

"The throttle-valve is opened or closed by the operator on shore in this way; a current is made through one of the wires in the cable, having its ground connections in a copper plate sunk in the earth near the battery, and a copper plate on the boat, in contact with the sea-water. This current is conducted through a small electro-magnetic apparatus, in which it determines the movement on the principle of the galvanometer, of a central armature. When the current is reversed, the direction of this movement is reversed; and in this way the course of a strong current from one of the boat batteries is directed upon one of two helical electro-magnets. The movement there produced is exactly on the principle of the ordinary telegraph machine. It operates on a valve admitting the high-pressure gas behind a small piston, the movement of which opens the throttle-valve proper. A reversal of the shore current changes the route of the local current, and in a similar way drawing the small piston back closes the throttle and instantly stops the engine. The apparatus for steering embodies a similar principle, only that the alternate action of the helical magnets is made through the change of a valve, to admit carbonic acid gas to one or the other of the two small pistons, the motion of which moves the rudder arm right or left, putting the helm hard "up" or "down." When the steering shore current is not reversed, but interrupted altogether, the rudder assumes, by virtue of an ingenious arrangement, the medium position of "steady."

"We have told how the gas is carried in liquid form. There is enough of it to drive the boat two miles. When it expands as vapor a great loss of temperature is the result, and this might diminish the pressure seriously. This evil has been experienced in other carbonic acid motors, in some of which the volatilization of a part of the liquid froze the remainder, causing the pressure to cease altogether. It is counteracted in this machine partly by the large size of the wrought-iron reservoir or flask, partly by the method of conducting the gas past the reel compartment to the reducers, viz., through small pipes running along the outside of the shell, and thus exposing a large surface to the water, which imparts some heat to the gas within. The same end is facilitated by the use of the reducers. These are small flasks in which the gas is expanded before entering the engine. The pressure in the original flask is, as has been said, 600 pounds per square inch, but this is reduced before entering the engine to 90 pounds.

"It will be seen that there is no attempt in this machine to employ electricity as a motor, except in the subordinate and light work of opening valves. Even this in the case of the throttle is performed by the gas. What the shore-currents do, is to determine the route of the local currents, and through them the motions of the rudder-pistons and the throttle piston. Every expert will see that this plan offers greater advantages of ease and certainty of operation than any in which electricity alone supplies the power either of driving or steering, or both."

The United States Army and Navy Journal of the 7th December, contains the reports of the secretaries of War and the Navy. From the first we learn that the military force of the United States cost last year \$35,372,157.20; that a sum of \$3,725,000 is to be expended

in fortifications, and \$12,302,800 on river and harbor improvements.

It advises that a large arsenal be erected on the Atlantic Coast, that facilities of communication obviate the necessity of having one in every State, (but it is probable that the ease with which the Southern States armed during the late conflict had something to do with this recommendation.)

But the most important portion of the report refers to the services of the engineer corps, whose services appear to have been utilized for the following general purposes: works for coast defence, river and harbor improvements, and for the protection of the navigable rivers of the United States from deterioration whether from bridging or other causes. Geodetic and hydrographical surveys and reconnaissance, geographical and geological surveys; the construction of light houses, and the demarcation of the boundary between the United States and Great Britain.

The works on harbor and coast defence have so far progressed that "a large number of positions for guns and mortars of the largest calibre to be mounted behind sand parapets have been provided while others are in an advanced state of construction."

The battalion of engineers numbers 315 men, is in a high state of discipline, and furnishes instruction in engineering to the cadets at the Military Academy; while it has formed a school for torpedo defence at Willets Point.

Major H. S. Anson, commanding the engineer battalion has brought the torpedo system to such a satisfactory state that it has enabled the department to devise a plan of defence in connection with fortifications, simple in working and effective in results.

A most comprehensive system of hydrographic surveys for the lakes and River St. Lawrence has been in progress, and partly completed; while meteorological, geological and topographical statistics have been accumulated with great skill and the most valuable results.

It is very evident, that the Government of the United States understands the value of its military Engineer Corps, and we question whether, in any other country in the world, the trained services of such a body, have been utilized to as good purpose.

Our own military organization is totally deficient in this arm of the service, and it is inconceivable, how it has been neglected hitherto. We have been engaged in experimentalising on this matter in connection with the artillery arm of the service, but it is evident the people south of the 45th degree of latitude, understands the value of each service, and keeps them separate.

The navy of the United States consists of 173 vessels, carrying 1,378 guns, exclusive of howitzers, as follows:—

68 steamers, 929 guns.
31 sailing vessels, 322 guns.
51 ironclads, 127 guns.
28 Tugs.

This is a formidable force on paper, but it is explained, that of the steamers, five are unfinished, two in the service of the quarantine establishment at New York, nine under repairs, thirty seven in commission, and fifteen in ordinary. The sailing vessels, two are on the stocks, six in commission, six are used as store ships, six are hulks for quarters at navy yards, two are under repairs and eight in ordinary. Of the ironclad fleet two are in commission, 1 in use at the naval academy, and the balance undergoing repairs or laid up at League Island near New Orleans.

The report details the special duties of the squadrons on the following stations, where the United States are represented as follows:—

European Station	6 vessels,	110 guns.
North Atlantic "	11 "	77 "
South " "	3 "	33 "
Asiatic " "	12 "	116 "
North Pacific " "	5 "	65 "
South " "	5 "	51 "
Special service	3 "	10 "

Total 41 vessels 462 guns afloat.

The Inter-oceanic Canal, the work effected by the hydrographic office. Scientific experiments on steam boilers, a recommendation for the annexation of the Navigators Islands, and other minor matters comprise the bulk of the Report.

The last paragraph on the Torpedo System is the most important in the Report, altho' we differ with the Honorable Secretary on the historical fact that Fulton was the inventor of torpedoes, or rather submarine mines. There is little doubt but the Yankees were the original inventors of jack knives, and none at all about that of wooden nutmegs and baswood hams, but of the historical fact alleged, we are sceptical; the concluding sentence we are prepared to endorse.

"These cheapest but most powerful weapons of defence, called torpedoes by Fulton who invented them, were at first little regarded, but their use is now established as a necessity of naval warfare. England, Germany, Austria, and even China, are devoting much attention to their preparation and employment. This weapon seems to have an especial value to the United States. Our separation from the political complications of Europe produces a security which has resulted in notorious unreadiness to meet any sudden hostile emergency, which can come only from the sea, by an armed Navy in proportion to our strength or to the extent of our coasts. A well developed system of torpedo warfare would, to some extent, possibly to a large extent, meet this condition of unreadiness. Naval construction had not yet even remotely indicated any floating structure which can withstand the destructive power of the modern fulminate, skillfully applied. While