

The gun used yesterday was much lighter than the one which was fired on a former occasion, the latter having been objected to as exceptionally strong. It weighs 3 tons, and is the same as the guns which are used by the Volunteer Artillery—namely, a 32-pounder cast-iron smooth-bore converted into a 61-pounder rifle by means of a coiled wrought-iron barrel only 2 1/2 in. in thickness. The previous history of this barrel is very remarkable. It formerly belonged to another 32-pounder, which it converted into a 61-pounder rifle, and was tested by firing excessive charges; next a series of shells filled with gun-powder were purposely burst inside and, finally, it was deliberately tested to destruction by charges increasing in severity. Towards the end of the programme it fired 30 rounds of 30lb. of R. I. G. powder and 100lb. of R. I. G. powder and a 15lb. shot. The bulged barrel was then taken out of its casing and the bulged part, 26 in. long, was bored out. A swelling about 1 in. in thickness was located, which brought the bore back to its original size. The exterior bulge was next cut off in a lathe, and the barrel was then put into its present cast-iron gun. The chief point which Sir William Palliser has had in view in these experiments has been to illustrate the extraordinary strength, toughness, and enduring qualities of a coiled wrought-iron barrel. It is worthy of attention that two Palliser rifled guns were also tested to destruction with increasing charges by the Spanish Government, and that in each instance the gun actually became unserviceable by similarly bulging the barrel and harmlessly cracking the outside casing. Sir William Palliser intuits that upon the principle of *Steel non-frangit* it is practically possible to explode a gun lined with a coiled iron barrel by any means. The firing of this gun will be continued on a future occasion, when charges of R. I. G. powder and projectiles fitted with studs and gas-checks will be used.—*The Times* 14th December,

## Torpedo Warfare.

*Broad Arrow*, 1st November, 1879.

WHATEVER difference of opinion there may be respecting which side was victorious in the recent mimic torpedo contest at Portsmouth, there can be only one opinion regarding the benefit which both Army and Navy derive from a well-conceived sham encounter. It is in the highest degree desirable that our governing authorities should recognise the important part which torpedoes will play in future naval warfare. In order to clearly realise the advantages of torpedo warfare and the dangers of meeting torpedo attack, it is necessary that the various descriptions of that weapon should be fully studied and their capabilities tested. To discover all that it is possible to know about the torpedo, it is not sufficient to ascertain what can be done with it; our information is not complete until we know in what way it can be successfully met. Like all other human instruments, there are limitations to its capabilities, and like most mundane monsters, there are joints and weak places in its armor. The recent mimic contest was arranged with a view to the attainment of both these desirable objects. For the protection of the harbour the torpedo was employed in every way which our present acquaintance with the weapon enables us to do, without having recourse to the use of war vessels. These operations were confided solely to military authorities, chief among whom were necessarily the Royal Engineers and Artillery. The attack was carried into the hand of the Navy, and was conducted by the *Bloodhound* gunboat, the *Vesuvius* torpedo vessel, and six second-class torpedo-launches of the *Vernon* torpedo-school and the *Ugla* torpedo-depot. There was thus arrayed on the one hand, all the advantages of prearranged and concealed defence, and on the other hand the darkness of night lent its aid to the attacking party which had for its object the destruction of the obstacles laid down by the defenders. The obstacles were of two kinds—a boom and submerged torpedoes fired from the shore. To protect these obstacles was the duty of the artillery element stationed in Fort Monckton, together with a company of the 24th Regiment and another of the Royal Marines, in addition to the sixteen guns of the fort and the rifles of the attacking party, the attacking party were further exposed to the annoyance of two electric lights placed one at each extremity of the fort. These lights were of course used in order to discover the movements of the attacking party, and thus deprive them of as much as possible of the advantage sought for in making the attack by night. The skill with which the electric lights were used constituted a very important element in the defence. In the same way, the extent to which those in the torpedo-boats,

managed to elude the glare of the light was also a considerable factor in the offensive force brought to bear on the obstacles laid down. All these conditions were well provided for in the scheme prepared for the guidance of the umpires, so that the decision arrived at by that body of officers necessarily afforded a very fair criterion of the manner in which each party availed themselves of the circumstances and forces under their command. We also believe that, with abilities so fairly balanced as was the case between the attackers and the attacked on this occasion, we may fairly judge by the results not only which party was successful in this particular instance, but also which arm would probably have the advantage under the circumstances in a real combat. In short, we are of opinion that the relative advantages of the torpedo for attack and defence were clearly exemplified in the recent mimic encounter.

In taking this experiment as a basis upon which to estimate the value of the torpedo for offensive and defensive purposes, it is necessary to remember that only the fixed mine in form of that weapon was employed on this occasion by either party. It will, therefore, be at once evident, that at an advantage the defenders of a port start in having these mines laid down precisely in those channel ways which a vessel must take to reach the place to be attacked. There is no limit to the number of torpedoes which may be sunk and placed under the entire control of the defenders, except that fixed by their financial capabilities. But so inexpensive is the weapon when in this form that even that limitation may be removed. Hence the work imposed upon an attacking party may be rendered so considerable and difficult of attainment as to make it practically hopeless. No admiral would send a hundred boats to drag for and destroy the mines laid down by the defenders of a port, when he knew well that the feat, even if successful, must cost him at least fifty of that number with their crews. Yet such must inevitably be the case in a well-devised system of torpedo defence. No attack, however bold, could succeed if the defenders became aware of its approach, and had previously provided themselves with the electric light to discover the enemy's movements, together with artillery and rifle fire to co-operate with the mines in destroying his gun and torpedo boats.

The correspondent of one of our contemporaries reported that "the enemy exploded the mines, the defenders submitted to a landing being effected, and it now only remains for the umpires to decide that the Navy were victorious." Considering that the *Bloodhound* was ruled as being blown up, that the *Lightning's* propeller was disabled, that four of the torpedo-launches were destroyed by artillery fire, another blown up while the last was disabled, and that all this was the price paid for breaking the electric contact of six out of thirty-two mines laid down, it is difficult to learn upon what information our contemporary's correspondent based his communication. So far from the victory being with the Navy, the result showed that the attack was completely repulsed, and that the defences of the port received thereby no more injury than could be made good in a few hours.

Such a result is in the highest degree satisfactory to an insular nation like ourselves. It establishes the fact that an impregnable coast defence is at our command. It shows us that even with our first line of defence withdrawn on distant service, it is still possible for us to lay down such obstacles to an invading enemy's approach as would present to him an impenetrable barrier. It may perhaps be said that the advantage to ourselves is questionable, seeing that we have to share it with others. We do not question for a moment that what we find so useful for our defences will be fully utilized by other Powers. In fact the experience of the Russo-Turkish war shows that the hindrance to the navigation of rivers and narrow channels offered by torpedoes and sunken mines has already been realised by our European neighbours. But it is not of much moment to the Power which maintains the mastery of the seas what may be the local defences of a port, so long as an effective blockade can be maintained. It is our pre-eminence on the