

vance with increased charges to try the gun still further.

Meanwhile a temporary difficulty arose. The rod used to extract the copper cap of the "crusher," or pressure gauge, broke off at a joint in the middle, and was rendered useless. While the reck of the burnt powder was still rising from the muzzle, and the smell of the gas was unpleasant to by-standers, a young fellow in the employ of Mr. Mehen volunteered to creep in and attach a cord to the broken rod. Now, it is known that boys of goodly size have entered the cannon known as Mons Meg, at Edinburgh, as also the huge piece of ordnance at Ghent; but it has not been recorded that any human being ever, till yesterday, entered a gun five minutes or so after it had been fired. This smart young workman repeated his attempt again and again, suffering visibly each time, especially in the eyes. He was drawn out quite black, and, though much distressed, could not help laughing. His fifth trial succeeded; and when the copper cap had been pulled out, Major Matland went up to the young fellow who had done such cheerful service, and who stood rubbing his inflamed eyes to ask him his name. It was Robert Kiddle; and a certain interest was added to the story of his exploit by the statement that he has only been married a week. After the delay caused by this little adventure of the Woolwich Benedict, and after much peering into the gun and its carriage by the proof master, Mr. M. Kinsley, and other officials, whose faces are well known on all such occasions, the bell rang for the second round. All that followed was a scarcely varied repetition, the difference being that each of the six rounds brought its progressive addition of 20lbs. or 10lbs. to the charge of powder, with commensurate results. Here is a tabular statement which shows the fact at one view:—

Rounds.	Charge.	Shot.	Muzzle Velocity		Pressure on Chamber	
			lb. ft. sec.	ft. sec.	on chamber.	on shot.
1	170	1258	1393	242	—	94
2	190	1259	1523	223	—	182
3	210	1258	1475	243	—	198
4	220	1254	1503	222	—	214
5	230	1260	1550	196	—	218
6	240	1258	1549	273	—	—

Inasmuch as the sixth shot was not dug out of the sandbutt last night, the pressure on its base cannot be stated. The recoil of the gun, at each round, was, on a nearly level line of rails, about 29 feet. The energy was ascertained to be full 20,000 tons; and it is hardly necessary to say that this was very gratifying to all who take an interest in the new gun.

That the trial of the new arm was a splendid success is matter for public congratulation and national rejoicing, but it is also pleasant to recognize the private share of interest, and the personal triumph so fairly earned with respect to the Monster Gun.

### Artillery Experiments.

Although the results of the artillery experiment at Okehampton, which were brought to a conclusion last week, cannot be properly digested until all the details are accurately tabulated, it is not, we think, premature to say that as a whole they are the most important which have ever been carried out with field artillery in this country. We do not know whether it would be going too far to speak of it as an Aldershot axiom that beyond about 1,800 or 2,000 yards field artillery is useless; but it is, we believe, a fact that on several occasions officers commanding batteries have been directed to

cease firing at these ranges, simply because the distance was considered too great for them to do any good, and it is not less certain that a number of dispositions are annually made at our summer manoeuvres on the basis that 2,000 yards is about the outside effective range of field guns. The Okehampton experiments seem to have shown that our present 9 pounders and 16 pounders can be desperately effective at even double this range, and may sometimes be used with no mean effect up to about 5,000 yards, or about three miles. If the Okehampton experiments had taught us no more than this, and if this lesson can be sufficiently pressed home, so as to relieve our field artillery of the fetters which ignorance of its real power frequently imposes upon it, they would not have been instituted in vain. But they have, in fact, taught us a great many things besides this. They have taught us, for example, that so effective are our present field guns and projectiles as to involve any force that might attempt to attack a battery direct in simple annihilation. The guns shoot so hard, the "permissible error" of their shrapnel is so large—in other words, the space covered with their deadly mitraille is so considerable—while the rate of fire attainable is such, that long before the battery could be reached the attacking troops would be cut to pieces. Any one who has any doubts on this subject will do well to refer to the account given by the *Times* of the trials of the last day, from which it appears that in some practice against cavalry targets at 2,000 yards, with Boxer shrapnel and time fuze, the result of 36 rounds was as follows:—Through, 368; lodged, 131; struck, 954; direct hits of shell, 29; while in some subsequent practice against 400 infantry dummies, specially disposed in positions supposed to be most favourable to the attack, the result of nine minutes' firing at ranges from 1,000 to 200 yards (the dummies being supposed to be advancing as a sort of forlorn hope to attack the battery), 129 rounds were fired, scoring 479 hits on the attacking party, and 99 on the supports. The tremendous power of the Boxer shrapnel with time fuze has been exhibited in a remarkable manner in the course of these experiments, and artillery officers have now had it impressed upon them, with an emphasis to which no other experimental results have ever attained, that the forward cone of dispersion of a good shrapnel, bursting on a good trajectory, will carry death and destruction over a distance of 200, 400, or even 500 yards from the point of bursting. In fact, these experiments have brought out with extraordinary clearness the real nature of shrapnel fire—namely, that it is in fact a fire of case (the most deadly missile within its proper range known to artilleryists) delivered from a gun the muzzle of which is, so to speak, practically carried forward to a point which is represented by the point of bursting of the shell. This was the original intention of the inventor, who very appropriately called his shell "spherical case shot;" and to this intention the modern adapter of the shell to the requirements of field artillery has adhered—contending unflinchingly, and in spite of much opposition, that the maximum shrapnel efforts could only be attained by the use of a time fuze. This is another of the lessons which has been written out very clearly upon the Okehampton hills. No doubt it has been established that under certain circumstances, as, for example, firing against deep formation, or for finding a range, or for resisting a sudden attack upon an unexpected quarter,

where the ground is fairly favourable, percussion shrapnel is very useful; but it is quite clear that the efficiency of the time shrapnel has been established in a far higher ratio, and that the recommendation of the Dartmoor Committee of 1869, to retain 60 per cent. percussion fuzes, which we ventured to challenge at the time, has thus been decisively overthrown. Indeed, the remarkable results attained by the "water shell" as a percussion shell, coupled with the fact that for the purpose of finding the range a common shell is the most useful of the three on account of the greater amount of smoke given forth by its bursting charge, seem to tend still further to reduce the occasions upon which the shrapnel shell could be beneficially employed with percussion fuzes. The smallest results obtained with the water shell show that this projectile—or rather the occasional adaptation of a common shell to this end—must hereafter find a recognized place among our field artillery projectiles, and will give a lively interest to such experiments as may be instituted with a view to the application of Professor Abel's scheme in other directions, and to the further improvement in detail of the water field shell. Probably it will be found desirable to take steps for diminishing the number and increasing the size of the fragments into which these shells break up.

The value of Captain Nolan's range-finder has again been conclusively established by these trials. When the range was known, the results of the practice were enormously, and Nolan's range-finder enabled the range to be found with such ease and accuracy as to point to the necessity of a signing to this instrument a more recognized place in our field artillery equipment than has been hitherto accorded it. Moreover, it should not be lost sight of that such an instrument is not merely useful in action or at actual practice, but may be profitably employed in the instruction of artillerymen in estimating distances; and among the valuable results of these experiments we must not omit to mention the increased interest in a familiarity with their weapons which such trials are calculated to give, not only to those officers and men who personally take part in them, but to all artillerymen who follow the accounts of the trials. The money expended in the experiments has been well laid out; but it will not have been invested to the best possible advantage if the lessons of these trials be not widely and diligently circulated among officers of cavalry and infantry as well as among all officers of the artillery.—*Full Mall Budget*.

### Artillery Experiments at Dartmoor.

These experiments were continued on Friday week, when the practice was conducted against two targets, each representing a body of infantry composed of front and rear rank, and supposed to be retreating. The ranks were formed of 6ft. square targets, nine being placed in each rank, their situation being on the continuation of the slope of Yes Tor. The Royal Horse Artillery Battery went into action in the morning at 11-30, under the direction of Major Rusk Keene, a half-battery of three guns firing at each target. One half battery fired Boxer-Shrapnel time fuze shells at target No 1, which was placed at the foot of the slope, the other half using Boxer Shrapnel percussion shells at target No. 2, placed up the slope. The ranges in each case varied approximately from 2500 down to 1300 yards, and were judged by the bat-