

of a shell. Chilled shot must not be mistaken for shot cast in chill. The process of chill casting is, and has, for some time been perfectly well known in the iron trade, and shot have been so cast; but there is an important and characteristic distinction between the two, and in it lies Major Palliser's claim to originality. It is this, that where the old style of cast shot has an uncertain fracture, in which grey iron, more or less, predominates, Major Palliser's shot has a fracture of almost unvarying uniformity, in which grey iron is scarcely perceptible, and in recent castings it is eliminated. In short, the first was accidentally case hardened externally, more or less, the latter is designedly made for a particular purpose of a definite and carefully determined hardness throughout.

Steel shot are made of the best steel, not too hard, or they will break or impact with the object struck: not too soft, or it will alter their form, and they will cease to penetrate. They will, however, in all probability, soon cease to be used. Some shot are made hollow headed, and consist of a cylinder of iron, with a hollow conical head to enable them to cleave the air in their flight with greater ease, and thus render the ball steadier. We use also hollow bodied shot usually called battering shells: they are used for our heavier breech-loaders, either as a hollow shot or shell.

The application of solid shot is against troops in column or compact masses; in breaching or wherever penetration is required round shot are sometimes heated and fired against shipping. Common shells are fired both from rifled and smooth-bored guns, varying in shape accordingly, and being hollow they are filled with powder. The thickness of their metal must be such that the shell may be able to contain as large a bursting charge as possible, and at the same time be strong enough to withstand the shock of the discharge of the gun. The fuses of these shells should be bored rather long, so that they may penetrate into the object fired before bursting, and thus do the greatest amount of damage. They are used against wooden buildings, earthworks, and wherever you want a large flame to set fire to any combustible material: they will also do great destruction against masses of troops, in which case your fuse ought to be so regulated that the shell bursts immediately before reaching the ground in the midst of the troops. I have already alluded to the powerful shells fired from mortars and large muzzle-loading rifled guns. The shell of our 9-inch gun weighs 250 pounds and has a bursting charge of 18-pounds.

Sharpnel Shell include Diaphragm, Segment, and Boxer rifled sharpnel—the object of all being the same. This class differs very materially from the former, both in object and construction, common shells depend for effect on the magnitude of their bursting charge, and our object is to burst them in the middle of something, either troops or buildings and scatter their fragments in every direction right and left, and at the same time to evolve a flame capable of setting fire to every thing near their objects fired at. The Sharpnel class of shell is intended on the other hand to be burst some fifty yards in front of a line of troops, and does not depend on its bursting charge for effect. On the contrary the smaller it is the better, for all it is required to do is to open the shell and allow the segments or bullets in side to travel on without scattering them. These shells then require a construction weak from the inside, but strong enough from outside to resist the shock of the discharge of the gun. The Sharpnel shell for

smooth bores has its bursting charge in a tin cylinder running down the centre of the shell, bullets being all around. This is faulty, and this shell is abolished, and the Diaphragm shell, an invention of Col. Boxer substituted. Here the bursting charge is divided from the bullets by a thin wrought iron partition or diaphragm, whence its name. This again is faulty, as the bursting charge is in front of the bullets instead of the rear, and so tends to keep them in the shell instead of driving them out. The Armstrong segment shell is made of a number of similar segments, built up inside of a thin cast iron packet on an iron disc around a circular cavity, into which the bursting charge goes. We thus get the principle of the arch and consequently have what we want in the way of weakness from within and strength from without, but our bursting charge being in the centre of the segments gives too much lateral spread which is increased by the rotation of the shell in the air. Boxer's Sharpnel shell for rifled ordnance are the most perfect, being an application of the diaphragm construction to elongated projectiles. But the charge is situated at the bottom of the shell and separated from the bullets by a stout iron disc diaphragm, the head of the shell is lightly rivetted in, and thus becomes easily detached and the bullets, with which it is filled, relieved. To weaken the shell further from the inside and thus assist its opening, grooves are cut longitudinally down it on the inside. Here the bursting charge is in its right place, and the shell only requires a very small one. This class of shell was invented when musketry became more accurate, and its range lengthened, to act as elongated case, and fired against troops in line. Spherical Diaphragm shell is fired from our smooth bore ordnance except 10-inch mortars. From our breech-loading rifled ordnance we fire segment shell; and Boxer's Sharpnel has been adopted for 7, 8 and 9-inch muzzle-loading rifled ordnance.

Case is only fired at very short ranges. It consists simply of a tin case with a wooden or iron bottom filled with bullets, varying in size and number with calibre of gun, that for 100-pounder, 10 inch, 8-inch, and 32-pounder have iron cases. Lieut. Reeves has introduced a case shot for rifled ordnance, similar to that in use for smooth bores, the adoption of which, however, is as yet only provisional. Grape is principally intended for the use of the navy, and is not fired from bronze guns nor from guns with wrought iron tubes, but from all smooth bored guns of cast iron. That for the 10-inch is a kind of case. The present pattern consists of a number of cast iron balls arranged in three tiers by means of three cast iron circular plates, and a bottom plate of wrought iron, the whole is secured firmly together by means of a wrought iron pin which passes through the centre of the plates, and has a head on the lower end and a screw on the top to receive a nut. The number of shot vary in each tier from three to five according to nature of gun. Grape being for the sea service, as I said before, and for the defence of work, are very destructive up to 300 yards, but may be employed advantageously some times up to 600 yards. Martin's shell is a projectile used with the 68-pounder 8 and 10 inch guns against shipping, and consists of thin shell filled with molten iron. This shell is broken on impact and the molten iron is released and poured out setting fire to everything. The shell requires no plug. Carcasses are shells of considerable thickness of metal, with three vents. They are filled with an inflammatory composition, which being ignited by discharge of the gun,

issues from the vents in a powerful flame for from three to twelve minutes, and on the shell falling into a building or among combustible matter of any kind, the flames will produce conflagration; the nature of the composition is such, that it will continue to burn even under water. These shells are chiefly used in bombarding towns and against shipping and are fired from mortars, howitzers or guns. The vents are covered with brown paper and kit plaster, which has to be removed before loading. Besides these projectiles we have hand grenades; small shell to be thrown into works by hand; or fired from mortars in bouquets; light balls to discover enemies working parties; smoke balls, to fire into mines or other confined situations, to suffocate, or expel working parties; Manby's life apparatus, a shot, with four fuze holes attached to a rope to fire across a ship in distress, the fuses being to warn them of its approach at night; but my time will not allow of my entering into their detail. Every shell requires a fuse. Now of fuses we have three kinds: 1st, time; 2nd, percussion; 3rd, combination of both. The object of a fuse is of course to ignite the bursting charge of the shell at the right moment. This object, however, is attained with difficulty in each of these three classes. The time fuse is ignited by the flash from the charge of the gun, burns during the time of the shells flight, and ignites the burster at a fixed time. The percussion fuse is prepared for ignition and remains inactive during the flight of the shell, but on its impact ignites the bursting charge. A combination fuse is ignited by a similar mechanical arrangement as a percussion fuse and then acts as a time fuse. Our fuses are both of wood and metal; of time fuses we have Boxer's for spherical shell with 1, 2, 3 and 6-inch composition; of percussion we have Armstrong's field percussion Pillar fuse and Pittman's; of combination fuse we have Armstrong E. pattern time fuse and Boxer's 2 inch and 9 seconds fuse for rifled ordnance. We had formerly also some metal fuses for our naval shells, but they are to be withdrawn. Setting and boring of fuses is a very important thing, for on its being rightly done, depends the effect of our shell fire. You will find that the gunner, is much more likely to go right in it, if he knows first how his fuse is constructed, and I should recommend you who have to instruct him to pay great attention to this point, as it is the hardest thing of all to get well done in action, however, I think you will long have thought that I have talked enough, so with your permission I will limber up and retire.

HOCHELAGA LIGHT INFANTRY.—We are glad to learn that the daylight parade of this fine regiment of Volunteers continues to be well attended. On Tuesday afternoon nearly two hundred of all ranks were present at the drill on the Champ-de-Mars. The steadiness of the men, and their clean, soldier-like appearance, gained the approbation of a large number of spectators. Great credit is due to both officers and men of the "Hochelagas" for their perseverance in their drill.—[Montreal Daily News.

PRESENTATION.—We understand that the Brockville Infantry Company, lately presented a splendid sword and a pair of spurs, to Lieut. Col. Buell, the late Captain. The presentation was made by Captain Starr, in the Company's drill room, and was followed by a very complimentary, but truthful address, congratulating the Colonel on his deserved promotion, and acknowledging that to the faithful discharge of his military duties may be justly attributed the efficient and honorable position the Company now stands amongst the Volunteer force of the Province.—[Central Canadian.