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ARTILLERY EXPERIMENTS AT SPEZIA.

Spezia has been again the scene of the most costly and gigantic experiments in guns and armor. For the purpose of determining the best material for the armor plates for the new Italian monster iron clads Italia and Lepanto, solid plates of 19 inches thickness have been submitted to the firing of one of the nine 100-ton muzzle-loading Armstrong guns, their firing charge being reduced for the purpose of giving the plates fair play at close quarters and with repeated blows.

The interest of the experiment consisted in the fact that the plates were either wholly of steel or steel faced. The targets were, of course, destroyed, but not without offering a resistance which renders it very doubtful indeed whether this country can safely decline to go forward in the costly struggle between guns and plates; for the steel plate, measuring 10 feet 10 inches by 8 feet 7 inches, received blows in all equal to 122,300 foot tons energy before complete destruction, while a shot from our 43-ton gun is credited, at the outside, with only 23,320 foot tons energy.

But perhaps the more interesting experiments were those which followed. They consisted, says the *Illustrated London News*, in firing eighteen rounds from the new 100-ton breech-loading Armstrong gun. This gun very far exceeds in power any gun ever yet produced, and has already been fired with charges greater by not less than 200 pounds than any charge hitherto fired. Of the eighteen rounds three were with 771 pounds of powder and 2,000 pound shot. The velocity given to the shot was 1,834 feet per second, and the energy resulting amounted to 46,700 foot tons, sufficient, that is to say, to lift the gun itself nearly 500 feet, or to penetrate thirty inches of wrought iron plate.

This great weapon presents many new features of interest. It has no trunnions, but lies in a brass saddle or cradle, so narrow that the two guns of the turret lie close side by side, like a double barreled gun. The breech is opened and closed by hydraulic mechanism, not attached to the gun, so as to maintain perfect simplicity and solidity in the gun itself. And the gun is so mounted through means of hydraulic appliances that, when in the turret, the gun fills up the port, thus excluding all enemy's shots.

In the experiments at Spezia the gun was not mounted in a turret, but on a pontoon, built for the purpose. It was loaded and worked, however, by the mechanism to be used in the turret, and precisely as it will be on board ship. It was found that one man can accomplish all the movements required for the loading and aiming of the gun with ease and rapidity. No difficulty or hitch of any kind occurred in these extraordinary experiments. The working of the gun and machinery exceeded all expectation, and the Italian officials are in the highest degree gratified at the brilliant success attending their almost audacious enterprise.

The experiments have a great interest for this country, apart from the circumstance that the gun and machinery are of English invention and production. It is well known that the whole of the machinery and appliances originated with Mr. George Rendel, now a Lord of the Admiralty, who, with Mr. Barnaby, C.B., was present on the part of our authorities. Moreover, the whole of the 43-ton breech-loading guns to be mounted on all the new British iron clads are to be mounted and worked in precisely the same manner as the Italian monster gun. As the greater must include the less in such matters, the success of the present experiments guarantees that of our own intended mode of mounting and working heavy guns.

The only subject for regret, perhaps, is that we have not the security these experiments assure to Italy in respect of the gun. The Woolwich 43-ton gun will, no doubt, be a close reproduction of the new type Armstrong guns. But at the very best it cannot hope to achieve half the penetrative power of the Italian gun as against wrought iron plates; and as against the new steel plates, which, it appears, must be battered to pieces rather than penetrated, its power will probably fall much short of half.

It is perfectly idle for the authorities of this country to attempt to regulate the advance of artillery to suit conveniences of manufacture, or the state of official invention, or difficulty of obtaining money. They cannot say to the gun or plate maker, "Thus far, and no farther," any more than Canute to the tide. We have four 80 ton guns afloat, against the eight Italian 100-ton guns; but the power of the

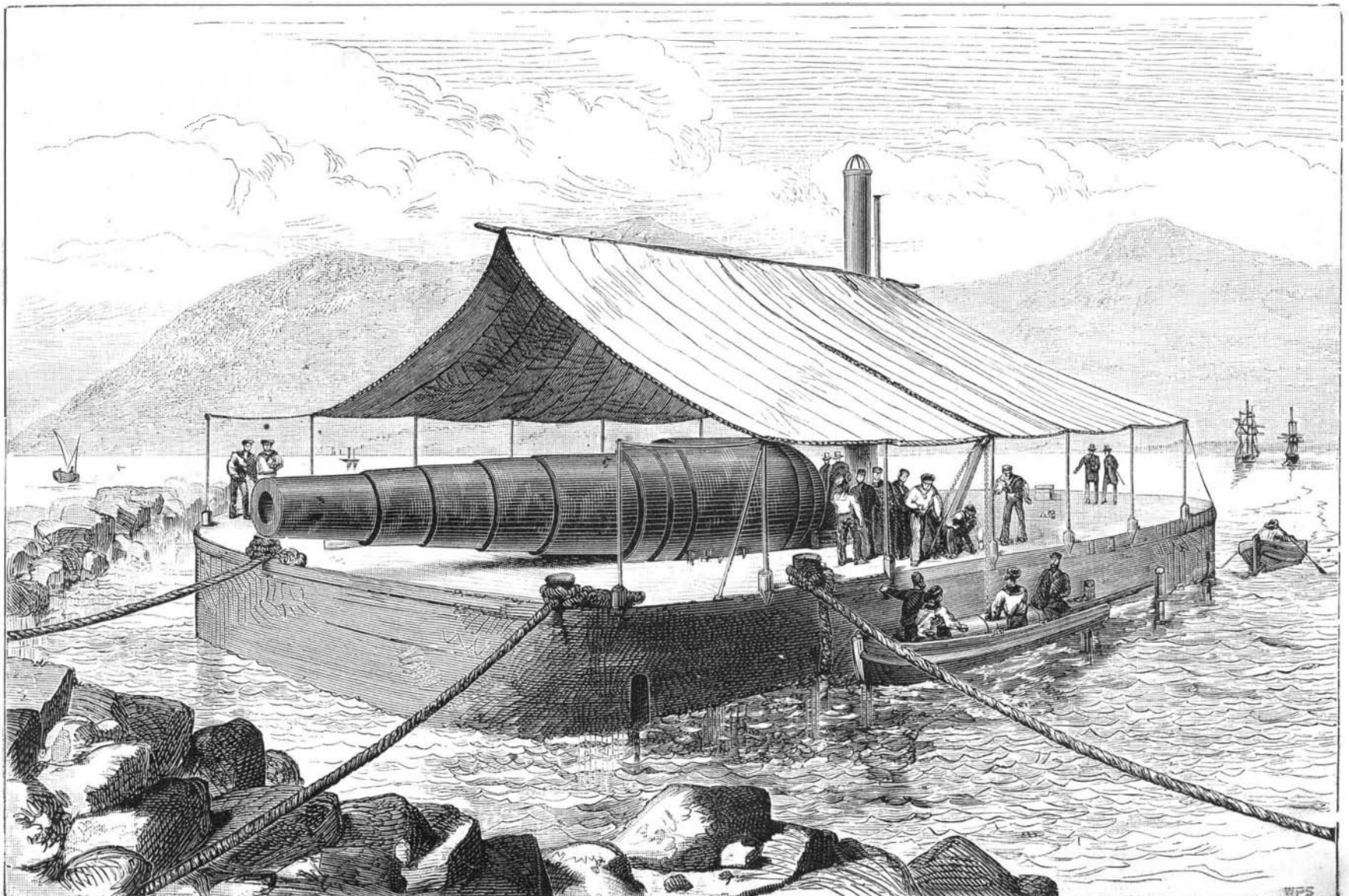
eight new breech-loading guns now built or building for Italy at Elswick, and of which the sample has now met with such unqualified success, is in excess by 50 per cent of that of our 80-ton gun; the one being 30,000 foot tons and the other 46,700 foot tons.

Public Use and Sale prior to Grant of the Patent.

In the case of Alteneck, on appeal from the Commissioner of Patents, the Supreme Court of the District of Columbia holds that an application for a patent cannot be rejected on the ground that the invention was in public use and on sale for more than two years before the time of filing the application, when the only proof before the Commissioner consists of mere *ex parte* affidavits taken without notice and cross-examination. The law confers upon the Commissioner authority to institute an inquiry into allegations of public use and sale of the invention, such as would bar the patent. This proceeding, on which the Commissioner acquires his information through the testimony of others, is a kind of judicial inquiry, and when the testimony is furnished by those in adverse interest, it becomes substantially a contest, and in such case justice requires that the fate of the application be determined by proof which conforms to the fundamental canons of the law of evidence, according to which *ex parte* affidavits, taken without opportunity to cross-examine, are in no case admissible upon the merits of a case.

Electric Motors in Mines.

A novel application of the electrical transmission of power has been made at the Trafalgar Collieries, Forest of Dean, England. A pump in the underground workings is driven by an electric motor, the current, generated by a dynamo machine at the surface, being led down the shaft and along the workings a distance of 500 yards. The drainage water of the deep workings is raised by the electric pump 115 feet vertically and forced through 500 yards of piping to the bottom of the shaft, whence it is raised by steam pumps to the surface of the ground. The working of the electric pump is said to be very satisfactory.



THE GREAT ITALIAN GUN LATELY TRIED AT SPEZIA.