

A NEW SUBMARINE TORPEDO BOAT.

For some time past Lieutenant Zalinski has been experimenting at Fort Hamilton, in the Narrows, with a novel submarine torpedo boat, the invention of Mr. John P. Holland, of this city. The boat can be sunk to any desired depth below the surface of the water, propelled in any direction, and brought to the surface at any time. The boat has a wooden hull, is cigar shaped, and measures 50 feet in length by 8 feet in diameter at the largest part. The floating surface, under ordinary conditions, is 30 feet long.

All the various operations of the boat are controlled by one man in the turret, which is a small chamber placed about in the center and provided with a dome-like cap, in the sides of which are glass bulls' eyes, spaced the same distance apart as a man's eyes. Through these glasses observations can be made.

The propeller is driven by a petroleum engine. The vertical and horizontal rudders are operated from the turret. The two horizontal rudders are placed one at each side of the stern, as plainly shown in the large engraving, and are used to raise or depress the stern, as may be required. When the weight of the boat is but little more than that of the water displaced, these rudders can be used to depress the bow and compel the boat to pass below the surface. But the sinking and raising of the vessel is usually accomplished by admitting or forcing out water from certain chambers, compressed air accumulated by a compressor serving to expel the water.

When fitted for actual service, the bow of the vessel will be provided with one of Lieut. Zalinski's compressed air guns for throwing cartridges charged with nitro-glycerine. Just before firing the gun, the muzzle will be raised a little above the surface by forcing water out of one of the compartments in the bow, when the vessel will rest at an inclination, as shown in Fig. 2. The recoil will serve to completely submerge the boat. To permit of properly guiding the boat without bringing it above the surface, there will be a tube extending six or eight feet above the top of the turret. The top of the tube will be provided with an inclined mirror, and the bottom will be a camera lucida prism, by means of which the surroundings may be conveniently viewed by the individual in the turret, which may be kept at a safe distance beneath the surface. A cartridge could be thus thrown at a vessel from a distance of one or two miles, while the only indication of the torpedo's presence during its approach would be the small portion of the tube reaching above water.

Another method of attack would be to run beneath the vessel, detach buoyant cartridges to be exploded by electricity when the torpedo boat had reached a safe distance. Still another plan would be to fire a steel pointed cartridge into the bottom of a vessel, and discharge it in the above manner. It is apparent that with a perfect submarine boat, a vessel could in many ways be destroyed without exposing the torpedo to excessive danger. Provision is made for allowing a man in a diving suit to leave the torpedo when the latter is submerged, and there is also means provided for the crew leaving the boat should it be unable from any cause to rise to the surface. As an additional safeguard, there are several different methods of accomplishing each of the various operations of the boat, such as raising or sinking, and working the propeller and rudders.

The torpedo now at Fort Hamilton was designed as an experimental boat to test the plans of the inventor. It has attained a speed of nine miles an hour, and has been successfully sunk to the bottom and raised. It is expected shortly to more thoroughly and severely test the capabilities of the boat by more extended journeys beneath the surface.

Legal Hints for Travelers.

A railway company is not an insurer of its passengers, according to the law in England, but is responsible for their injuries, according as it or its servants have or have not been guilty of negligence.—13 Pet. 181.

But the fact that any part of the car breaks raises the presumption of negligence.—2 Camp. 79.

And, indeed, if any of the means of transportation, whether connected with the engine or train, or with the roadway, gives way, and you are injured, it is presumptive evidence that the company has been negligent.—18 N. Y. 534.

But the fact that an accident has happened does not

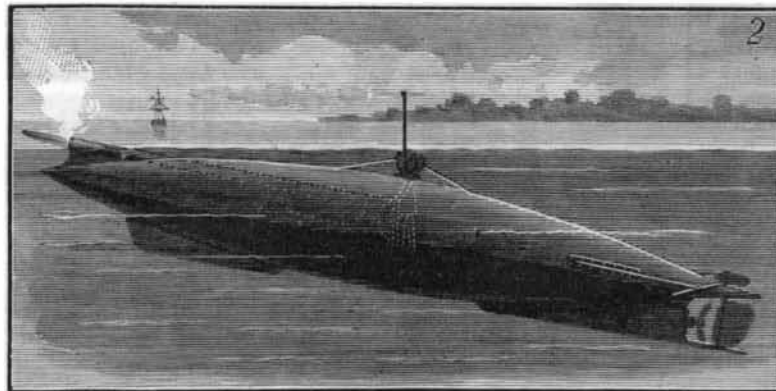


Fig. 2.—TORPEDO BOAT IN POSITION FOR FIRING.

always raise a presumption of negligence, for the accident may be imputable to a trespasser, for whose conduct the company is not liable.—18 N. Y. 534.

Out of regard for the value of human life, and in view of the danger that besets a railway traveler, the law makes it the carrier's duty to convey the passengers safely, so far as human care, skill, and foresight can do it.—14 How. (U. S.) 468.

As fast as new and improved means and methods are perfected and found practicable and more safe than the old things and old ways, they must be adopted.—64 Pa. St. 225.

It is a first principle that a railway company must employ competent inspectors to make proper examinations of its rolling stock. For instance, it has been laid down that every test known to science and recognized by experts must be applied to boilers of locomotives, to ascertain their condition. But if there are defects which such tests would not bring to light, and which experts could not discover, and by reason of such defects an explosion occurs, the company is not liable.—20 Blatch. (M. S.) 338.

The mere fact that an explosion takes place where such tests have not been applied raises a presumption of negligence.—Id.

And likewise, car wheels and other parts of the cars

defects, and properly laid down and spiked on sufficient cross ties.—74 Ind. 462.

If a bridge gives way, it is presumed that the company has been negligent in constructing or locating it.—2 Col. 442.

But if the bridge gives way and the train plunges into the water because of an unusual and extraordinary flood—something unknown to common experience in that region, and which could not have been reasonably anticipated by skillful engineers—the accident may be attributed to "act of God," for which the company is not liable.—53 Texas 46.

And so if the track is undermined and weakened by an extraordinary freshet. But the engineer is in a position to notice such an extraordinary condition of things, and take precautions. If the water is so high as to afford suspicion that the track or bridge may be out of condition, he must stop and test it, or he will make the company liable for the consequences of an accident.—76 Mo. 518.

Allusion is made to the acts of a trespasser for which the company is not responsible. Thus, if a shot is fired into the car and you are wounded, the railway is not bound to pay the bill.—27 L. J. 155.

Nor is it liable if an obstruction is suddenly thrown across the track, or a switch maliciously opened, and your train rushes into destruction before the employees have time to right things.—Id.

And if the train is derailed by a tornado of unforeseen violence, that, too, would be considered an accident caused by "act of God," relieving the company from liability.—3 Neb. 44.

It is not always that a company escapes liability for the consequences of an accident caused by a misplaced switch, though. If not suddenly thrown open by a trespasser, in front of a moving train, the company must show that by no human skill or foresight could the accident have been averted.—6 Am. & Eng. Ry. Cas. 139.—Myron T. Bly, in *Pathfinder Railway Guide*.

A New Joint Material.

Portland cement mixed with a solution of calcium chloride rapidly acquires considerable hardness. Setting begins in three or four minutes, and is attended with an elevation of temperature that may attain to 70° C. A slight expansion is also produced in the course of setting. Cement mixed with calcium chloride softens if it is plunged immediately into water; but after having been air dried for eight or ten days, it may be so immersed without inconvenience or detriment to its cohesion and hardness. Ordinarily damp air has no influence upon the mixture. The fact that, according to the *Journal du Ceramiste*, the runners of cement mills are repaired with this chloride cement

mixture is a sufficient indication of the great strength which the compound is capable of acquiring. The stones are put to work within an hour of repairing; and the cement is perfectly resistant, and wears less than lead, which is commonly employed for the same purpose. All joints can be made with great facility, and acquire in a short time extreme solidity with this chloride cement mixture. The slight swelling during setting is very useful in filling all hollows and making good adhesion. The cheapness of calcium chloride permits of the use of the mixture for numerous purposes.

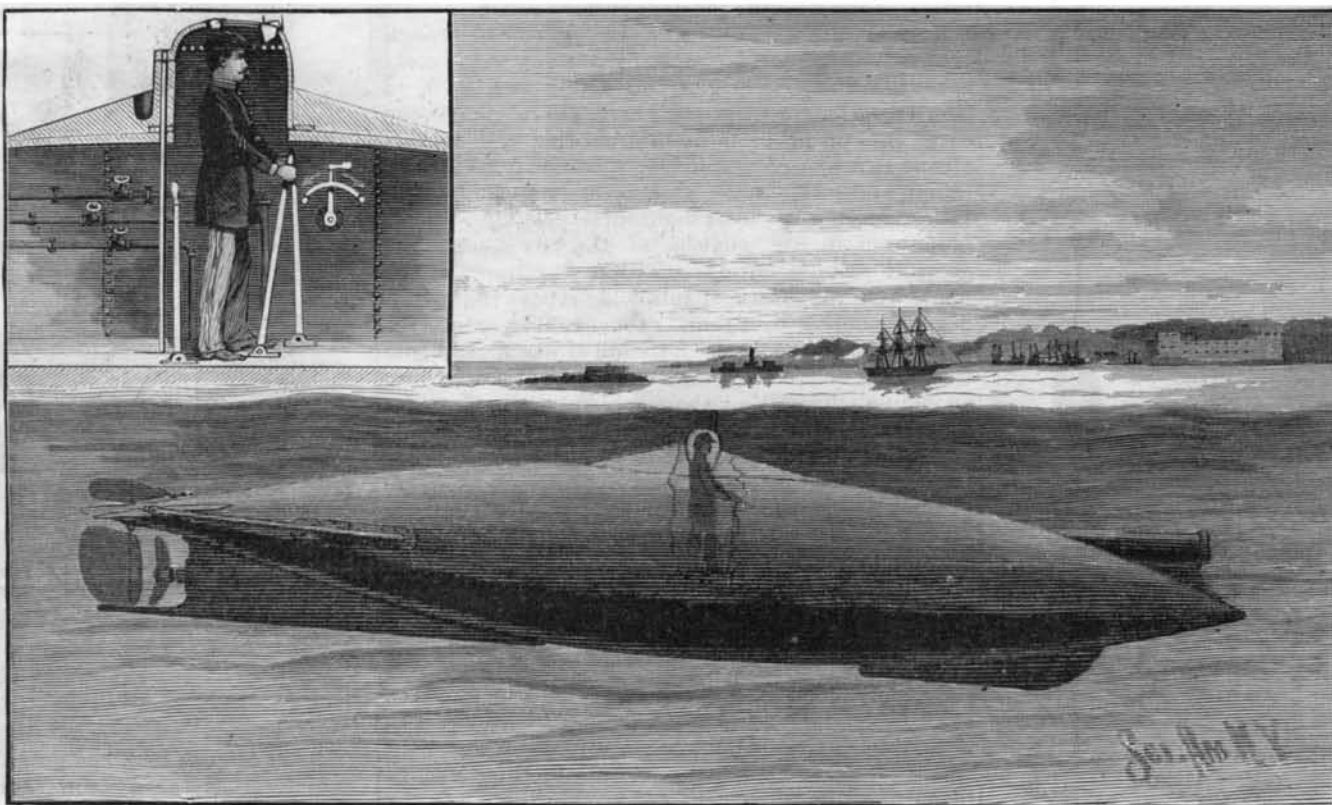


Fig. 1.—HOLLAND'S NEW SUBMARINE TORPEDO BOAT.

must be frequently inspected. It is no excuse that the cars were bought ready made of a reliable car builder, and that the defect which caused the accident was a defect in manufacture which could not be discovered after the car was completed, provided the defect could have been known during the process of manufacture.—13 N. Y. 9.

When an accident is caused by a broken rail, the company can only relieve itself from responsibility by showing that the rail was sufficient in size, free from

poses. When great hardness and quick setting are desired, the cement may be gauged pure; but in general, an equal mixture of sharp sand or gravel will be found to answer every purpose.

Most metals and alloys shrink or contract on cooling. But an alloy which will expand on cooling may be made of lead nine parts, antimony two parts, bismuth one part. This alloy can be advantageously used to fill small holes and defects in iron castings.