

THE MONITOR SYSTEM.

TO THE EDITOR OF ENGINEERING.

SIR,—The report of Mr. Robeson, the present Secretary of the United States Navy, has been most erroneously interpreted by those English journals who assume that the forty iron vessels of 800 tons burthen, for coast defence, which Mr. Robeson proposes to build, will be monitors. Such a supposition shows complete ignorance on the subject, as our smallest monitors of the Passaic class, have a displacement of 1500 tons; while the larger class of monitors range from 3000 to 7000 tons displacement. It should be observed, that no reason whatever exists for adding to the monitor fleet, as the United States now possess turrets

the security of the maritime cities and dockyards of the United States against foreign aggression, have of late years been deemed assured. But the means thus relied upon have suddenly lost their potency. Mr. Reed is now building monitors, carrying the full thickness of solid armour possible by adopting the turret and abandoning freeboard and sails. The *Devastation* and the *Thunderer* may steam up the Hudson in spite of our batteries and our monitors, and dictate terms, off Castle Garden.

Mr. Fox, in order to prove that monitors could cross the ocean, paid a visit to St. Petersburg in the *Miantonomah*, and Commodore Rodgers went round Cape Horn in the *Monadnock*. Shrewd men, at the time, expressed the opinion that the United States

side ironclad ships for foreign stations, is "withering testimony to the defects of the monitor system." Mr. Robeson, it will be observed, couples his proposition with the following remark: "It is true, our best monitors would, if brought into action, be powerful against anything that floats, but these are steam batteries, not sea-going cruisers." Mr. Reed is acting in strict accordance with the ideas of Secretary Robeson and the professional advisers of his predecessors. He is building, not sea-going cruisers with masts and sails, but genuine monitors, "fighting machines," as Mr. Fox appropriately terms these vessels. Unfortunately for the United States, the persistent advocate of the monitors demolished by his voyage to St. Petersburg, objections which, had he not made that demonstration, might have deterred the British Admiralty from building these fighting machines.

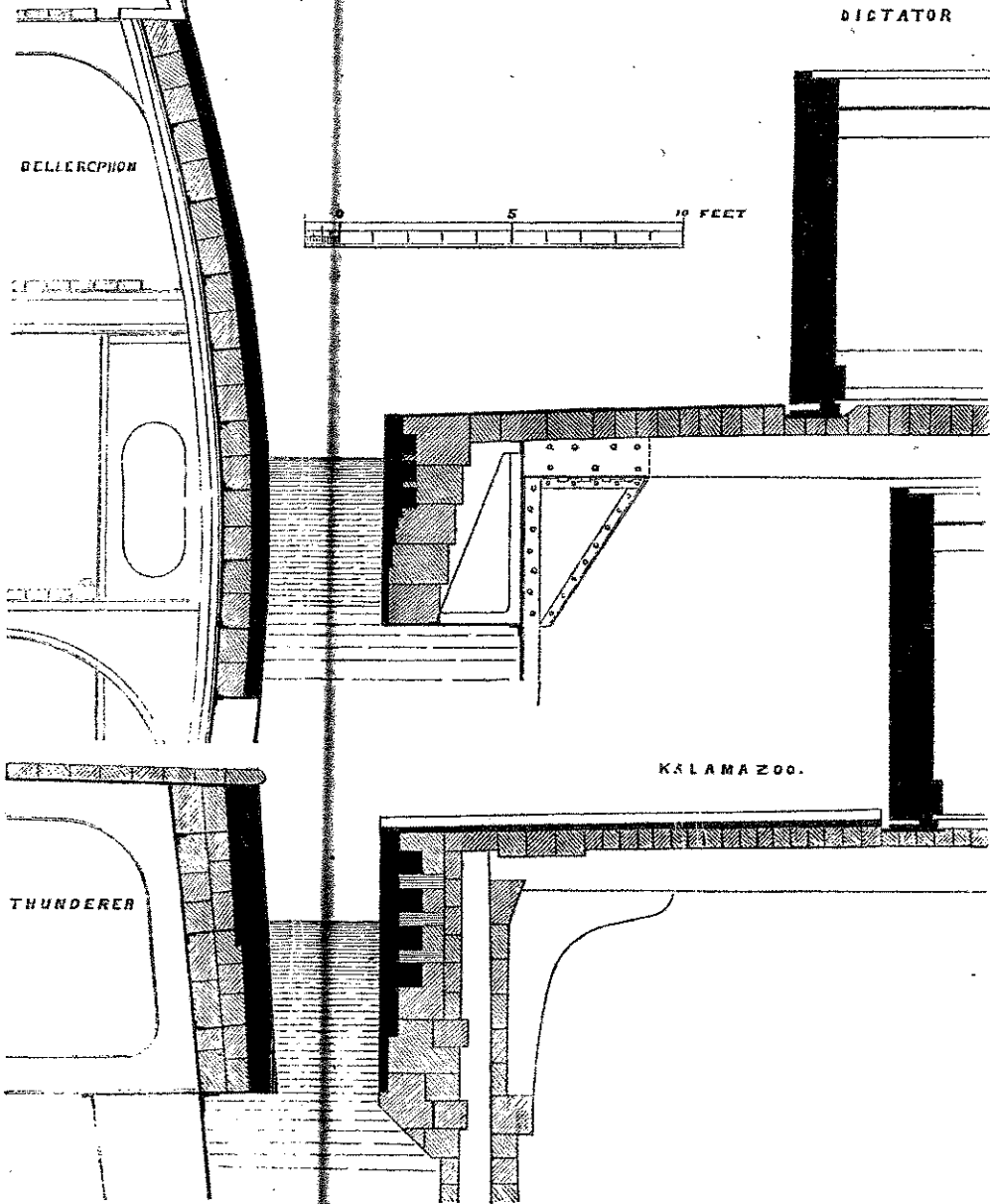
The subject is now being anxiously discussed in our naval circles, and the question is being continually asked, what force can we oppose to Mr. Reed's sea-going monitors, *Thunderer* and *Devastation*, with their solid 12 in. side armour, and 1 1/2 in. thick plating on the turrets? Some persons censure Mr. Fox for having so effectually established the fact that monitors are sea-going craft, while others regret that the Chief Constructor of the British Navy, in addition to his skill, should possess a mind so perversely independent as to disregard the advice tendered by distinguished members of the mechanical press. There is a third class of persons, however, outside of official circles, who, cheerfully accepting the situation, are now endeavouring to solve the following important problem: How can monitors, superior in thickness of armour to our own, be defeated, and what use might be made of those forty 800-ton iron vessels which Secretary Robeson desires to build for coast defence?

In a future communication I propose to show how the problem may be solved, and now conclude by asserting that impregnability is no longer attainable by the mere application of a belt of armour plating reaching a few feet below water line. Up to the present time Mr. Reed has unquestionably distanced all his competitors; the *Thunderer* and *Devastation* are in fact impregnable above water. But it will soon be found, as stated, that invulnerability calls for devices wholly different from those which are now deemed sufficient. Much has, however, been gained by the British Admiralty carrying out Mr. Reed's adaptation of the monitor system. The problem has thereby been greatly simplified, and all further speculation as to what ought to be done above water may now be regarded as waste of time. The field, in fine, has been most materially reduced; our labours being now confined to devising means for piercing the hull below the point that terminates the protection for which Mr. Reed is indebted to the skill of Sir John Brown.

Yours truly,

New York, February, 1870. JOHN ERICSSON.

THE THORNCLEIFFE WORKS.—The works and collieries belonging to Messrs. Newton, Chambers, and Co., and the scene of the late disgraceful riots, are situated midway between Sheffield and Barnsley, and rank among the largest in the West Riding. There are two blast furnaces, with extensive foundries, which produce a vast quantity of gas and water pipes, for the manufacture of which the firm has long been noted, besides general castings. A good deal of ironstone is also raised, the entire production in 1868 being 18,000 tons. There are five pits, capable of yielding about 300,000 tons of coal per annum. At three of them the well-known Silkstone seam is worked, for which there has generally been a very good demand for the London and other markets. The effect of the dispute, however, may be gathered from the fact that while there was sent to the metropolis alone of Silkstone coal, in 1868, no less than 51,937 tons, last year, owing to the dispute there was forwarded only 17,582 tons. At the collieries, however, where strikes have been, perhaps, more frequent than at any other in the West Riding, the wages paid have always been considered very good, higher than at many others in the district. Mr. John Chambers, who was long the managing partner, and chairman of the South Yorkshire Colliery-owners' Association, in giving evidence before the Coal Commission appointed by the House of Commons, stated that the firm generally employed about 2000 persons, the wages amounting from 1600*l.* to 2000*l.* weekly. He also stated that in one colliery, employing 250 hands, non-unionists, where they had been working straight on for years and years, a good experienced miner, the managing man of a bank could earn from 8*s.* 1*l.* to 11*s.* 6*d.* per day of eight hours, on an average of two months' work. At another colliery where 400 hands were employed, the men earned 8*s.*, 10*s.*, 12*s.*, and 14*s.* per day, and they struck for an advance of 5 per cent. on those wages. The firm has not been unmindful of the moral and intellectual welfare of the families of those in their employ, for, although there are schools in all the villages around, Mr. Chambers stated that himself and partners supported two schools themselves, in addition to which they had been



enough afloat and on the stocks, for any possible emergency. Indeed, it may be asserted that they are sufficiently numerous to defeat the present armoured fleet of England if entering our harbours. In support of this assertion it will suffice to state, that 24 of the English ironclad ships nearly all first class, are protected with only 4 1/2 in. armour plating; the average thickness of plating of the 47 vessels tabulated in Mr. Reed's recent work, being only 5 1/4 in. Thus while the English gunner fights behind armour plates less than 6 in. thick, the American monitor turret affords a protection varying from 11 to 15 in. thickness of iron. The annexed delineation, representing sections of two classes of English and American ironclads, shows very clearly the superior strength of the turret over a broadside vessel, with average thickness of plating. The stale objection that our turrets are composed of a series of thin plates scarcely merits consideration in view of the fact that the total weight is not affected by the number of plates employed. It is all sufficient that the system admits of carrying the stated enormous thickness. The substituting solid for

would some day have cause to regret this eagerness to convince maritime rivals that monitors, contrary to the prevailing opinion, could navigate the ocean. Well informed persons said, that the spirited Assistant Secretary of the Navy only intended to convince the English that turrets could be sent to St. Lawrence. Certain writers, however, inferred from his report to the Navy Department after his return from St. Petersburg, that he recommended monitors in place of sailing ironclads for the protection of American commerce in distant seas. The absurd idea of employing vessels without sails for such a purpose, was, of course, ridiculed by professional men, specially those connected with the service. Mr. Fox, who from the commencement up to the present time, has regarded the monitor as a fighting machine, was himself actually engaged for a long time, in maturing plans of full rigged ironclad casemate ships. It is surprising that, although wholly unacquainted with the true state of the case, a London mechanical journal, smarting under the failure of its persistent endeavour to influence the Chief Constructor of the