A SNIDER CARTRIDGE.

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Having lately had an opportunity of visiting the cartridge factory at Quebec, I made a few notes on what I saw and learned relative to the many processes through which the parts of a cartridge have to pass before it is ready for the rifle, and now submit the same for the information of riflemen in Canada.

The bullets, cap shells and cartridge cases are made in the factory, formerly the barracks of the Royal Artillery; the loading and completion of the cartridge and of the cap are done at the laboratory in the Cove Fields; and that most dangerous operation, the preparation of the fulminate, is carried on in small detached buildings, some four hundred yards distant from the laboratory.

The following description of a Snider cartridge may not be out of place, and here it may be stated that the same description of cartridge is used in all B. L. arms with the Snider action. It is composed of sixteen parts, as follows:—Base disc, outer base cap, inner base cap, case body, with its paper cover and lining, cap-chamber, paper pellet, cap and charge of fulminate and anvil, powder and wad of wool, bullet and lubricant, and clay plug. The diameter of the bore of a Snider rifle is ·577 inch, the diameter of a bullet is ·573, or small enough to drop through a clean barrel, and a "fit" is made at the time of firing by the expansion of the rear of the bullet by the clay plug, which is forced forward by the explosion of the powder charge. The bullet is made from pure lead, and weighs as it comes finished from the machine 468 grains, the clay plug, which weighs 12 grains, going to make up the total weight of 480 grains. It is hollow in front and rear, the hole in the point being closed by having the lead spun over it, and that in the rear holding the clay plug. These hollows are necessary in order to get the bullet of sufficient length to ensure good shooting without unduly increasing its weight, and also to have its centre of gravity in the proper place to prevent its "tumbling" during flight. Three grooves, called cannelures, surround the base of the bullet, and are supposed to act like the feathers on an arrow in keeping it true in its line of flight, but their principal use is to hold the wad, which by the expansion of the bullet is squeezed out and lubricates the barrel. The case-body is formed of sheet brass, covered with brown paper, and lined with white tissue paper to prevent corrosion by the powder when stored for some time. At its base the body is strengthened by two cups of brass, an iron disc (the object of which is to afford means of extraction after firing), and a paper pellet, or wad inside, the whole being rivetted and held together by the cap-chamber, the top of which is bulged out over the pellet, whilst its base fits the chamfered recess in the base disc. In the bottom of the cap-chamber a "fire-hole" is pierced, and on the shoulders of the anvil rests the copper cap with its charge of fulminate. The charge of 70 grains of R.F.G. powder is placed in the shell, over which a small wad of cotton wool is pressed, then follows the waxed bullet, which is secured in place by being "choked" in the bottom cannelure.

A cartridge is 2·445 inches in length and weighs 715 grains; and thus each packet of ten weighs slightly over a pound.

As the manufacture of the clay plug is the only really dirty work in the factory, where all else is cleanliness itself, it will be first disposed of. A blue clay, from the parish of Beauport, is soaked and puddled and mixed with water until the impurities are extracted, and it becomes of the consistency of molasses, when it is pumped into calico bags, placed in an iron box, and submitted to pressure for nine hours, by which time nearly the whole of the water is extracted; the cakes are then taken to a furnace and thoroughly dried, after which they are broken up and ground fine enough to be passed through a wire sieve of 60 meshes to the linear inch. This powder is then taken to the plug machine, where it is mixed with a small proportion of water and compressed into plugs, which are afterwards burned in a furnace, and finally dipped into molten beeswax when they are ready for insertion in the bullet.

The lead from which the bullet is made of must be chemically pure, as the admixture of any substance which would harden it prevents its free manufacture and proper expansion at the time of firing. It is melted in charges of 250 lbs. and run direct from the pot into a hydraulic press, where as the lead cools, it is submitted to a pressure varying from 1,000 to 1,500 lbs., the result being that the lead is squirted through an orifice in the shape of a rod, the diameter of a bullet, and is wound on a reel of sufficient size to hold one charge of the press. From the press a reel is taken to bullet machine number one, in which the lead rope is cut off in bolts of uniform length, each having a cup-like cavity punched into the end which eventually forms the head of the bullet. In machine two, these bolts are placed by hand, one at a time, into equi-distant holes in the face of a disc which revolves vertically, and at certain intervals a punch presses into the bolts, the effect of which is to form the hollow in the rear and to round the point, leaving a rim extending beyond the point. It is in this machine that the exact size and weight of the bullet are determined, and they are carefully weighed and gauged, and if not found to be correct, the machine is at once adjusted. In machine three the cannelures are formed and the cavity in the point is closed by spinning the rim of lead over it, thus completing the perfect bullet; and here from time to time the bullets are frequently gauged. An examiner now takes the bullets in hand and places them in holes in a tray having a movable bottom and lid, when the points are brushed clean and carefully examined, and all deemed defective are rejected. The lid being put in place the tray is reversed and the bottom removed, thus exposing the bases to be likewise brushed and examined, after which the tray itself is lifted off, thus showing the sides of the bullets for inspection; having passed which they are placed, points down, in holes near the edge of a horizontal circular table about five feet in diameter, which revolves slowly, and while there the prepared clay plugs are inserted. This table is heated by steam and the time taken to effect one revolution is sufficient to thoroughly heat the bullet, thereby expanding the lead and softening the wax in the plug. From this table they are taken one at a time and passed through a hole or groove while hot, and the plug is pressed home, the metal in cooling contracting and holding the plug firmly in its place. After this process they are passed through the hands of a second examiner who inspects them in the same manner as was done by the first, and those which pass are packed in boxes and sent to the laboratory.

The base-disc may be called the foundation of a cartridge. The iron out of which it is made is imported in strips, 1.85 inches in width and .05 inch in thickness, which arrive at the factory in coils ready to pass through a machine which punches, at one motion, not only the disc, but the hole through its centre as well. The discs are then taken to a second machine, consisting of a table twelve inches in diameter, which revolves horizontally and has holes at regular intervals near its circumference, into which discs are placed, one at a time. As the table revolves, each disc in succession is brought under a cutter, which counter-sinks the hole on what afterwards becomes the outer side, and into which the flange of the cap-chamber fits. After the completion of this operation the discs are taken to a furnace, where they are heated on wire trays to redness, and then plunged into linseed oil, a certain portion of which being burnt causes them to assume a black and varnished condition, thereby preserving them from rusting.

The brass for the outer base cup is .017 inch in thickness and is imported in strips regularly coiled and in readiness for the machine through which it passes, the operation of which is to (a) cut a circular disc, and (b) to punch it into the cup shape. These cups are not annealed, but are scoured in an acid solution. The brass for the inner base cup is .005 inch in thickness, and it is passed through a machine similar to that for making the outer cup, only that a larger disc is cut, and a greater length of cup is formed, after which it is annealed. After these cups have been completed they are taken to a machine in which an inside cup is placed bottom up, and on it is placed an outside cup, which, as the circular table revolves, are brought under the action of a punch, which presses them tightly together and in the same movement punches the cap-chamber hole through them both, and completes them for the cartridge case.

The sheet brass cut of which the cap-chamber is formed is .036 inch in thickness, and is split into strips .7 inch in width to feed into the first machine, which cuts out a circular disc and forms it into a shallow cup, when it is annealed and passed through a second machine which elongates it and at the same time lessens it in diameter. A second annealing here takes place, and in its passage through a third machine it is further elongated and drawn to its proper diameter. It is then cleaned by being placed in quantities with saw-dust in a drum which revolves horizontally, and after a few hours of continuous motion, it is removed, separated from the saw-dust, and taken to a fourth machine in which it is trimmed to the requisite length in readiness for the last operation in a machine in which it is flanged at the rim. After this operation it is most critically examined for size and freedom from any defect, and certainly many are rejected, which, to the eye of an outsider, appear to be perfect, and yet do not come up to the standard required in the factory.

The caps are made of copper, strips of which .4 inch in width are passed through a machine, which punches out circular discs and presses them into cup shape at one operation; these, after annealing, are passed through a second machine which further elongates them and forms them to the correct size inside and out. In a third machine they are cut to the proper length, after which they are again annealed, drummed in the same manner as the cap-chambers, and examined most