

It points to a chain of provinces bound together by a tie of affection and respect ever ready to rise in defence of one another under the talisman of a Union Jack. A warning finger has been held up to all rebels that will last for many a long day, and will serve to show that the Beaver as well as the Lion cannot be trodden upon with impunity.

RIFLES AND RIFLE SHOOTING.—XI.

BY CAPTAIN HENRY F. PERLEY, HEADQUARTERS STAFF.

The bullets used with the Snider-Enfield rifle are known as expanding bullets, and *pure* lead only is used in their manufacture; for, being one of the most non-elastic of metals, it requires the least force to expand it, and makes but little effort to resume its original shape after having been altered by any force impressed upon it, whilst its mixture with any other metal affects this property of non-elasticity. As has been before stated bullets were originally cast, and as a rule were found to be imperfect and faulty. Now, they are made by machinery, by which they are formed in steel dies and the accuracy of their manufacture has been brought to such a state of perfection that a working limit of two grains over or under a weight of 480 grains, is all that is permitted in the Snider bullet. The machinery in use will turn out 2,650 bullets in less than two hours at a cost of about two cents for five; but before commencing their manufacture great care is exercised in testing the purity of the lead to be used, which, if found to be satisfactory, is placed in a melting pot, and when sufficiently fluid is removed to the "squirting machine" from which the lead issues in the shape of a rod, and is wound on reels which hold 130 yards, each reel weighing nearly one quarter of a ton, or enough to make 6,800 bullets. A coil is then placed in a bullet machine, the end of the lead rod being passed between a pair of grooved rollers, by which it is drawn forward through a box of lubricating composition to facilitate future movements. Passing through a hole rather more than half an inch in diameter, a piece exactly the length of the future bullet is cut off and is instantly seized by a pair of nippers and is held momentarily before a die; a punch then protrudes and forces the cylinder into the die where it takes the prescribed form. But this operation leaves it hollow and open in front, but by passing through another machine the point is spun over and closed, and the bullet then has its shape and appearance as seen in a cartridge. A number of changes have been made in the Enfield bullet, both in its shape, in the number of grooves by which it is surrounded, in the plug, &c. At first it was smooth and had a cavity in the rear, the sides of which expanded, directing into the grooves by the action of the gas, but it was only under certain conditions that satisfactory results were generally obtained. To obviate the difficulties experienced the shape of the cavity was altered, and an iron cup placed in it to aid expansion. But this did not fulfil the requirements of a good bullet, and in 1855 a new form with a boxwood plug was adopted which gave increased accuracy in shooting, and in a few years after a plug of baked clay was substituted for the boxwood one. The construction of the Snider bullet is peculiar—the head as well as the base being hollow; this last being required to receive the plug which is forced forward by the explosion of the charge of powder and expands the rear of the ball into the grooves of the rifle, whilst the first was found to be necessary in order that a proper length should be obtained without increasing the weight, and at the same time to preserve the centre of gravity, and thus ensure the bullet travelling point foremost in its flight. This bullet weighs 480 grains is 1.065 inches in length and is .573 inch before being lubricated. The length of a Snider cartridge is 2.445 inches, weighs 1 oz. 10 drs. 20 grs. and contains 2½ drams or 68 grains of powder. Up to 1857 the lubricating mixture was composed of five parts of tallow and one of wax, and it may be said that the use of these materials was the cause of the rebellion in India. Amongst the Mahomedans, the pig is held in abhorrence, whilst among the Hindoos the cow is venerated, and it is considered a sacrilege for any of the last to touch with the lips the animal or any part thereof which is thus venerated; and it is an abomination to the first to do the same with the detested pig. Great dissatisfaction arose among the Sepoys, fermented no doubt by fanatics, and the *lie* was spread over the land that by compelling the Mahomedans to apply his lips to the fat of the pig, and the Hindoo to that of the cow, the British government intended to break down "caste," or the distinction and difference with which the native Indian has enwrapped himself. In explanation it must be stated that the muzzle loading Enfield rifle and its cartridge had only just been put into the hands of the Sepoys, without giving prominence to the change which had been made in the firing exercise, that the cartridge was to be torn open with the fingers of the left hand, instead of being bitten off with the teeth, as was the practice with the cartridges served out for "Brown Bess." Owing to the revolt the lubricant was changed to five of wax and one of tallow; and in 1859

and since then only wax has been used. If an Enfield bullet be examined it will be found to be surrounded by three grooves called "cannelures." These, beside holding the lubricant, assist, by the impinging of the atmosphere against their bases, in keeping the longitudinal axis of the bullet in the line of flight, as will be explained further on.

At present the Snider cartridge case consists of a base-disc of iron .047 inch thick, copper or brass cap chamber, two base cups of brass, paste-board or rolled paper wad, and a body which is made of 1¼ turns of brass .005 inch in thickness, covered inside and outside with thin paper. The exploder consists of a copper cap which is placed in the cap chamber, resting on a small brass anvil, which in turn sets on the bottom of the chamber. To explode the cap the crown is indented by the striker of the rifle, when the detonating composition is brought into contact with the anvil, and the flash passing through the fire-hole at the bottom of the cap chamber ignites the charge of powder. Each cartridge case is first capped and then filled by the aid of an apparatus with the proper amount of powder on which is placed a plug of cotton wool, then the bullet, which has been coated with wax, is inserted, and the cartridge is "choked" by running a crease around it into one of the grooves, and is finally completed by wiping off the wax around the edges.

The manufacture of caps is exceedingly simple. A sheet of thin copper is stamped into the discs of the proper size, which are passed through a machine which punches them into the required shape and trims them off to the proper length. The caps are then placed mouths upward in a tray, and the inside of each is touched with a strongly adhesive varnish, after which the requisite quantity of detonating composition is deposited and pressed into place.

With the exception of being "bottle-shaped" the Martini cartridge case is similar in construction to that of the Snider. The bullet is solid, made of an alloy of 12 parts of pure lead and one part of tin, weighs 480 grains, has two cannelures, is papered and lubricated with wax. The body is made of sheet brass .004 inch in thickness and lined on the inside with tissue paper cemented to it. At the base it is strengthened by an additional band of sheet brass of the same thickness. The top end of the cartridge is .45 inch in diameter, and the base .577 inch. The charge of powder is 85 grains, over which is placed a wad of wax having one glazed millboard disc underneath, and two above it, and the bullet is secured in place by being choked into the cannelures.

(To be continued.)

THE DUTIES OF FIELD ARTILLERY IN ACTION.

BY LIEUT.-COLONEL W. KEMMIS, R.A.

(Continued from Page 76.)

THE STAFF NON-COMMISSIONED OFFICERS.

The limbers being separated from the guns, though but a short distance, and the divisional officers having in action their attention fully engrossed in an opposite direction, should as a whole, be in charge of some responsible N.-C. officer. For this duty the senior staff N.-C. officer is the most suitable, because he will thus have the greater scope for active usefulness, while he will be nearer to the commander, who, failing an available officer, might require to make special use of him; at the same time having in his daily routine of work much to do with the discipline and distribution of the battery generally, and having thereby a perfect knowledge of the N.-C. officers and men, he is well fitted to make the most of their individual abilities in emergency.

Being then in charge of the limbers, the senior staff N.-C. officer has first to retire them to the spot directed, placing them, if there be any choice, as advantageously as possible with regard to cover and convenience of movement for limbering up; he should then see that the gunners with the limbers are at once ready to supply ammunition and, so far as he may, that they supply it, as ordered, on the command to load; while the fighting proceeds he must maintain the limbers ready to move, carrying out any special instructions which the commander may give respecting them and see generally that the N.-C. officers and gunners with them do their duty correctly: he should also note the expenditure of ammunition and the casualties which occur, reporting from time to time to the second in command, or, in his absence, to the commander, obtaining his instructions and acting thereon.

When ammunition, spare men and horses arrive from the wagons, it will be his business, under the second in command, to see to the proper and ready distribution of the former and to the best utilization of the latter.

At the same time that the senior staff N.-C. officer fulfils the foregoing particular duties he will have opportunities for general usefulness.