

means. The cabins are provided with the requisite furniture and the tables are fitted to the smallest mitters, and our policy should be equally liberal. Such a system makes an officer very independent and enables him to leave home to join a ship at a moment's notice, no matter in what part of the world she may be, without encumbering himself with troublesome effects and going to an expense which he can ill afford.

"To show the difference between the pay of our own and foreign officers, I will compare the grade of rear-admiral in the United States and in the British Navy.

"The pay of an officer in the British Navy is given for the support of himself and family; but, to prevent the commander of a vessel being put to pecuniary inconvenience, thus impairing his usefulness, the government allow table money and other emoluments. Thus a rear-admiral or commodore of the first class receives \$5,475, with an allowance of \$8,210 for table money, servants, etc., amounting in all to \$13,685 per annum, or more than twice as much as the full sea pay of our rear admirals afloat.

This difference is still greater when it comes to the pay of higher officers. For instance, an admiral of the fleet receives \$19,160 and a vice-admiral \$15,510, besides other allowances. From this it will be seen how inadequate would be deemed the pay of our commanding officers by other governments. In addition to the above, all commanding officers are allowed "table money" for entertainments, which enables them to leave a sufficient amount of pay at home to support their families.

"I doubt if we have an admiral, captain, or commander afloat who is not sorely pinched on account of the various calls upon his hospitality, and duty on shore is naturally so much more agreeable and less oppressive that officers hesitate to seek sea services.

"It is not just that officers, out of pay only sufficient for the support of themselves and families, should be subjected to any expense in returning home, which are absolutely of a national character. I speak in behalf of the Navy, have no personal interest in the matter, and trust that a liberal view will be taken of the subject and all possible allowance made to prevent officers abroad from being placed in embarrassing positions and subjected to unnecessary expense. This subject naturally belongs to Congress, but the department can in a measure regulate the matter of allowances and add to the comfort of commanding officers abroad as well as those in command of shore stations.

"The torpedo system has occupied my particular attention during the past year, and although much engaged in matters relating to the building of the new torpedo vessel, I have yet found time to investigate the experiments made in other quarters.

"I am confirmed in my opinion that the torpedo system, although still in its infancy, is destined to play a most important part in future naval warfare, so that the nation most advanced in torpedo science will possess great advantages over all others. To us, who seem to experience so much difficulty in maintaining a navy, it is absolutely necessary that we should devote more time and attention to the subject of torpedoes than other nations, and make a liberal outlay for this purpose. I regret to say that there is not so much interest displayed in the torpedo question in our Navy as its importance deserves for I know of but two vessels that have gone to quarters and fired their torpedoes. If in action, I am convinced that proper attention will not be given

to this subject until special instructions are issued from the department.

"In my opinion, no one can make a good torpedo officer, unless his heart is in the work, and hence I believe it well to make the duty as attractive as circumstances will admit.

At present the torpedo station is a theoretical school without sufficient practice, and the experiments are not altogether suited to impress the students with the importance of the work on which they are engaged. I am pleased to say, however, that some very good and useful practice has lately been had at Newport while fitting the *Monogahela*, which will do more to impress the officers and crew of the ship with the power of torpedoes than anything else could have done. A number of officers would like to go to Newport for instruction, but some of the rules of the station seem to them inconsistent with the relations that should exist between seniors and juniors where the latter are superintendents and instructors. Now, in foreign navies—England, for instance—the torpedo instruction is under the immediate supervision of a rear-admiral or officer of high rank who has the opportunity of selecting the best officers in the service as assistant instructors. Two rear-admirals, ten commodores and a large number of captains and commanders are now under instruction in the British navy, and seeing the difficulty in the way of our future progress in torpedo instruction, I recommend that a like course be pursued with us.

"Among all the officers who have studied at the torpedo station I have met with some who seemed to have invented anything or proposed any improvement on what has been done before. This is, I think, because they are not sufficiently interested. It should be the policy to encourage every officer to use all his faculties to bring the torpedo system to perfection. In my several visits to the torpedo station during the present year and during my sojourn there of two months it was evident to me that the means of instruction were inadequate. There are only two or three small launches attached to the station, and they are not at all suited for the work, and there is no course of instruction whatever for defence against torpedoes.

"It is evident that to make the torpedo school what it should be a more liberal expenditure is required, and the cost of one small ship of war annually for this purpose would be money well spent. There should be added to the present means of instruction four large steel launches, fifty feet in length and ten feet beam, with double screws for quick manœuvring, and all other modern appliances; also the different kinds of torpedoes for harbor defence, and various nets and spars for the protection of vessels against torpedoes, and a good monitor from which to send off the Lay torpedo, for I do not believe ships will come close enough to be injured by that device, and we must consequently go to some distance from shore to attack them.

"In addition to this, there should be sections of ships or iron buoys made equally strong, to test the effect of the different torpedoes fired from the water level to twenty feet below. Specimens of all foreign torpedoes should be bought and tested, and remedies applied against their attack. Such as prove good we should adopt into the Navy, and teach our officers how to encounter and use them under all circumstances.

"I merely make these suggestions without going into details, but the liberal expenditure of money in this matter of

torpedoes would, no doubt, give birth to many devices not thought of at present. A great deal of importance has been given to the Harvey torpedo, the Fish torpedo and the Lay torpedo, and the probability of their destroying ships under all circumstances. No doubt all these are for formidable contrivances, to a certain extent, and a commanding officer ignorant of the manner in which their attack should be met would be in danger of losing his vessel; but with an understanding of the subject and a vessel of equal speed any commander could elude and destroy either of the torpedoes mentioned.

"No towing, diving, or swimming torpedo yet invented is a match for a smart vessel properly armed, with her crew at the guns, and it is for this reason that I recommend the construction of so many large launches for the purpose of teaching officers how to manœuvre in attacking and repelling the attacks of torpedoes or torpedo vessels. Officers would soon find out the difficulty of destroying a ship properly handled by means of towing torpedoes, unless the torpedoes were hidden, although it might be easy enough to blow up a vessel not on the alert or improperly handled. A vessel of equal speed need have no fear of an opponent carrying either the Harvey or Fish torpedo, for these inventions can only be successfully used against ships taken by surprise or lying at anchor.

"As a protection against such contrivances I would recommend that all our ships be supplied with twenty four pound howitzers to fire at them over the stern and quarter when coming up or down upon their decks when close on board.

"An intelligent commanding officer will naturally bring either of these torpedoes astern of his vessel, which it is easy to do in daylight, no matter from what direction they may approach. If from ahead he can turn on his heel; if from abeam he can change his course eight points and the Harvey torpedo vessel with all her reels and towing lines, deck crowded with men, etc., would soon be hors de combat unless she were shot-proof, which, I presume, it is not intended such vessels should be, for a torpedo boat must be light and able to manœuvre quickly.

"In fights between two or more ships when the vessels, as is always the case, are enveloped in smoke, these torpedoes will be extremely formidable, and it will require all the ingenuity of a commanding officer to guard against their attacks. The practice I recommend, of manœuvring in steam launches, will teach officers to provide for all contingencies.

"Any ship can be arranged with a heavy net all around, from the bowsprit end to the end of the spanker boom, which, fastened to her lower yards (the yards resting on the gunwale), can be kept triced up and dropped just before the Harvey or Fish torpedo gets within striking distance. The torpedo would be exploded twenty feet from the ship, and would do no harm except to the net. Nine thread ratline stuff made into a sufficiently small network to prevent one of these torpedoes passing through the interstices would explode a Harvey or Fish torpedo before it could reach the ship's side.

"Here, then, is a most interesting and important experiment to try. The network is the only certain defence a ship can have against anything that dives, although it is a poor protection against a torpedo on a bar connected with a properly constructed torpedo vessel with appliances for cutting through the net.