

hard up or down; but in going straight ahead, the rudder is kept in position by some arrangement, the nature of which has not been published. Another important device, the particulars of which have not yet been published, is necessary for letting water into a chamber at the bottom, to make good the weight lost as the wires are reeled off during the progress of the boat. Other necessary devices connected with the mechanism of the torpedo boat might be pointed out, for instance: in order to prevent the great loss of motive energy attending the reduction of temperature during expansion, the carbonic acid gas is passed through a system of pipes intended to abstract heat from the sea and transfer the same to the frigid motive agent. Considering the high pressure employed and the great number of pistons, valves and joints, connected with the torpedo-boat, all of which must be perfectly tight, Messrs. Clute deserve great credit for their excellent workmanship.

"8 The submarine torpedo is controlled altogether by the handle of the stop-valve, which admits air into the tubular cable. When this handle is placed in a vertical position, the torpedo moves directly ahead; inclined to the right, the helm is put hard up, and when inclined to the left the helm is put hard down. By intermediate degrees of inclination of the handle, the rudder may be placed at any desirable angle. By bringing the handle, to a horizontal position the air is shut off from the tubular cable, and the torpedo stops. The steam engine employed in charging the air receiver which supplies the tubular cable, also turns the reel. Accordingly, the torpedo may at any moment be hauled in with great rapidity, or caused to perform a retrograde movement during contact, by simply throwing the reel in gear. It is scarcely necessary to contrast this simple mode of controlling the submarine torpedo with the intricacy involved in the system of effecting the object by electric currents and small motive engines operated by carbonic acid gas, in the manner described. The fragile character of the insulated wires, and the liability to dis-arrangement of mechanism of such complex and delicate nature, need no comment.

I would respectfully call attention to the fact that the trial at Newport was conducted at high water, under exceptionally favorable circumstances, and that the drifting of the boat, after stopping the motive engine, was resorted to at last in order to reach the mark showing that the absence of means of effecting a retrograde movement is a serious if not fatal defect.

"9. The torpedo-boat, although too small to carry sufficient motive power, and incapable of running at high speed, is twenty-five feet long and three feet in diameter. Evidently such a body is too heavy to be handled with facility, while an adequate supply of such cumbersome and complicated structures in time of war will involve numerous difficulties.

"10. The movable submarine torpedo is nineteen inches in diameter, and ten feet long, the shell being composed of light galvanized iron. It is provided with an engine which transmits to the propellers the motive energy conveyed through the tubular cable. A medium pressure fully fifteen horse power will be developed. Of course a considerable portion of this motive energy will be consumed in towing the cable; but the torpedo itself, the section of which is less than two square feet, requires for its propulsion only a fraction of the stated power. It merits special notice that the propellers are

employed, turning in opposite directions, an expedient indispensable to counteract the torsion produced by the great amount of motive power applied. Obviously, the torpedo will revolve in the water unless the tendency to rotate be prevented by the expedient of turning the propellers in contrary directions.

"In conclusion, I have the honor to inform you that a trial has just been conducted in the bay of New York, for the purpose of ascertaining practically what amount of motive energy is consumed in towing a tubular cable of adequate size to transmit the intended power. The result of this trial has established the important fact that a tubular cable half a mile in length, towed at a rate which will give a mean velocity of ten miles per hour to the submarine torpedo, consumes one-third of the motive power capable of being transmitted through the cable. I have also the honor of informing you that the seemingly difficult problem of running the torpedo across tidal currents, has been satisfactorily solved. I am, sir, your most obedient servant,

"J. ERICSSON."

As the period cannot be much longer delayed when the *Canadian Army* will be registered amongst the auxiliary forces of Great Britain, we would most earnestly direct the attention of the officers of the force to the advantages to be derived by becoming members of the *Royal United Service Institution*, which they can do, by paying an entrance fee of £1 sterling (five dollars) and a yearly subscription of £1, which will entitle each member to receive the *Journal* of the Institution, in which every military and naval question of the day is discussed and illustrated; and they will also have the privilege of attending the lectures, the use of the library, and reading rooms, as well as the instructions to be derived from an inspection of the model and map room, as well as the museum; whenever they may happen to be in London; and as it is likely a part of the force will be engaged in the next Autumn Manœuvres, the advantages offered will be speedily realized. They will also have the privilege of furnishing papers on professional subjects, which will appear in the *Journal*, and to such officers as our gallant correspondents *Centurion*, *Kanuck*, *G. W. G.* and others, this would afford a vehicle for the discussion of their several specialities, far greater than the pages of the *VOLUNTEER REVIEW*. We can assure our readers as they very well know, we make no small sacrifice in giving this advice, but we look upon the dissemination of knowledge, such as has been acquired by our correspondents, as entirely too valuable to be left wholly to the chances afforded by a mere local organ.

It will be in the memory of our readers that a most able series of papers on the probable strategy of an *Invasion of Canada*, was furnished by our gallant correspondent *CENTURION*, and appeared in our pages in the early part of the current year, and it was to us a source of keen regret that it was out of

our power to place it before the military authorities of Great Britain, with the emphasis it deserved. If that gallant officer had been a member of the *Royal United Service Institution*, his memoir on *Canadian defence* would have been brought under the notice of the chief military authorities of the Empire, and a subject little understood, and not at all appreciated in Great Britain, would have received ample elucidation. It is hardly necessary to point out the precise value of such a course to the military and national interests of Canada, they are sufficiently apparent. But, apart from this view of the case, the knowledge and advantages to be derived are all important to the gentleman who aspires to be that most accomplished of human beings, an efficient military officer.

In our issue of the 2nd December, we noticed the receipt of No. LXVIII of the XVI volume of the *Journal of the Royal United Service Institution*, with the following articles from the pens of officers of distinction in the army and navy:

On the economy of fuel in Ships of war. On Naval Guns. On mounting and working of heavy guns at sea. On the lighting of H. M.'s ships. On explosive agents applicable to naval and military purposes, as substitutes for gunpowder. On military transport and supply in India. On Autumn Manœuvres at home and abroad. On the latest changes made by Prussians in their Infantry drill book. On the theory and practice of peace manœuvres with their relation to real warfare. On our naval and military establishments, regarded with reference to the danger of invasion. On the practical instruction of Staff Officers in Foreign Armies.

We question whether in any one publication in any country in the world, subjects of such paramount importance and interest to the military student and officer could be found, or that it would be possible under any other conditions than those offered by the *Royal United Service Institution*, such a variety of practical and scientific subjects could be got together in one pamphlet.

There are several subjects which it is our intention to review at an early day, especially the article on "Naval Guns," "The working and mounting of heavy guns at Sea," and "on Naval and Military establishments regarded with reference to invasion." But, in the meantime, we think it to be our duty to place before the officers of the *Canadian Army* the advantages which a membership would confer on them.

The Secretary, Capt. Burgess, has kindly sent us several copies of what may be called a prospectus of the *Institution* and some forms of application for membership, which we shall gladly send to such of our readers as may wish to avail themselves of the advantages held forth, and we hope very many of those will one day become the leaders of the *Canadian Army* who will be amongst the number.