

to be derived from the adoption of part rifling in place of full rifling for our present service arms and ammunition. The present system of full rifling gives very good and uniform results, with even considerable variation in the manufacture of the arms and ammunition. This fact is not only established by the experiments herein referred to, but by extended experiments made at this armory and the Frankford Arsenal for several years past. Part rifled barrels sometimes give very good results, but slight defects in the construction of the barrel and the quality of the ammunition impair, and sometimes totally destroy, accuracy of fire. Twists of one turn in four feet and one turn in six feet do not give, with part rifling, sufficient rotation of the bullet to insure its hitting a target twelve feet square at a distance of 500 yards. This was found to be true both for charges of 70 grains of powder and 405 of lead and 90 grains of powder and 300 of lead. The statement that part rifling is cheaper to make than full rifling may be true as regards the Henry system and the rifling machinery in use in England, but it is not so with the system of rifling and machinery employed at this armory. The cost of full rifling a barrel at this place is four and one half cents. The extra operation of reaming out the barrel to within four inches of the muzzle, required in part rifling, costs six and one half cents per barrel, making the cost of part rifling over full rifling about two cents per barrel. When on a visit to the small arms factory at Enfield, England, last summer, I was informed by Col. Fraser, the superintendent, that it required one workman for a day of nine hours to rifle ten barrels on the Henry plan at that establishment. Paying the workmen the same wages allowed here for a day of eight hours would make the cost of rifling at Enfield between thirty and forty cents per barrel. It may, therefore, be true, as stated in the reports referred to by General Meigs, that part rifling is cheaper than full rifling, as done in England.

We join with General Meigs, when he says of these experiments. "They go far to settle some vexed and important questions, and having been made with the accuracy and care which distinguish the work of our Ordnance Corps, they will be a valuable contribution to science."

AN EIGHTY TON GUN.

The London *Standard* says: "It may not be generally known that the principle upon which all our guns are now made is that discovered by Colonel Fraser. Briefly, it consists of a series of coils, welded together in such a way that the grain of the iron is best opposed to the explosive force of the powder, and encircling a steel tube, the interior of which is rifled. A long bar of iron—say of eight inches square—previously prepared, is slowly drawn from a furnace, to a length of about 300 feet, and wound into a double coil in the form of a cylinder. This is again heated and placed beneath a steam hammer, where it is welded together by tremendous blows, which so effectually do their work that a cylinder capable of bearing the greatest possible strain is formed at a comparatively trifling expense. Several of these coils being made, they are placed in order upon a long steel tube which has been made in Sheffield, and the weapon is finally turned out at an average cost of about £60 a ton, as against nearly £150 at Krupp's factory in Essen. Upon this principle, then, it was resolved to construct an eighty ton gun,

which should be able to pierce twenty inches of iron at a distance of a thousand yards, with a shot 1,600 pounds in weight, and by the aid of 300 pounds of powder. The length of this magnificent piece of artillery was fixed at twenty seven feet, its diameter at the trunnion six feet, and at the muzzle sixteen inches, inside measurement. It was calculated that such a gun would be able to deliver its mischief working missile at a distance of nearly ten miles, and that it would, at the same time, be easily placed in the turret of a war ship or the embrasure of a battery, and worked quickly and without difficulty. Of course there were many difficulties in the way of the construction of such a weapon. No steam hammer such as that which Krupp possesses at Essen was to be found in England; no forges were built large enough for such a tremendous "heat;" no cranes were in possession to hoist such a weight. But all these difficulties were speedily overcome by the skillful officials at Woolwich. The forges were built, a huge steam hammer of forty tons weight, with double action arrangement and a striking power of nearly 1,000 tons made, and very soon all was in readiness to begin the construction of the great gun. Curiously enough his Majesty the Emperor of Russia was the first to see one of its coils welded; and since that time the work has been gradually going on, till now the steel tube, the breech piece, the coil, and the trunnion are finished; so that it is certain that by June next the gun will be ready for trial. It will then consist of the following: A tough steel tube inside, weighing nearly sixteen tons, and measuring about twenty four feet in length; a breech piece coil, another coil nearer to the muzzle, and the trunnion coil. The cascade through which the fire from the friction tube is communicated to the cartridge inside the gun is of steel, and immensely strong. Such is the weapon upon which hopes of a victory over twenty inch armour plates are built. If it should succeed, three more will be made immediately, and the four pieces placed on board the *Inflexible*, which will then be the most powerful armed vessel in the world. Possibly, at the same time, some addition may be made to her arm, so that she may be as invulnerable as she is terrible.

HOW TWO PERSONS LOST THEIR LIVES.

Coroner Reinhardt last night began an inquest in Kinney's Hall, Jersey City Heights, over the bodies of Elisha Harvey and John Horne, who were killed by the explosion of blasting materials at the new Delaware, Lackawanna and Western Railroad tunnel on Wednesday night. John Farrell testified that he was employed about 100 feet from the place at the time of the explosion. He found the boy's body and extinguished the fire, which had caught in his clothing, and also found Harvey's body, the latter being very near the shop. An explosion had occurred at the same place on the previous Monday, and Harvey, the blacksmith, had said they were experimenting. Farrell had inspected the shop on the evening of the accident, and had seen a box of cartridges lying on one side of the building. It was usual to warm the cartridges before using them. Some of them were of ordinary black powder, and some of the Rendrock powder. The latter were considered safer. Warren powder had sometimes been used, but no giant powder had been used in the last six months.

M. C. Brown, superintendent of the mining department, testified to having examin-

ed the shop shortly before the explosion, but noticed nothing unusual. The powder was not dangerously near the fire. He had given all the men the most positive orders not to trample with the cartridges. The powder was the best that could be procured. The caps were kept separate from the cartridges, and Mr. Brown believed that the concussion could not have been strong enough to blow up the shop had not caps been affixed by whoever was handling them.

T. O. Beach of New York testified that he made Rendrock powder, and that it was not explosive without the caps. His factory had burned with a ton of powder in it, and there had been no explosion. He showed the non-explosive nature of the powder with a coal shovel.

Capt. W. H. Heuer, resident engineer at Hell Gate, testified to the non-explosive qualities of the powder without the cap.

ALSACE AND LORRAINE.

BERLIN, Nov. 30.—In the Reichstag to day the Alsace Lorraine Loan bill was taken up, and gave rise to a most interesting debate. The Deputies from Alsace and Lorraine declared that they were opposed to the high endowment of the University of Strassburg, and to other educational grants for the provinces, because they were made in the interest of the Empire and not of the provinces themselves.

This called out Prince Bismarck, who replied as follows:

The question before us concerns imperial interests. It is not a question of Alsace and Lorraine. The University is for imperial purposes. In a well fought war, in which we defended our existence, we conquered those provinces for the Empire. It was not for Alsace and Lorraine our soldiers shed their blood. We take our stand upon imperial interests, for which, and not for the sake of their own ecclesiastical interests, we annexed those provinces. We have other grounds for action than those people whose past leads to Paris and whose present leads to Rome.

My own views respecting the creation of an Alsace and Lorraine Parliament, which at first were too sanguine, have been modified since I became acquainted with the attitude of the Deputies from those provinces.

Such a parliament would lead to continual agitation and perhaps might endanger the peace of the Empire. We shall doubtless be obliged to take still more rigorous steps in regard to school matters there.

We cannot permit the existence of elements which strive to hinder education. My action is guided by imperial interest. I shall not be frightened from my course by reproaches, threats, or persuasion. Before advance is possible, we must be convinced of the existence of trustworthy elements. We may expect a better discernment in the rising generation, and must, therefore, see that good schools are provided for Alsace and Lorraine.

At the conclusion of the debate the Loan bill was referred to a committee.

The bill to carry into effect the provisions of the Berne Postal Convention passed its third reading.

Herr Sigl, editor of the *Vaterland*, has been sentenced in *contumaciam* to ten months imprisonment for asserting that Kullmann's attempt on the life of Prince Bismarck was a sham plot concocted by the police.