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RECENT EXPERIMENTS AT SHOE-  
BURYNESS.

IT is now some time since we had to record any experiments on an extensive scale, or of a more than ordinarily important character, at Shoeburyness. Since our last notice, however, various experiments have been carried out in connection with matters of relative minor importance, and it is upon these subjects that we now propose to inform our readers. First, then, we will notice some further trials of the Vavasour 7-inch steel gun-carriage which took place towards the close of last year. The object of these experiments was to test the clutch arrangement of the screw compressor head of this carriage. For that purpose four rounds were fired, the first two with 14lb. charges of l. g. r. powder and the last two with 22lb. charges, 115lb. shot being used for each round. The elevation was in each case 7deg., the recoil being as follows:—1st round, 5in.; 2nd round, 6½in.; 3rd round, 1ft. 7½in.; and 4th round, 1ft. The average time of flight was 9.3sec. In this practice the slide drove back about 4in. at each discharge in consequence of the marshy state of the ground at the time, which afforded a bad hold. It was thus gradually carried off the racers on to the platform, which put exactitude of recoil out of the question. The clutch arrangement, however, effectually answered its intended purpose—that of securing the mechanical hold of the coned head on the friction drum during the recoil of the gun. Up to, and inclusive of, the above trials, the total fired was 145 rounds. These consist of two proof rounds of 27lb. at Woolwich; ten service charges of 14lb. and nine battering charges of 22lb. at Yarmouth; fifty battering charges at Woolwich; fifty-six battering charges at Portsmouth; and eight service charges and ten battering charges at Shoeburyness, the gun showing no signs of wear.

On the 10th inst., some experimental trials of Hale rockets from stone were made in consequence of reports of deterioration from keeping, a number having been found to fail in practice, one occasionally bursting. The course adopted was to test samples of the original and early patterns with others of recent manufacture. The first series of trials were made with 24-pounder rockets with plain cases, made in September, 1866. Ten rounds were fired at 15deg. of elevation, the times of flight varying from 7.7 to 9.6sec. The ranges were 1,766, 1,850, 1,602, 1,510, 1,557, 1,783, 1,872, 1,790, and 1,450yds. respectively for nine rounds, one bursting on graze at 1,608yds. The ranges and directions were good; eight out of the ten, however, puffed at about 6sec. of flight, the puffs being due to the irregularity of combustion caused by some deteriorated condition of the composition. Seven rounds were then fired with 24-pounder rockets with corrugated cases, manufactured in December, 1869. The elevation was the same as with the previous batch, and the times of flight were from 3 to 6 sec. The ranges were 906, 956, 1,163, 339, 800, and 1,063yds.; one burst on graze at 760yds., but none of them puffed. Three similarly formed rockets, made last month, were then fired at 15deg.; the times were 7.8, 4.2, and 7.0sec., the ranges being 1,406, 695, and 1,500yds. The direction in each case was good and not one of the rockets puffed. Following these trials were some with 12-pounder rockets which had been specially made for the committee under

Colonel Milward. Some of these had corrugated cases, whilst in others the cases were plain. Five rounds with those having corrugated cases, at 10deg. of elevation, gave from 1.9 to 2.7sec. to graze, the ranges being 150, 50, 228, 342, and 156yds., with deflections of 6yds. left and 5yds. right. Five rounds at 15deg. elevation gave the following results:—Time of flight from 6.4 to 9.0sec.; ranges, 1,020, 1,500, 1,116, 1,335, and 1,454yds.; deflections from 46 to 124yds. right. In ten rounds fired at 20deg. elevation the flights were from 7.8 to 10.9sec., the ranges from 1,924 up to 2,000yds., and the deflections about 189yds. right. Five rounds with rockets having plain cases at 10deg. gave flights from 2.0 to 3.3sec., ranges from 172 to 650yds., with deflections from 21 left to 4 right. Five more rounds with plain-cased rockets at 15deg. gave flights from 5.9 to 7.7sec., and ranges of from 1,022 to 1,337yds., the deflections being from 50 to 121yds. right. Ten of these rockets at 20deg. gave flights of from 8.8 to 12.1sec., ranges of about 2,070yds., and deflections of about 200yds. right. In one of these there was a puff at 9.9sec. of flight. The practice with the early examples of rockets undoubtedly showed some slight, but apparently inherent, defects. It will, however, be seen that their ranges and directions were as good as could be desired.

On Tuesday and Wednesday week a series of trials were made with Palliser guns and shells at Major Palliser's expense. The object of these experiments was to prove the capabilities of the 7-inch and 8-inch guns, recently converted on Major Palliser's system from 68-pounders, and of a new shell of large capacity. The 7-inch gun had already fired a hundred rounds with 30lb. powder charges and 120lb. projectiles in an 8-inch bore. The piece has, however, been re-lined with a thin tube, which gives it a 7-inch bore. The thickness of the internal tubing is now about 3in. and the gun weighs about 3 tons; it has been proved with 27½lb. of powder and 115lb. projectiles. The 8-inch gun has a wrought-iron tube 2½in. thick, weighs about 97ewt., and has been proved with 37½lb. of powder and 180lb. projectiles. Its rifling is of the Woolwich form, with increasing spiral. Both the guns were mounted on temporary timber carriages and slides, which, however, proved to be unsuitable and impaired the shooting, the radial deviations—always vertical—being very great. The targets to which these guns were opposed were the old Armstrong and Whitworth, composed of 4½in. armour and 18in. of teak backing with inner iron skin and iron ribs 2ft. apart and the old "Warrior" target. The new shells are partly cast in chill and partly in sand, by which Major Palliser obtains more tenacity of material in the body and a less dense nature in the event of rupture in the bore. They are 17in. in length, 7.92in. in diameter, and carry a bursting charge of 6lb. of powder. They have only one ring of studs, and weigh 122lb. before being charged. The first round was from the 8-inch gun against the Armstrong target with 22lb. of powder and a shell loaded to 128lb. The projectile struck on the edge of an old shot hole, burst on passing through the backing, developing cracks in the surrounding plating and setting the target on fire. The second round was fired with a similar charge and was attended with like results. The third shell passed through another old fissure and split the plate diagonally. The fourth shell followed on the heels of the third, removing a large mass of plating loosened and split by previous discharges and setting the target on fire for the third time. In the fifth round the powder charge was reduced to 18lb. and a shell filled with sand was used which passed into another old hole and broke up in its passage. The sixth and seventh rounds were also with sand-filled shells, one striking into an old hole and

the other near an old indent. In the latter case the shell broke up in the plating, which it cracked, shearing a wood bolt in the rear and bulging the skin.

The 7-inch gun, with 22lb. charges and a service shell with two rows of studs, weighing empty 113lb. and charged 115lb. 8oz., was then brought to bear upon the same target. Three rounds were fired with sand-filled shells; the first struck close to an old hole and tore away angle iron, skin, and timber from the rear. The second struck at a junction point in the plating, passing through, splitting the plate, and breaking through a rib in the rear, carrying away about a square foot of skin. The third round struck the top edge of the middle plate, passing out through an old hole to the rear. The gun was then laid to the "Warrior" target, the first round here striking a sound part of the target, which it completely penetrated, tearing off the skin in the rear, carrying away two armour bolts and one wood bolt, and forcing the teak backing out at the side. The two final rounds were fired to ascertain the effect of the heavy service shell of 180lb., thrown by the 8-inch gun with reduced charges. In the first of these the shell passed through an old hole, but in the second the projectile struck upon the middle plate just below the junction and smashed in a space 21in. by 13in., bringing down a large piece of the plate above and cracking the skin in the rear. Thirteen rounds in all were fired, and their results go to show in the first place that the large shells can be fired without prematurely bursting with heavy gun charges, although it is a question whether the walls of the shells might not be strengthened with advantage. Another result arrived at from the seventh round was that the 18lb. powder charge was not a penetrative one. The 7-inch gun has been proved perfectly capable of penetrating vessels of the "Warrior" class, and, finally, we see that the 8-inch gun with 180lb. shells is not equal to that purpose.

A new concussion fuse was tried on this day week, as were also two modifications of the E time fuse manufactured at the Elswick factory. The object to be attained in the fuses tried was safety during transport when the shells were carried loaded. The first practice was with the concussion fuses, which proved both sensitive and reliable. They are made with a pellet having broad solid shoulders, the collar into which the pellet fits having the same. With these shoulders resting against each other shearing or ignition is impossible, but on turning the pellet half way round these shoulders pass clear of each other and the fuse is ready for action. In this position the pellet is held by two small lead wings which are sheared when the gun is discharged. Upon the present occasion a service 12-pounder breech-loading field gun was used fired with 1lb. 8oz. charges. About two degrees of elevation were given to the gun, the range to graze being 1,000 yards, and the level of the battery 17ft. above the plane of range. Twenty rounds were fired, seventeen of which were set to burst on graze, which they did. The remaining three were set to safety, they struck the sands and ricocheted several times without bursting, thus passing this severe ordeal in a very satisfactory manner. No. 1 modification of the E time fuse was then tried. In this fuse the exploding pin which fires the detonator is removed during transport, and inserted when the shell is prepared for action. Five rounds were fired at 3deg. with fuses set to 1in., and five rounds with fuses set to 2in. The former burst regularly at from 1.6 to 1.8 seconds flight, and the latter at from 3.3 to 3.5 seconds flight. In the No. 2 modification of this fuse the detonator is removed during transport, and replaced at the limber when required in action. Ten rounds were fired under similar conditions to the previous ten, and with precisely similar results.