Committee) of most distinguished chemists, with Sir Frederick Abel as president. They decided that the proportion of the ingredients should be gun cotton, 37 per cent.; nitro-glycerine, 58 per cent., and mineral jelly, 5 per cent. (Mineral jelly (vaselin) is the liquid which distils over from petroleum at temperatures above 200°C.) It is a hydrocarbon, richer in carbon than petroleum, and it boils about 278°C.) The gun cotton is first dried (in the form of 9 ounce *pouries*) down to about 1 per cent. moisture. Then a portion, 27½ lbs., is placed in a brass-lined box, and 43½ lbs. nitro-glycerine are carefully poured over it. These ingredients are then carefully mixed by hand and taken to the incorporating machines, and the whole is brought into a gelatinous condition by the addition of about 15 10 16 lbs. of acetone, which is poured over the charge in the incorporating machine, and worked up into a kind of dough. (Acetone is a colorless fragrant liquid, sp. gr. 0.81, and boiling at 56.3°C. Its chemical title is "di-methyl ketone." It is also called "pyro-acetic spirit," and is obtained among the products of the distillation of wood.) 3½ lbs. of mineral jelly are afterwards added, and the material is incorporated or mixed for seven hours. When it has been sufficiently incorporated and is ready, the charge is taken to the press house, where it is squeezed in a cylinder, one end of which has a small hole of the required size for the *cordite*, which is squirted through by means of a plunger or piston pressing on the other end of the cylinder. The cylinder is fitted with composition, and the plunger pushes or squirts the soft material in the form of cord or string of the thickness required. The sizes are .0375 in., which is used for the rifle, up to a .5 in., which has been experimentally used with a heavy B.L. gun with satisfactory results. This string is wound on reels for the smaller, or cut into lengths for the larger natures. It is then placed in a stove and is dried, to get rid of the acetone at 100 degrees Fahr., from three to nine days, according to the thickness of the *cordite*. It is afterwards blended in the rifle *cordite*, by taking the production of ten presses, which are on "one-strand" reels, and winding these on to one "ten-strand" reel. Then the *cordite* on six "ten-strand" reels is wound on to one drum, which makes up a rope or cord of 60 strands, which in short lengths form the 30½ grain charge of the magazine rifle. The larger natures of *cordite* are blended on the same principles as gunpowder. The strange anomaly of two of the most violent explosives known, nitro-glycerine and gun-cotton, when