

The empty shells are taken to the loading house, where they are passed singly through the filling machine, which by the way was designed and manufactured at the factory, and is an improvement on the apparatus first in use. Into each shell is dropped 70 grains of powder, and this weight is often tested, but as the limit of variation in the charge is fixed at between 2 grains over and 2 grains under the standard weight, it follows that a shell holding 68 grains, or another holding 72 grains will pass inspection. As the filled shells are removed from the machine a lad places in each a small wad of cotton-wool, which is pressed with a wooden rammer on to the powder.

The filled shells are removed to another building, where the bullets are seated, and by the aid of the "shotting" machine are driven home, the end of the plunger being concaved to fit the point of the bullet, and arranged so as to descend only a certain distance. From the "shotting" machine the cartridge passes to the "creaser," and before it can enter it must pass under an arched gauge, and in its passage through the case is choked or creased into the bottom cannelure, and the bullet thereby securely fastened in place.

Capping is the last operation done by machinery. Reference has been made to the caps with their anvils being in readiness for the "capping" machine. They are now taken from the trays and placed in holes, anvils up, in the surface of a horizontal revolving plate. The cartridges are fed on end into the machine from the opposite side, and as each passes over the revolving plate, the cap is forced upwards into the cap-chamber by a concave punch. For fear of a cartridge exploding at the time of capping, the operation is performed under a stout iron tube, so that if an accident did happen, the bullet would pass through the tube into the roof of the building. No such occurrence has as yet taken place. Just before the cap passes under the cartridge, a hook acts automatically and extracts any cap that may not have had an anvil placed in it. This addition was invented at the laboratory.

After a final inspection and being passed through a gauge, the cartridges are complete, and are put up in packages of ten, and then in cases containing 240, 500, 1,000 and 2,000 rounds, each case being labelled and marked with the brand of powder used, number of the case, and date of packing, all of which is registered, so that by giving all the "case marks," the whole history of a batch of cartridges can be told at the factory.

Three per cent. of all cartridges made are tested by the superintendent; two per cent. being fired from rifles in the Whitworth rests at 500 yards range, at targets 24 feet square, the faces of which—for there are two of them—are laid off in divisions of three feet square, which are subdivided into six inch squares. A hit can thus be plainly seen by the aid of a telescope, and its position noted on a diagram. Twenty shots are fired at a time and noted and from the results obtained the figure of merit is calculated. On the margin of the diagram are noted the heights of the barometer, of the wet and dry bulb thermometers, the direction of the wind and its strength as determined by the anemometer, and also the general state of the weather the detail of the ammunition used, and the object for which the test has been made. The remaining one per cent. of cartridges are opened, the charges of powder weighed, the bullets examined, and the caps snapped to determine whether the anvils are or not present.

When powder is purchased an employé of the factory is sent to the powder mills, who obtains samples of the powder which are tested by the superintendent for density, for cleanliness by flashing, for granulation by passing through sieves of a stipulated mesh, and for initial velocity by being fired in connection with the Boullengé chronograph.

A new style of cartridge case has been invented by Mr. Dixon, foreman of the factory, known as the "coiled brass shell," in which the case body is made of a greater width of brass, thus adding strength at the base, just where it is wanted, and doing away with the brown paper cover. The machine on which this shell is formed is a combination of the "roller" and the "crimper" machines, and was designed and made at the factory. This shell has been thoroughly tested and has proved to be superior to the ordinary shell, and its cost is somewhat less, as the expense of paper, cement and labour is saved, against which there is an increase in the length of brass and in the case body. This shell has been re-loaded and fired twelve times, and as a handy set of re-loading apparatus, together with the bullets ready waxed and plugged, caps, anvils and powder can be obtained from the factory through the proper source, there is no reason why riflemen should not enjoy cheaper ammunition in the future, if they will only re-load their own shells.

The cartridge machinery was constructed in England, but many changes had to be made in it after its arrival before it would turn out work to pass the standard, and certainly many important improvements have been made upon it. New machines and apparatus, notably

that for filling the charge of powder into the shells, have been designed and made at the factory; and all the dies, punches, gauges, etc., required are made on the premises, and when it is known that everything has to gauge to the one-thousandth part of an inch, it proves that in the mechanical department a very superior class of workman are employed. The system of inspection is perfect; it is rigid and exacting, and every part of a cartridge must conform exactly to the gauges supplied and the standard fixed, and a constant supervision is exercised by the superintendent and his assistant and the foreman at all times, and the parts manufactured have a better appearance, than the similar parts in cartridges, mark IX. Between 50 and 60 hands, male and female, are employed. The ordinary output is about 15,000 per day, but during the late troubles in the North-West, 25,000 rounds were turned out in 24 hours, packed ready for shipment.

An improvement has been made in the mode of securing the lids of ammunition boxes. Formerly they were secured by a screw, which necessitated the use of a screw-driver, which in turn was not often at hand, and then much delay ensued. The screw has been done away with, and its place is taken by a brass spring cotter attached to a piece of twisted wire which passes through a hole in the cover, and permits the cotter to be put into place and secure the cover, and after it is in place a paper seal is put over the wire and remains until it becomes necessary to open the box, to do which a bayonet or other pointed tool, is passed under the twisted wire and the cotter lifted out of its place. As this cotter could not be purchased at a reasonable price from the trade, a special apparatus was devised and made at the factory to roll and form them out of ordinary brass wire. Up to the present the old cartridge boxes have been used for packing and shipping ammunition, and in the near future, those made from Canadian wood will have to be obtained.

The engines and boilers furnishing the steam power are of Quebec manufacture, and are ample for all purposes. The factory and the laboratory are lighted by the Edison system of incandescent lighting, each having its own dynamo, driven by the surplus steam power.

### THE TARGET.

The following details of the annual class firing in Military District No. 2, in the September camp at Niagara, have been forwarded to us for publication. It will be seen that the figures are throughout better than in No. 4 District:

Number who completed firing.....	1,209 men				
Percentage of 1st class shots.....	8.52 or 103 "				
"    2nd "    ".....	11.83 " 143 "				
"    3rd "    ".....	79.65 " 968 "				
19th Batt. average....	25.09	Best shooting Co....	2	Average....	34.82
20th " " "....	22.63	" " "....	1	" " "....	27.73
31st " " "....	17.80	" " "....	3	" " "....	21.53
37th " " "....	22.37	" " "....	4	" " "....	31.87
39th " " "....	15.03	" " "....	3	" " "....	18.42
44th " " "....	15.03	" " "....	3	" " "....	24.92
Best shot in Brigade—Pte. Gadsby, No. 2 Co., 19th Batt.....	67 points				

Ranges—200 yds., 5 shots, standing; 400 yds., 10 shots, kneeling; 500 yds., 5 shots, prone.

As I have forwarded my report to the D. A. G., and have not kept complete copies of all the particulars, I cannot give any extended notes. I might say that the weather was very trying on young shots, the wind blowing very strong from the left front; so much so that the targets were blown down once, compelling us to stop the practice.

Your comments on the target practice as carried out in camp are my sentiments, and I hope you will succeed in inducing the Department to listen to suggestions for the better conduct of this practice.

JOSEPH WHITE,  
Capt. and Adj. 34th Batt.,  
Brigade M. I.

LONDON SCHOOL OF INFANTRY.—Mr. H. James, architect of the Militia Department, Ottawa, on Saturday inspected the Carling farm, in company with Col. Aylmer and the City Engineer, and concluded to locate the proposed militia school building on the north-west portion of the recently purchased 55 acres. The front elevation and main entrance will be upon the south, and the intention is to make the buildings quadrangular in form, but at present only three sides will be erected, although the northern side will most probably be completed at a subsequent time. The school will have a frontage of about 100 yards on the south, and a depth of 50 feet on each side. The buildings will be two storeys in height, with basement, which will be constructed of stone. The plans have not yet been completed nor the tenders called for, but it is stated that this will be done shortly.—*London Free Press*.