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Contents:

(Illustrated articles are marked with an asterisk.)

THE LESSON OF THE SHOEYBURYNESS EXPERIMENTS. HOW LITTLE ENGLAND HAS PROFITED BY IT.

That England has profited less than her maritime rivals from the millions of pounds she has so liberally expended in experimenting with artillery, rifling, projectiles, and armored targets of almost every possible description, is a very remarkable fact. This fact—as curious as it is true—does not speak very highly with respect to the engineering talent and judgment which have directed the fabrication of her heavy ordnance and her iron-clad navy.

After the experiment with the 13-inch smooth bore at Shoeyburyness, Sept. 13th, 1862—five years ago—against the *Warrior's* section of 4½-inch plates, 18 inches of teak, and an inner skin of iron, to suppose that a target similar to that one with the exception that it had 3½ inches more iron, could resist the 15-inch gun, seems to us to betray a remarkable misapprehension of the important national problem committed to the English naval constructors and gunmakers for solution.

The complete penetration of the 8-inch "*Warrior* target," backing, and inner skin, by the 15-inch gun on Sept. 26th, as stated by the Atlantic cable, points out to every one who can read, that the iron-clad fleet of England is as vulnerable to the guns likely to be brought against it as the old wooden vessels were to the guns cast to attack them with. That the plans on which the English artillery have been built will not give to large calibers the strength necessary to attack first-class iron-clads, appears to be established by a retrospective view of the experiments of the past five or six years. Commencing in 1862 with 10½-inch wrought iron rifles, increasing shortly afterward to 13½-inch, we now see (and 1868 is close at hand) a puny weapon, the 9-inch rifle, the best gun in the English artillery parks, while on the other hand the maritime nations in the north of Europe—Russia and Sweden—knowing from the publicity of the English experiments, what not to make, are casting, as fast as they can melt the iron, duplicates of the very gun John Bull has just proved to the world can send its big round shot through any iron-clad he has built or is building.

Thus England, by the foolishness of her gunsmiths and constructors, has been materially assisted into such a position that her influence in European politics is nearly if not quite, wiped out.

With respect to the last exploit of the Shoeyburyness artillerists and "select committee men" in bursting their target and their reputation at the same time with the 15-inch gun, we do not believe they would have imported that weapon if they had any idea of its capabilities. Already had the highest authority on ordnance in England, Captain Noble, demonstrated, in an elaborate official report, that the maximum force of the 15-inch shot was only 8,658,760 foot-pounds (while he has himself proved by late experiments that it is 17,000,000 foot-pounds!) Again, neither is it likely that this officer and the "select committee" would have permitted the big smooth bore to demonstrate its power by the use of full charges against the target had it not been for the criticisms on his calculations and trials, by an American engineer, which were republished in several of the English journals. As it is, the extraordinary tests to which Noble has put the gun, failing, as was no doubt the desire, to burst it, exhibit its power in a stronger light than would otherwise have been the case. On the first trial against the target on July 26th, it will be remembered that after the first two rounds with cast iron shot, a steel shot weighing 498 pounds and no less than 14·945 inches in diameter (see *London Times*) was used, or in other words the windage was only $\frac{55}{1000}$ of an inch; in fact, this shot fitted as tight as a steam engine piston—it was as close a fit as could be got in the bore. The gun was not injured, and the next step was to raise it to an elevation of 32°, imbed it in timber, so that proper recoil was prevented, and blaze away with 100-pound charges, or 40 pounds more than they had used against the target. The gun also stood this trial without injury, and as several of the prominent British journals wanted to know why 100 pounds was not used against the target, there was nothing left but to accede to this very proper request. The trial was made (we believe with cast iron shot), and the target, nearly twice as strong as any British iron-clad afloat, was penetrated (according to the American system of penetration), and smashed. A comparison between the hole made by the 15-inch and the sort of gimlet penetration effected by the 9-inch, will show the difference between the British "awl hole" system and the American penetrating system. But a pretty correct idea of the appearance of the hole made by the 15-inch can be had by a photograph in our possession of the 4½-inch *Warrior* target after it had been penetrated by the 13-inch smooth bore in 1862. We trust, however, that Brother Bull will not omit to have a photograph taken of this last hole.

It is not unlikely that the 15-inch gun or the big smooth system is too plain a subject for the highly scientific writers on artillery and armor in English journals. They seem to be completely bewildered by the "hifalutin" talk (as the *London Army and Navy Gazette* has it) of their gun makers and ordnance officers. Our readers are no doubt aware that it is the habit of English officers, both of the army and navy, as well as scientific men in civil life, when a new idea strikes them, to rush into the amphitheater of one of their "Institutions," and either deliver a "lecture," read a "paper," or have a "conversation." These efforts are published with proper ceremony, and are called the "proceedings" of "Institution" so and so.

We remember very well the "papers" of such men as Armstrong, Coles, Halstead, Tyler, and many others, read and published during the progress of our rebellion; they often proved very entertaining to their audiences, as in many cases they proved, beyond the shadow of a doubt, that things which we Americans had already accomplished could not be. For example, that monitors could not possibly go to sea! By the use of a hydrostatic press, it might be possible to squeeze the "papers," "lectures," "conversations," and "pamphlets" of the naval, military, and civil *savans* of John Bull's land, on the subjects of guns and iron-clads alone, into the office—which is not very small—in which we are writing.

No antiquarian library on mechanical subjects can be complete without a set of these valuable documents.

These persons have been in the habit, as soon as an innovation in the naval or engineering line is broached, to grab it at once, shuttle-cock it about, until it is so befogged that the originator of the project himself would not recognize what they are talking about. So many irrelevant side issues are started by these ingenious investigators, that both writers, readers, lecturers, and listeners, were very often so confused and entangled, that they forget what it was that "light" was to be thrown on. The chief of artillery of the London *Times*, the scientific reporter of the Pall Mall *Gazette*, and the ordnance officer of the *Engineer*, appear to have wallowed in "papers," "reports" (Noble's in particular), and "discussions," until their minds are in quite a mixed up state. Here are some extracts from their last disquisitions on the big smooth bore. The chief of artillery of the *Times*, after stating that on the trial "for range," (*i. e.*, the trial to see if they could burst the gun,) the 15-inch, at 32° elevation, with 100 lbs. "American" powder—we call it "mammoth grain"—projected its shot with an initial velocity of 1,538 feet per second, and to a distance of 7,680 yards, 4¼ miles, says: "The gun is probably too short to burn all the powder before the shot leaves the muzzle, and a further increase of charge could not give proportionate velocity." As they proved on their trials, "60 lbs. give 1,170 feet per second (to a 453 lb. ball), and 100 lbs. *only* increase it to 1,538 feet."

Now, if a pound of powder in a given gun always performed the same amount of work, irrespective of the weight of charge, the *vis viva* would vary directly as the weight of the charge; and, consequently, the velocity of the shot as the square roots of the charges. Hence, as 60 lbs. give 1,170 feet to a 453 lbs. ball, a 100 lbs—if each lb. was of same efficacy as first charge—would give 1,511 feet per second; but this charge actually gave "1,538 feet" to the same weight of ball. The remarkable fact is thus shown that the work done per pound (notwithstanding the magnitude of the charge) increased with a charge nearly double the first one. Yet, in the face of this demonstration, which took place right under his nose, the chief of artillery of the *Times* says, "the gun is too short to burn all the powder," and "a farther increase of charge would not give proportionate velocity."

And in order to exhibit still further the strange ignorance of the first principles of gunnery which characterize the writings of this artillery *savant*, it will only be necessary to say that the proportionate space occupied by even a 50 lbs. charge in the bore of their 9-inch pop-gun, is so much *more* than 100 lbs. taken up in the 15-inch, that it shows he has no accurate knowledge of the subject on which he discourses to the whole of Europe through the columns of its "leading journal."

The change in the tone of his last article in the *Times* of September 10, from the gorilla-like shriek of his former one in *Times* of July 27, to use a comparison started by himself, is as different as the terrible roar of the 15-inch is from the tiny tinkle of the 7-pounder rifle fired on the same occasion. We are, by the by, quite anxious to read his account of the penetration of the target on September 26.

There is another point which it may be well for both the chief of artillery of the *Times*, the scientific reporter of the Pall Mall *Gazette*, and the ordnance officer of the *Engineer*, to make note of, and that is that the *vis viva* of their 9-inch "punching" bolt, compared with the atmospheric resistance it encounters, is only about 7 per cent. more than that of the 15-inch sphere.

The scientific reporter of the *Gazette*, in his issue of the 10th inst. says: "The rifled gun (9-inch) can be used in broadside, the smooth bore (15-inch) only in turrets." Is it possible that he does not know that we have a carriage which can handle a 15 or 20-inch whenever a platform can be found strong enough to carry it, broadside or any where else.

It is true we prefer to put them in monitor turrets, where they can be protected by say from 15 to 20-inches of wrought iron, instead of the English system of mounting their 7 and 9-inch guns behind a thin veneering of the same metal.

The ordnance officer of the *Engineer* has made the brilliant discovery that 34° is "the angle at which projectiles are thrown to the greatest distance." The same officer, in order to conceal his chagrin that the 15-inch did not burst after being fired two rounds with 100 lbs. charges at that angle, goes off on a long rigmarole about powder in his issue of 13th inst., leaving the *vis viva* of the shot out of the question! To restate what we have already partially alluded to, we will briefly observe that the big monitor smooth bore, the identical gun installed in our turrets over five years ago, at the commencement of the rebellion, has shown that it can put its shot through any iron-clad in the British navy.

Even if in future trials the Shoeyburyness artillerists succeed in bursting the American gun, it will not materially help their case, as the important fact of the great power of large round shot against armor plates has been fairly established, and there is no difficulty in building a smooth bore gun of 15 inches caliber, to use, say, 150 lbs. charges.

AN IMPORTANT QUESTION.

Is marking patented things with the patent stamp of nearly identical but inferior articles actionable under the act of 1842?

Frequently patentees suppose in cases where their inventions are infringed under color of right by reason of the infringer making use of the date of another and somewhat similar invention, that they have a remedy for the mischief under the 5th sections of the Patent act of 1842. The first clause of that section provides that a person shall not (under a certain penalty) affix upon an article not patented by him, the name of another who has obtained a patent upon such article, without the consent of such patentee; the second clause, that a person shall not affix the word "patent," or "letters patent," or "patentee," or any word or words of like import, with intent of imitating a patentee's device on any unpatented article, or in other words, on an article not covered by any patent whatever, for the purpose of deceiving the public. The first clause is the one enacted for the protection of a patentee under certain circumstances; the second for the protection of the public generally.

The case referred to above does not come within either of these clauses without it can be shown in an action brought that the infringer is wrongfully using the date of the second or similar patented article, as it may be made to appear that he has a license from the second patentee; or is using such mark upon an article unpatented by any person whatever, for the purpose of imposing upon the public, or in other words, deceiving the public by making it think it is getting a patented article when such is not the fact.

The case would be different and clearly within the statute, were the infringer using the name of the patentee who prosecutes in the action, or date of his patent, without his consent, or using his date of patent upon an article not patented by any person, with intent to deceive the public, as before explained. The only way of reaching such fraud so far given by our legislators is by proceeding as in cases of common infringement.

INDUSTRIAL EDUCATION—WHAT A LIBERAL MANAGER HAS ACCOMPLISHED.

The education of the families of skilled artizans is a subject which philanthropists and political economists never tire of writing about—in fact, we know of no subject in the educational line about which more has been said and less accomplished than this. This is almost, if not wholly due to the narrow-mindedness, illiberality, and, we may add, not a little to the stinginess of employers. What can be accomplished in this direction, by the energy and liberal-mindedness of a single individual, is very strikingly shown by the success which has attended the efforts of M. Schneider, manager, and we believe, the proprietor, also, of the immense iron works at Creusot (department of Saone et Loire), France.

These works are of great magnitude, as will be seen by the following description, taken from the Pall Mall *Gazette:*

Creusot may be said to form a kind of model manufacturing community, all placed under the direction of a single individual or firm, and consisting of 24,000 inhabitants.

The number of workmen employed is 9,950; the steam power is equal to that of 9,750 horses. There are coal mines, which produce 250,000 tuns annually. There are iron mines, which produce 250,000 tuns of minerals per annum; and the annual production of cast iron is 130,000 tuns. But it is not in the mere production of raw material that this company expends its skill. It converts its cast iron into all the forms of wrought iron employed in the manufacture of machinery, or in the construction of large engineering works. In the course of the year it turns out 100 locomotives, or about two a week. Although situated far inland, with no direct temptation to undertake naval engineering, it exhibits numerous examples of marine steam engines (one of 950 horse power nominal—upward of 5,000 actual) for the iron-clad ships of the French navy.

It seems, that, from their earliest childhood, the children,