

THE SPANISH SUBMARINE TORPEDO BOAT "PERAL."

We represent herewith, from *La Vie Scientifique*, the Spanish submarine torpedo boat "Peral," which was constructed at the arsenal of Caraca and launched October 23, 1887. The boat is cigar-shaped and is 72 feet in length and 9½ feet in width amidships. It is provided with two screws, an electric motor and a torpedo tube.

The first experiments were made with it in February, 1889. The question was not to examine the qualities of the boat as a diver, but simply to ascertain what its nautical capability might be. It was therefore maneuvered near the surface; but, unfortunately, one of the screws suddenly refused to revolve, and a landing had to be made to repair it. Five months later the "Peral" started out for the second time, and on this occasion no accident happened. The boat seems to have behaved pretty well and, as the *Cronica General* observed, "obeyed its inventor as a slave obeys his master." But the Spaniards are enthusiasts, and, long before the experiments, they had lauded both the boat and its inventor up to the skies.

During subsequent trials for speed, the boat was always meeting with some mishap, and it was even once stranded upon a sand bank. A submarine boat, however, is not designed to be maneuvered at the surface of the water, but is to navigate beneath. It must be confessed that from this viewpoint the experiments were, from all accounts, far from being conclusive. The "Peral" certainly dived, but so few times that the Spaniards had no reason to boast of it. The boat remained submerged for a quarter of an hour, but was immovable and attached to the wharf by a rope. From such an experiment no conclusion could be drawn as to its stability.

In some more recent trials of the "Peral," in the harbor of Cadiz, the vessel moved about upon the surface of the water with a speed of six miles an hour, turning short, stopping and starting with the utmost facility. After a display of her qualities in these respects, her powers of sinking below the surface of the water and rising again were exhibited. Several times up and down she went, sinking until only half of her tower, through which air was drawn, could be seen above the surface of the water. After going through a variety of evolutions, such as turning, stopping and backing while in this position, that is nearly submerged, the cover of the tower was shut down and the boat disappeared wholly beneath the water and remained under the surface for six minutes, only the flag upon the staff being visible.

After a trial of three hours and a half, most of which time the boat was submerged, leaving only the tower or air pipe half way above water, the performances were concluded, the boat rose, and Mr. Peral, the inventor, opened the cover of the tower, and, presenting himself upon the exterior, was received with the greatest enthusiasm by the spectators. It was, says *La Ilustracion Española*, "a day of glory for the inventor and of prestige for Spain."

It is stated that the Spaniards expect to show the efficiency of the "Peral" in the defense of some one of the ports of Cuba; but, says *La Vie Scientifique*, "let us hope, in the first place, that it will be possible to use the boat!"

The Loss of the "Maine."

The German naval commander Hermann Gercke publishes in the current number of the official *Marine Rundschau* an extremely interesting article on the loss of the "Maine." He comes to the following conclusion: "It is difficult, if not impossible, to give a definite answer to the question as to what the cause of the explosion on board the 'Maine' may have been. There is much probability for the assumption that gas was generated from coals or fresh paint, and, becoming in some way ignited, caused an explosion in the magazine; that only one explosion took place, and that no mine played any part in the affair." Commander Gercke continues by saying that if it should be proved that a mine was capable of inflicting such damage as that suffered by the "Maine," extensive changes must in future

be made in naval construction, such as the strengthening of ships' bottoms and the changing of the positions of ammunition spaces. For our own part, we cannot coincide with Commander Gercke that there is the least probability of the explosion being due either to gases generated from "fresh paint or coal." To our minds, after the most careful perusal of the evidence given before the United States Naval Court and a minute examination of the drawings attached to the report, it is only possible to arrive at the conclusion that the explosion came from the outside. The evidence and report generally appears to us to finally dispose of any chance of the explosion having occurred on the inside,

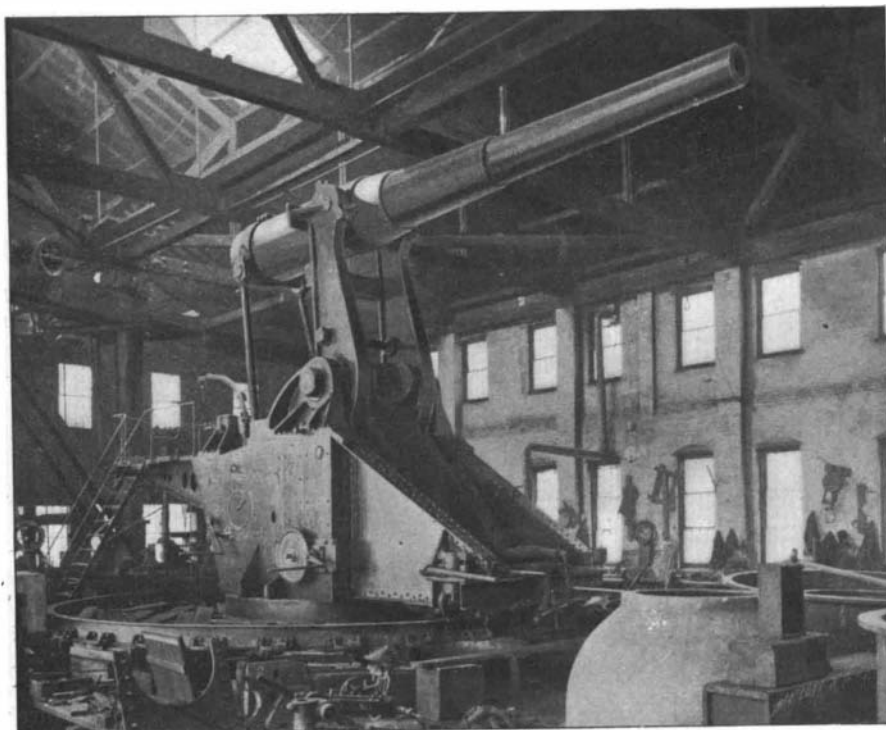


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and from the causes suggested by Herr Gercke. As to the changes suggested by this gentleman in regard to the strengthening of ships' bottoms, we cannot think that any strengthening within reasonable limits would protect a ship from the effect of the explosion of such a mine as, in all probability, has been the cause of the destruction of the "Maine" and the loss of some two hundred and fifty gallant men.—*Industries and Iron*, of London.

A NEW DISAPPEARING GUN CARRIAGE.

During the last few years great attention has been paid by ordnance experts to the production of disappearing gun carriages and gun lifts for coast defense. The results have been very satisfactory, and among the several types of carriages have been the Gordon, Buffington-Crozier and others. A new "all-around fire" disappearing gun carriage for a ten-inch breech-loading rifle cannon has just been finished by J. B. & J. M. Cornell, of New York, at their West Point foundry. This gun differs in its action and its underlying de-



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sign from that of the Buffington-Crozier. In both of these carriages the gun is mounted by its trunnions in bearings in the upper ends of two levers. In the former the fulcrums of these levers are stationary, the lower portions of the levers being connected with the counterpoise weight and the recoil-resisting appliances. The result of this construction is that the trunnions of the gun travel in a true circle. The Buffington-Crozier gun, which is described in the *SCIENTIFIC AMERICAN* for March 14, 1896, is also mounted in the upper end of two levers, the fulcrums of which after fire travel rearwardly along horizontal guides, while the lower ends of the levers travel in vertical guides and

then quickly disappear as the line of travel approaches the end of the stroke, the short diameter of the ellipse.

The total weight of the carriage is about 300,000 pounds, which is made up of 155,000 pounds of steel and iron castings, 15,000 pounds of steel and iron forgings, 85,000 pounds of lead counterpoises, 40,000 pounds of structural steel shapes and about 5,000 pounds of brass and other metals. The gun weighs about thirty-three tons, and the shop tests have been highly satisfactory. The gun has now been delivered to the government. The great advantage of this gun is that it can fire in every direction, which will prove very valuable in many locations, as on low sandy spits.

The carriage was built in the old historic West Point foundry, located at Cold Spring on the Hudson, which has recently been taken and modernized by Messrs. J. B. & J. M. Cornell. This plant is well known as the foundry at which the celebrated "Parrott" guns were made which played such an important role in the Civil War. The same foundry also built the "Zalinsky" dynamite guns.

Quenching the Soldier's Thirst.

Everybody at all familiar with the actual conditions of an army on the march, says *The Independent*, ap-

preciates the great practical difficulties in the way of obtaining an uncontaminated supply of drinking water; and one of the most valuable suggestions was made by a gentleman who imagined the possibility of making use of "driven" wells, through which safe water might be obtained, and, fortunately, there is carefully recorded experience to testify to their value.

In the French invasion of China, in 1856-1857, the Chinese, when driven from a place, put poison in the springs and surface wells, and many French soldiers were killed thereby; and at once the engineers made requisition for iron pipes. These were forced into the earth with sledge hammers, and common pumps put on, and an adequate supply of wholesome water drawn. As our authorities are quick to avail themselves of all really fertile ideas, this suggestion will not be lost on them.

Another way of quenching thirst, harmless and efficient and available, when there is strong pressure for uninterrupted action on the part of the soldier, would be to fill his canteen with tea. Of course, this would be made from boiled water; and the addition of a few drops of lemon juice would increase its power of exciting the salivary glands to greater activity, and it is an expedient often resorted to where it is desirable that the least possible amount of liquid should be ingested.

The use of tea is still further approved by the testimony of experience. Sir John Hall, K.C.B., says: "In the Kaffir war (1852) a march was made by 200 men, in which 1,000 miles were covered in seventy-one days, or at the rate of fifteen miles a day, without wine, spirits or beer." Officers in India, when marches were made through malarious regions, had an opportunity to test the virtues of tea. Sir Garnet Wolseley urges its use, and the experience of the Canada lumbermen confirms its value. They spend the winter in the backwoods in the hardest sort of labor, and are exposed to a freezing temperature, and while no spirits are allowed, they have an unlimited supply of tea.

Enough has been said of the horrible sanitary conditions in Cuba in the neighborhood of the cities to warn us that even the driven wells might not serve as an absolute protection where the soil is saturated with infectious material, unless they could be driven far down beyond what must be the inevitable soakage during the rainy season. People forget that the decaying vegetation in a kitchen midden contains many minute organisms, to which the interstices of common earth are as spacious galleries and ample conduits, needing only water to be washed far down into the earth.

FOUR vagrants, says *The Railway Review*, headed for Chicago, boarded an Illinois Central train at Kankakee, recently, and took passage in a refrigerator car, where they were locked in. When the train arrived in Chicago, a day later, the men were found badly chilled and unable to move.