MEMORIALS,

RESPECTFULLY ADDRESSED TO THE CONGRESS OF THE CONFEDERATE STATES.

It is stated in the Northern papers that the Federal Government is constructing a large number of iron gun-boats, of great breadth of beam and which will only draw from 3 to 8 feet water, with the view, during the ensuing winter, of penetrating the tributaries of our large rivers. We have still deep rivers which require defense, and the Mississippi, of which it is urgent to secure partial possession, and if possible to resume our occupancy of its whole navigation. If we could not, or at least as we did not construct forts, and arm vessels to secure our former occupancy when we were in uninterrupted possession of that navigation, our future opportunities must be comparatively limited, if relying only on these means of defense. We know that the Federal Government are now constructing numerous iron-plated vessels, of much greater strength than those first used, and carrying guns of a calibre hitherto unknown for such service. There was, however, one means of defense heretofore neglected, equally applicable to deep and shallow waters, and equally formidable to the lightest iron-plated boat, and to the most solid of these new leviathans, viz: the use of sunken charges of powder, fired by the galvanic battery, and commonly called Torpedoes. These at least should be used as adjuncts to every other system of river defense, where the latter are practicable, and offer the further advantage on a long river like the Mississippi, of being applicable where available forts cannot be constructed, nor floating defenses launched, able to compete with our adversaries. This—providing time and expense were no object—but, presenting this further favorable feature, that, carried out on an effective scale, it does not involve a per centage of the expense of either of the other systems of defense.

Two questions in this connection naturally arise: Have we the material and the competent skill? Is this Torpedo system really effective, and where has it been tried?

To impress conviction on the minds of those whom your memorialist has the honor of addressing, as to the feasibility of this scheme, or of its being at least worthy of their serious attention, he must beg them to follow him in a brief history of the subject matter, and of his personal experience thereof.

The Torpedo, which is nothing but a charge of powder, contained in an iron, tin, or wooden waterproof vessel, to be exploded under

ships, was revived in a more ingenious form by Fulton, and Johnson, (with the latter your memorialist, was personally acquainted, and who showed me his plans, and explained to me his views thereof) at the close of the last, or beginning of the present century. They obtained for this invention an award of £10,000 from the British government, and models of some of their Torpedoes are still exhibited at the Rotunda at Woolwich. One of these, by means of clockwork, would explode at any given time. Others, intended to be moored in rivers, were devised to ignite by means of triggers, when the bows or sides of vessels touched against them, or fastened two together by a line or rope, were intended to be launched, down stream against vessels that were ascending or lying at anchor, so that if any portion of the line struck the vessel's cutwater, the two Torpedoes (or one of them) would be drifted by the current against the sides of the vessel, and thereby the action, if only very slight waves, ignited by the triggers with which it was provided, bumping against the sides. It was abundantly proven, by various experiments, that a very small charge of powder, fired under a vessel, immediately destroyed her. Amongst others, I recollect seeing the drawings and report of a vessel destroyed in the Medway, by Capt. Johnson, in presence of the Duke of York, the Commander-in-Chief of the British army, and which report was verified by the Duke's signature. A very small charge fired under this vessel entirely broke her up, and she sank almost as quickly as by the explosion of a powder magazine. But these and other Torpedoes, though subsequently tried in various forms, and in different places, were never (or only very partially) successful, from these two great difficulties: first, getting them into the right place, and secondly, exploding them at the right time. The vessel to be destroyed had to come to the Torpedo, or the Torpedo to the vessel; somehow it was very rare that the vessel was so accommodating, and for the Torpedo to go to the vessel partook too much of the "*belling-the-cat*" to be a very practical operation. The difficulty of igniting with certainty and at will, was, however, practically the most formidable. This obstacle was, however, removed by the discovery or invention of conveying the galvanic spark, so as to ignite charges below water. Professor Jacobi, of St. Petersburgh, claimed to be the inventor of this method, and was rewarded as such, by the Russian Government.

About the year 1840, I saw him at the house of Gen. Schilders, Chief of Engineers in the Russian army, on Petrowski Island, near St. Petersburgh, and in the delta of the Neva, make experiments in presence of the Emperor Nicholas in igniting submarine charges. They were placed under the ice, at various distances, some exceeding half-a mile, and the wires conveyed into the room where the experimenting party was assembled. To the best of my recollection, not more than two out of every ten of these charges exploded on the first attempt to fire them. Gen. Paisley, of the British Engineers, discovered, or had the credit of discovering, that charges of powder laid on the top of a submarine rock would blast it, and he extensively used the galvanic battery for the purpose of igniting them, but as it was of very little consequence in these operations, whether his charge

was fired after one or several trials, no great progress was made in attaining certainty of firing at the first attempt. I found, however, that various illiterate miners, quite unacquainted with the theory of the instrument they were using, had obtained perfect certainty of ignition.

About 1852, Mr. Julius Krohl, a Prussian Engineer, after much study and experimentalization, (undertaken at the suggestion, of your memorialist), obtained this certainty of ignition. He took and successfully executed, in New York, and in several of the Canadian and West India harbors, contracts for the removal, by blasting of submarine reefs. Amongst others he removed the Vanderbilt Rock in the North river, and also, the Diamond Reef, opposite Governor's Island, New York. During many months spent in these operations, he exploded every day, many charges, varying from one to 600 pounds each. He had obtained an average certainty of explosion of 98 out of 100. He took (also, at the suggestion of your memorialist,) as a pupil, Captain Henry Bolton, whom, after a certain course of instruction and experiments, he pronounced to be as perfect an adept in this art, as himself. Probably from taking greater care, Bolton's average was still higher.

When the United States Government sent a Naval expedition to Paraguay, Mr. Krohl, who had satisfactorily fulfilled many contracts for the Navy and other departments, was called on to furnish several galvanic batteries, but it was found, after these were procured, that there was no one, at that time, either in the Engineer, Artillery, or Naval corps, sufficiently conversant with their use to manage them. The Navy Department, therefore, applied to Mr. Krohl, to provide some person who could give instruction or undertake the practical management of the same. Mr. Krohl replied that he did not know any one in the United States, except himself and Capt. Bolton, who, however, declined this offer. Although the theory and construction of the galvanic battery, as applied to igniting submarine charges is known to most scientific men, and to many intelligent officers of Engineers and Artillery in most services, the practical use of the same is very rare, as may be judged from the fact that neither Professor Jacobi, the alleged inventor, nor Gen. Paisley, who applied it to new uses, had much skill in its management. To attain this, it was necessary for any person desirous of becoming proficient, to go through the whole process, from the preparation of the wire in the work-shop, to its final application, under the guidance of an instructor, already himself a proficient in its practical use. Mere theory, or book knowledge would no more enable him to ignite his charge with certainty, than the discoveries of Liebig, in Organic Chemistry, to cook properly a beef-steak, which it was a very easy thing for any good cook to accomplish, who had never even heard of Chemistry.

It will be readily perceived that in using the galvanic wire in firing a torpedo or sunken charge, two things are required: firstly, that it should be sure to go off, and secondly, that it should go off at the first attempt, because before this attempt could be renewed, the vessel in motion would have passed beyond the danger. Both of these requi-

sites Captain Bolton combines. He alleges that in a very few weeks he could teach intelligent people to carry out the practical portions of this art quite efficiently. He is now in the Confederacy, 1st Lieutenant of infantry in the regular army of the Confederate States, and detailed for engineer duty, which he has performed in Western Virginia, on Roanoke Island, in North Carolina, on the Peninsula, and about Richmond. Your memorialist has known him for many years as a most reliable gentleman, and he hastened to offer his services to the South, immediately on the secession of South Carolina. He has further ascertained that all the material for the construction of the galvanic battery is procurable within the Confederacy.

Certainty of ignition and the proper isolation of the wire (so that they may be kept for months in an operative condition) being obtained, remains the question as to how rivers may be defended by means of torpedoes, or sunken charges? That is to say, how such charges may be brought under the hostile vessels, which it is purposed to destroy? Lieutenant Bolton proposes defending rivers by anchoring across the channel to be defended, a row of torpedoes, i. e., tin cans, or waterproof casks or boxes, containing a charge of powder, connected with one on shore by a galvanic wire, and sunken a few feet below the water level. These he proposes to place sufficiently close together to prevent any vessel (ascending or descending,) from crossing this wire without being at some time, immediately over one of them. One torpedo every 20 feet would suffice. This would give 15 for every hundred yards of channel to be defended. It would not, however, be safe to trust to one line, because the hostile squadron, informed that such obstructions existed, might send out boats to grapple for them. The first boats crew which reached one of them could be easily destroyed, but the steamer or steamers might follow safely over where the explosion had taken place. If this, however, only brought the first vessel on to a second line, where she was destroyed, it is reasonable to suppose that those following would proceed no further—a third and even fourth line would obviously be proportionally more effective. It will be readily understood that a line of torpedoes, if protected by the fire of a battery from the shore, would not be in danger of being fished up by small boats, but still without a second line, after the destruction of one vessel others might pass up or down. Of course wherever there were batteries, lines of torpedoes would be very desirable, but some of their chief advantages are that they can be placed where there are no batteries—that such lines can be easily established with comparative secrecy, and that position easily shifted when required. Wherever a strong battery is erected the enemy is very apt to know its whereabouts, and therefore to attempt to take it from the land side unless protected by strong works, a large force or natural inaccessibility of position, which inaccessibility, is mostly incompatible with accessibility for the heavy material required. For this latter reason it most frequently happens that on a river like the Mississippi, batteries cannot be placed on what would be the most effective sites, with reference only to the channel, but the land conformation and the means of access to it, have also to be taken into consideration. Again a battery once

erected cannot be easily shifted; finally, on any point of a long water course patroled, so to say, (as the Mississippi is at present,) by the enemy, a battery attempted to be established on its bank, unless of strength adequate to bar a passage to the hostile squadron and fully completed, would be useless, if discovered, and attacked before such completion.

Four objections may be urged to giving this system of defense a trial: Firstly—The large expenditure involved in attempting a mode of defense which had not yet been practically proven. Secondly—The large quantity of powder it requires. Thirdly: The weight of the material. And fourthly—The liability of torpedoes to be washed away.

In reply to objection the first, it may be answered that a very small expenditure would demonstrate the power of charges thus fired. For instance, a strong raft of heavy hewn timber might be framed at a trifling expense, superior in strength to the most solid naval construction. One torpedo, exploded thereunder, would settle this question. A single galvanic battery, involving a cost under $100, and half a mile of wire (which if the experiment failed would not be wasted,) would suffice to test the distances at which charges could be fired, the certainty with which they could be fired, as the operator might ignite successfully several hundred musket cartridges, and (by so doing after the wire had been for several weeks immersed in water,) prove the feasibility, or rather his proficiency in isolating it. It is worth while to remark in this connection, that the "ram," though constructed some years ago by the French and British Governments, was never actually tested until the experiment made by the "Virginia," and that no one knew or could know whether two thicknesses of ordinary railroad iron, would resist heavy shot at certain distances, till this was tried in the iron battery in Charleston harbor.

In reply to the second objection, it may be stated that this system, according to present calculation, requires about 3 - 4 ton for each line in every hundred yards of the channel to be defended. Supposing three lines, this gives 2 1 - 4 tons powder for every 100 yards. Now, as this system of defense can be applied wherever the channel is most favorable, on even the largest rivers, points may be selected where that channel is not over 500 yards in width. This would require between twelve and thirteen tons of powder. If we take the comparative expenditure of powder in batteries, the smallest charges for guns of that description, average 8 lbs. each, and the smallest supply to each gun would be 100 rounds (in fact from 400 to 800 rounds are the ordinary estimate in Europe, and in the old United States service). This is, therefore, the amount of powder that would be required for 100 charges each for 30 guns. But such guns it is known have no effect on vessels even like the "Monitor," and it is known that the enemy are building boats of superior strength to hers, though of course without corresponding solidity below, which corresponding solidity, even, would not save her from the blast of submarine batteries. It is in the next place to be remarked that this powder, if not actually used in the destruction of a hostile craft, is not expended, but preserved in good con-

dition for any future use, whereas, a large proportion of that used by most effective batteries is certainly wasted. Again, if it be not (as it ought not to be for so important an object,) a question of economy and cost, but only of economy of material, the same, and better results may be obtained by the use of gun-cotton, which Lieutenant Bolton has ascertained by consultation with manufacturers and chemists, may be manufactured from material attainable within the Confederacy, and without materially interfering with the production of gunpowder.

In reply to objection third, "with regard to the weight of material," it may be stated that although great, it is much less than that of any battery, but especially offers this advantage, that as (where water transportation cannot be obtained,) the chief objection to the weight of guns consists in the impossibility of dividing that weight, thereby offering great difficulties to their transportation by ordinary roads, through swamps, etc., and occasioning almost insuperable obstacles to this being done either promptly or with secrecy. Now the weight of all the material required for a line of torpedoes, is so divisible as to be easily carried on horse or mule back or even by hand. That material consists of wire, of powder, of the cases in which it is submerged, of rope for anchoring them, of tools, of two or three light boats, all of which may be divided into parcels not weighing over fifty or sixty pounds each, including even the means of anchorage, by use of crates or boxes filled, on the spot, with stone, gravel or mud even, as circumstances will allow.

As far as regards objection fourth, with respect to the liability of torpedoes to be washed away, it may be stated that though this might occasionally occur, it would be immediately noticed and could be easily remedied by the operators, these torpedoes, from their lightness, being easily refished or replaced by others, by use of a light boat or two, unlike heavy obstructions which require the assistance of towage, large craft, heavy cables, and much time and work, to restore them to their place, wherever this can be done at all, and which being the result of long and practiced labor, there is not either time or the necessary material to renew. A brief description of the *modus operandi* in laying these lines across a river like the Mississippi, or any other occupied by the enemy, will, of course, render needless any explanation of mode of laying them to defend water courses not occupied by the enemy, the additional facilities of which obviously suggest themselves. The operator trains some twenty assistants to the proficiency of igniting charges with certainty, of keeping the torpedo water-proof, and keeping up the insulation of the wire. This proficiency in the art may be obtained in much shorter period than is required to prepare and test that wire, and to construct the galvanic battery, etc., and to this point Lieutenant Bolton is satisfied fifteen days would suffice for men of ordinary zeal and intelligence, volunteering for, and obtained for that purpose. This (making due calculation for sickness, etc.,) would always leave time sufficient to establish at four different points, station, of three operators, who, relieving each other, would be permanently on duty the whole twenty-four hours. We now suppose the point on the river selected, to establish a treble line of these

torpodoes, each line consisting of charges placed every twenty feet across the width of the channel to be defended. On the bank, concealed in wood or swamp, is sunk in the ground or marsh, a box, a few feet square, caulked, if necessary, and protected by a roof, from which the operator and his two assistants (or the one on duty there) work the galvanic battery. This box, covered by brush, cannot be perceived from the river. The operator and such workmen as are required on this point, having a secure means of retreat provided, can operate up to the last moment with the utmost confidence. From this box a line of wire conveying the electric spark radiates to the three lines. For every hundred yards of each line there is a separate wire, which, presuming five hundred yards to be the width of the channel, would give fifteen wires, which would require from four thousand five hundred to five thousand yards of wire. By means of five floats of various shapes and sizes, and which (from others being scattered about) could afford no indication to the enemy, the operators know exactly where their torpedoes are situated. By marks on the opposite side of the river, they can easily and unerringly sight vessels attempting to pass this line, so as through the instantaneous rapidity of ignition which the galvanic wire allows, to be sure to fire their charge under the approaching craft, however limited her length or great her speed. Unlike a battery of artillery, the explosion of a torpedo affords no indication of where the blow comes from, and no danger would be incurred sufficient to deter the operators (protected as they would be in their their sunken box) by a promiscuous fire, vaguely directed on the adjacent banks. As either of these lines of defence would be occasionally shifted, as they ought and would probably (if at all adopted) be established on several points of important rivers, and as the corps managing them would sound and explore at many points; where they would leave marks and floats for their guidance, the effect must be to keep the enemy in great suspense and uncertainty as to the whereabouts of these lines, should even any information thereof reach them. Such information in possession, even of the loyal inhabitants of the banks, being necessarily only of a vague character.

Your memorialist is aware that a few torpedoes were laid some months ago in the James river, but he has reason to believe that no one has yet been employed fully and practically skilled in firing them by the galvanic battery. Under such circumstances the torpedo, though a most destructive, is a most uncertain means of defense, so much so as not to justify much reliance, nor any large expenditure thereupon, by those charged with the defense of inland waters.

An individual threatened with attack would wisely prefer a sword, knife, club, or any weapon certain in its operation, to the most destructive fire-arm, which was liable to miss fire in the moment of mortal conflict. If forced to option between the former and the latter, he would wisely select the former—if allowed both, perhaps not choose to tamper himself with the latter, and, at least, only use it as an adjunct.

If, however, certainty of operation can be combined with decisively destructive effect, the scheme of torpedo defense, assumes a very different character and importance,

Through this memorial your memorialist is endeavoring to call attention to the fact that such certainty is attainable and to the mode in which it may be attained. To that certainty of operation, when directed by Lieutenant Bolton, and where certain material was procurable, your memorialist has been personally a witness. He is informed by Lieutenant Bolton (in whose reliability and judgment he has, through long experience, the highest confidence,) that the necessary material may be here procured.

There are many forms of varying ingenuity, in which the use of the torpedo is proposed, in all of which certainty of ignition is desirable.

By the simple scheme of rows of torpedoes across a channel (so close to each other in each row that ascending or descending vessels must pass over them,) with certainty of ignition and proper vigilance, such channels are clearly rendered impassable, unless by the sole expedient of clearing both banks of the operators.

It is worth considering in this connection that in any scheme of defence by means of plated vessels, that it is at least questionable whether any can be built and floated to resist the 15 inch and 20 inch guns, (carrying shot over 400 pound and 1,000 pounds,) which the enemy is known to have adopted.

Your memorialist, in conclusion, begs to explain that he has been induced at brief notice to present this memorial by the unexpected advice, to that effect, from members of your honorable body, to whom, in the form of notes, the document was originally forwarded, with a letter which he appends as explanatory and apologetic of the motives which have prompted him to this proceeding.

Very respectfully,

C. F. HENNINGSEN.

LETTER OF GENERAL C. F. HENNINGSEN.

RICHMOND, *September* 27, 1862.

Hon. Mr. FOOTE :

DEAR SIR : I enclose a brief memorial or explanation on the subject on which I last spoke to you. My object in forwarding it is, to request that you will look it through, at your leisure, so that you can advise me how to proceed in the premises. I have no motive, but a purely patriotic one, in performing the irksome duty of endeavoring to call to this matter the attention of those who may render it serviceable to the country. After perusal, and such further explanation as you may require, I shall be thankful, both for your candid opinion on the value of the proposition itself, and your advice as to how best to bring it forward. With a like request I gave Mr. Boyce a copy yesterday. Should the occasion arise, and you think fit, pray consider yourself at liberty to show the rough communication enclosed to any one you may deem proper, making use of my name as endorsing it, if that can be of any service in obtaining an investigation, or trial of the scheme, though I have no ambition (and in fact rather a disinclination) to obtruding my personality into the matter.

But in truth, with my convictions on the subject, I feel I should be neglecting my duty, if I did not make this effort to call attention to this means of defense, even at the risk of being considered officious and classed with the many well-intentioned and credulous individuals, prone, without sufficient grounds, to father the schemes of every enthusiastic projector.

This will be delivered to you by Lieutenant Bolton, C. S. A., to whom the enclosed communication refers.

I am, dear sir, very respectfully, yours,

C. F. HENNINGSEN.

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