than those which attend all vessels useing an exhausting material.

The last part of Mr.Ericsson's objection was not a question overlooked by the board, who were satisfied that the wire cable of Lay's torpedo is of sufficient strength to pull her astern in case of utmost neccessity, which which would in actual warfare rarely or never occur, as the boat is intended to attack an enemy going straight from the operator to the opponent, and after performing her mission properly, she will not be expected to return.

Mr Ericsson objects to Lays's torpedo, and consequently criticises the intelligence of the board in such matters by his article No. 7, which is his.

Fourth point of attack, and too lengthy to quote entire. We will first remark that the apparatus used in starting, stopping, and steering the torpedo is neither complex nor delicate. Any person with a common school education in electricity will without any difficulty comprehend, and with a little practice be able to prepare for work the whole arrangement of the machine, in fact its great value is in its extreme simplicity.

The necessity of carrying the cable in the boat and paying out from her is patent to any man familiar with nautical affairs.

The experience required by the operator is imply to be able to read the words, "port, starboard, steady, start and stop," to know the meaning of those words and also how to steer any ordinary boat. The amount of attention required is simply to put the boat straight end on the object to be attacked, to keep it there and "go for it." Both the experience and attention can be supplied from any U. S ship or naval station, where seamen, and very ordinary seamen, are to be found.

As Mr Ericsson has not been able to obtain the particulars of the arrangements by which the rudder is kept in position when going straight ahead, he will perhaps be glad to know, through the medium of your valuable paper, that this question also arose in the minds of the board and that examining the arrangement, its nature was found to be "india rubber" in cylindrical form, about fifteen inches long and one inch thick, the middle made fast to the tiller head and the the two ends shackled to the sides of the boat.

The important device for the admission of water to make good the loss of wire reeled off, and for the weight of the gas expended (the latter not mentioned by Mr. Ericsson), and the other necessary but simple and practical device of the inventor, Mr.J.L.Lay, for the proper introduction of the motive power to the cylinders, excited the admiration of the whole board, which will no doubt feel itself flattered both individally and collectively by the reflection that in admiring the excellent workmanship of the Messrs. Clute Bros. & Co. they have unknowingly, and apparently accidentally coincided with the professional opinion of a great inventor and engineer.

Mr. Ericsson's remarks on the trial at Newport, however, completely dispel the idea that perhaps the opinion of the board and of the celebrated inventor, hitherto opposed to each other, were beginning to coincide. His comments upon the height of tide required show that he knows absolutely nothing about the floating requirements of the "Lay torpedo," which can, like any other boat drawing three feet of water, navigate and manœuvre wherever she can float. the state of the tide having nothing whatever to do with it, beyond that of properly supporting her.

His assertion "that the drifting of the boat after stopping the motive engine, was resorted to at last in order to reach the mark" shows conclusively that his knowledge of the circumstance and of the management of the boat is exactly equal to that mentioned above concerning the requirements of the Lay torpedo. The boat was run out, turned round at will, and brought back toward the launch, running from left to right across a line from the operator instead of directly from him as she is intended to go (the most unfavorable line of approach). A small error in calculating the distance with the eye, brought the torpedo boat between the operator and the launch, just alongside of it; the torpedo was stopped, allowed to drift clear and then started ahead pointed for the launch, and run into her, exploding the torpedo which she carried on her bow, to the entire satisfaction of the board and of the foreign officers present, and I may say of the spectators generally.

Having thus explained to the public the reasons why the board dare to differ from the great inventor in their opinion of the Lay torpedo, I will refer to the design of that gentleman for supplanting the same, "fatal defect" and all.

1. Ericsson's Submarine Torpedo being immersed from fifteen to twenty feet below the surface of the water must be out of sight of the operator and consequently cannot be steered with sufficient certainty, practically (however well theoretically) to hit anything save perhaps the bottom of the neighboring shore. If by any contrivance on the surface its position is made know to the operator, there is nothing to prevent "a watchful enemy" from seeing it also and making his preparations for defence.

2. In this Mr. Ericsson's appreciation of the destructive effect of several hundred pounds of nitro-glycerine appears to have developed somewhat more, or else he could not have thoroughly understood the explosive intented to be used with the Lay torpedo. (The board will have reason to commence flattering itself again.)

Agreeing with Mr. Ericsson as to the safety and reliability of the motive power for his submarine torpedo, "atmospheric air under moderate pressure," it would yet seem that his method of supplying the same to the engine, through a tubular cable, although a very comfortable an inexhaustible one would be somewhat difficult to practically realize.

In carefully reading over the comparisons set up by Mr. Ericsson, I note that while he attempts, not always with success, to describe the Lay torpedo minutely, his own design is comparatively undescribed and therefore in order that it may not be supposed that this great gogginess in the description of the tubular cable, etc., by which air is conveyed from the air-pumps on shore to the engines in the torpedo is intentional, let me ask, What size of tubular cable it is intended to employ in order to transmit sufficient power to the fifteen-horse power engine in the torpedo? Of what strength of material to withstand the pressure required to force such motive power through two miles (the distance required of Lay's torpedo) of tubular cable; and further What will be the external diametar of the cable? What size of reel would be necessary to accommodate the required two miles? What size of engines to operate the same, and what size of air-pumps to transmit the requisite pressure through the two miles of tube.

Supposing its external diameter to be one inch, the smallest delivering area which would allow the torpedo to even approximate the speed claimed by the inventor, we should have a circumferential area of frictional surface of 2,763,2 square feet, to overcome which friction would require all and more power than Mr. E. calculated to put in the boat, although he claims that he has practically demonstrated its capability to tow one-half a mile of tubular cable at the rate of ten knots per hour without absorbing more than one-third of the motive power of the boat. Mr. Ericsson would confer a great favor on the mechanical world generally, by explaning mathematically the process of towing, and whether he supplied the apparatus with air through the cable at the time of towing the same at a rate of ten knots per hour.

Does Mr. Ericsson's tubular cable float, or does it sink?

If it floats, there is nothing to prevent an enemy from cutting it, by running astern of the torpedo with a boat picking up and cutting the cable and thus depriving Mr. E's operator at that place of employment. Should the cable sink the friction is greater, and in case of turning the torpedo, should the cable foul any object such as rocks, accidental anchors, etc., the cable would be not only choked, cutting off the supply of motive and steering power, but the boat would be firmly anchored, so that not even Mr. Ericsson's superior intelligence in such matters could command the working capacity of this engine to such an extent as to drag the tube when fouled as described. And here, by way of comparison, let me remark that the Lay torpedo, which pays out as she goes, can foul all the cable which she carries, as fast as paid out, without any detriment whatever to her management, rate of of speed, or efficacy, which is not only evident from an inspection of the arrangement of the cable, but has also been shown practically in the experiment at Newport.

The stress laid by Mr. Ericsson upon his ability to reel up cable and thereby retire his torpedo from any unexpected difficulty, appears to be a flight of imagination on his part, and presents so many difficulties that practical men will not be ready to accept it as gospel. One of the first difficulties presenting itself to the mind is, the inability of of an operator to discover whether a torpedo a mile off and 15 feet under water, should go to port or starboard, ahead or astern. As for hauling it astern by the cable, supposing that the operator desired to make that movment the same can be done with the Lay torpedo, which the board has approved of. The wire of which is sufficiently strong to perform that operation and also to anchor her by if necessary.

Referring to the authority of Mr. Ericsson for the discription of a boat 10 feet long and 19 inches diameter carrying an engine of 15 horse power, 400 lbs. of nitroglycerine, and towing a tubular cable half a mile in length at the rate of 10 miles per hour, I have only to remark, that Mr Lay's torpedo carries only an 8 horse engine conveniently and at the utmost could only accommodate as to space one of 12 horse power, yet Lay's torpedo has 15 feet more length and 17 in. more diameter, than the one designed by Mr. Ericsson. There is no practical way of accounting for this difference, and when we add that the displacement of a cylinder 10 feet long and 19 inches in diameter equal 1,260·92 lbs. of water which with an exponent of 0.68 would allow a displacement of the hull of 853.42 lbs. of water, while the approximated weights would be as follows.