progress of the torpedo through the water; the gauge piston descends and keeps the stream of compressed air passing into the engines at a tolerably even pressure. This should be some 600 pounds to the square inch. The steering of the torpedo is, however, the nicest point, as it must always be kept in a perfectly straight line towards the object to be attacked, and this is effected as follows:—"Two heavy balance weights are suspended in the centre compartment of the fish. When its equilibrium is disturbed these weights touch either one side or the other, and strike a lever which communicates with the steering fans at the tail end of the torpedo. The fans are behind the screw propeller and act as rudders, so that whichever side the torpedo "dips" or "heels over" towards, the corresponding fan is set in motion and corrects its movement by giving a contrary impulse to it. The gun cotton, or other explosive element with which the torpedo is charged, is contained in the foremost end. The recent accident occurred just as the torpedo was being lowered, into the water, after having been placed in the cast iron cylinder, out of which it is propelled. The same torpedo had been tried before with a pressure of 1,000 pounds to the square inch. It had been loaded in the Royal Laboratory, and had been brought down loaded on a truck to the starting house on the canal. But no fall or mi-adventure occurred on the way, and at the moment of the explosion one of the workmen was quietly starting with his finger the screw propellor, whilst another was oiling the machinery. Therefore, the cause of the accident was from no outward circumstances, but must have arisen from inherent defect in the torpedo itself. Yet the air chamber was propelled unbroken to a distance of sixty yards; so the fault was not in the strength of material employed. What, then, can have been the origin of the explosion? Probably some manufacturing fault. The plate or bulkhead which closed the air chamber may have been badly fitted, or the screw thread on it or on the inside of the chamber may have been defective. Indeed the "shearing" which has evidently taken place with the latter would give rise to such an idea. Whatever it may have been, a most searching investigation is, we understand, to take place, and we earnestly hope that the real cause of the accident will be allowed to transpire.

The leading article of the United States *Army and Navy Journal* has the following comments:—

"Experts, who had supposed, from the extraordinary jealousy displayed by the English officials, and the great secrecy observed, that the Whitehead torpedo contained the elements of perfect safety and infallibility, will no doubt be surprised on perusing the foregoing description. Experimentally a pressure of 800 pounds to the square inch may be retained in a vessel; but for practical purposes, such an enormous tension is inadmissible. Indeed, the accident at the Woolwich Arsenal is an almost inevitable consequence of employing compressed air which exerts a force of 800 pounds to a single square inch on receivers necessarily made of very light substance. Again, the weight of air of the stated high pressure is nearly four pounds to the cubic foot, hence, when the receiver has been exhausted, the equilibrium of the fish in the water will be sadly disturbed, rendering automatic adjustment necessary—a very objectionable expedient. Referring to the supposed novel device of applying cylinders of unequal diameter, adverted to in the foregoing extract, it may be said that the secret was not worth keeping, since large and small cylinders" are always employed by engineers when elastic agents of very high tension furnish the motive power. Regarding the expedient of regulating the flow of air into the cylinders by means of "an enormously powerful spring pressure gauge which runs through the fore compartment of the fish," most engineers will wonder why this device, which is stated to "keep the stream of compressed air passing into the engines at a tolerably even pressure," was adopted in place of the rotary spring governor. The latter, as long experience has shown, is capable of regulating the speed of the engine whatever be the pressure of the motive agent, whether steam or air. The third great secret communicated by the *Army and Navy Gazette* relates to the plan of steering the fish torpedo, which, we are told, is effected by fans behind the screw propellor acting as a rudder, in the following manner: "Whichever side the torpedo dips or heels over towards, the corresponding fan is set in motion, and corrects its movement by giving a contrary impulse to it," heavy balance weights being suspended in the centre compartment of the fish for effecting the movement described. Obviously, this explanation is quite incorrect, since balance weight can only regulate vertical movement. The fact is that the fish torpedo contains no device for steering. In other words, it cannot change its lateral motion in order to strike an object moving across its course, or correct the deviation occasioned by currents. These imperfections we regard as absolutely fatal to the Whitehead fish torpedo.

Again, it will be evident that in case the torpedo should miss the intended mark in a general engagement, it becomes a hidden danger, which may interfere seriously with the necessary evolutions during the contest. The impossibility of locking the exploding gear of the Whitehead torpedo, after a miss, thus presents another serious defect. Nor can we omit to call attention to the great disadvantage inseparable from the fish torpedo, that it cannot be recalled after having made a false start—a mishap that will no doubt frequently be met with in a conflict between ships in motion.

In view of the shortcomings of the Whitehead torpedo system thus pointed out, we feel called upon to advert briefly to the moveable torpedo constructed by Captain Ericsson, which, as our readers are aware, is actuated by compresed air conveyed through a tubular cable. Having on former occasions described the tubular cable system with sufficient minuteness to give a clear idea of its details and leading features, we now propose merely to call attention to those points of the device by means of which the defects of the Whitehead system have been overcome. 1st. The compressed air necessary to actuate the torpedo machinery being furnished gradually by pumps driven by engines on board of the vessel despatching the torpedo, no air receiver is needed in the latter; hence the objectionable interference with the displacement and equilibrium of the immersed body has been effectually overcome. 2d. The requisite amount of air being gradually supplied through the tubular cable, the dangerous high pressure indispensable when the motive energy is stored in the torpedo has been dispensed with. 3d. By the admission of more or less air into the tubular cable, a piston connected with the balance rudder causes the latter to move to port or starboard, thus enabling the operator to direct the course of the torpedo by simply changing the position of a lever connected with the admission valve. 4th. The torpedo may be hauled in at any time by means of the tubular cable, the latter being coiled round a reel actuated by the same engine which furnishes the compressed air. 5th. The gear which causes the explosion of the charge of the torpedo is at all times, when the compressed air is *not* admitted through the cable, firmly locked by a substantial spring catch. The arrangement is such that, when air is admitted by the tubular cable, the spring catch is pulled out, thereby liberating the gear. On the other hand, by shutting off the air the catch at once drops into the notch, thereby firmly locking the gear. It will therefore be seen that the gear which causes the explosion of the charge of the torpedo by contact under water may be effectually locked, whenever it becomes desireable, by simply suspending the flow of air through the tubular cable. Consequently, the torpedo may at all times, when compressed air is not admitted, be handled quite roughly without risk of accident.

The following amount of some very interesting gunnery experiments is copied from *Broad Arrow* of 14th Feb:—

A piece of rolled armour plating, 14in. in thickness, representing the side armour of the sea-going monitor *Fury*, building at Pembroke, was tested with satisfactory results at Portsmouth on Monday, under the supervision of Captain Boys, commanding the *Excellent* gunnery at the port. The plate, which was tested in the proof room of the *Nettle*, in the upper waters of Portsmouth Harbour, was a part of a plate selected by the Admiralty inspector from 1650 tons, which have been manufactured at the Atlas Works, Sheffield (John Brown and Co., Limited), under a contract with the Admiralty, as side armour for the *Fury*. The plate was tested in the usual manner, being bolted on to the face of an immensely strong athwartship timber target, and fired at with a Palliser chilled shot from a 7inch muzzle loading rifled gun with 30lb. of pebble powder, 30ft. being the distance between the plate and the muzzle of the gun. Five overlapping shot were planted in the form of a square extending over four superficial feet. The greatest penetration was nine inches.

On Tuesday, in the same proof room, and under the supervision of Captain Boys, an introductory trial so to speak, was made of a somewhat novel description of a rifled breech loading cannon of American invention—the "Macomber." A small specimen of the gun with sectional models, was exhibited at the last Paris Exhibition, and at one of the South Kensington Exhibitions we have some recollection of seeing a gun with one of the most marked of the peculiarities of the "Macomber"—an enlarged powder chamber, as compared with the rifled bore—but this was not a breech loading weapon. The present improved "Macomber" gun has, however, claimed for it by its inventor such important advantages over all other guns in its endurance, the initial velocity of its projectiles and their accuracy of flight, as well as other minor matters, that the British Admiralty had been induced to give an order for its trial, so far as the size of the specimen gun the inventor has now with him in England will allow. This gun has but an extreme length of 48 in., with a length of tube of 24in., the length of grooving in the tube being 23 in. The power chamber is 7·25 in, in length, with a diameter of