THE SCREW PROPELLER.

TO THE EDITOR OF ENGINEERING.

SIR,—Having read different treatises in Swedish and English papers this year concerning the screw propeller and its inventor, I have pleasure in forwarding to you the inclosed Swedish paper, in which you will find it shown that Mr. John Ericsson cannot be considered as the first inventor of the screw, as he insisted upon in a letter to the Swedish *Aftonbladet* at the end of April. In this letter he maintains that the propelling screw of Mr. Owen was not fit for working under water. The inclosed paper may convince you of the fact. The book referred to is to be had, I think, at Klemming's Antiquariat, Stockholm, but I think the following extract will be sufficient.

I am, dear Sir, your most obedient Servant,

A SWEDISH OBSERVER.

Stockholm, June 29, 1872.

From the Swedish Paper "Dagens Nyheter" (News of the Day.) No. 2183, February 23, 1872.

The *Aftonbladet*, and several other newspapers, have not only disputed an article in the English periodical ENGINEERING, the object of which is to prove that the screw propeller was invented by Samuel Owen, but gone so far as to declare to a certainty that Captain John Ericsson is the inventor. In the interest of truth, and without consideration for either English or Swedish vanity on this subject, the following facts may be worth mentioning.

Already in the year 1793, a French mathematician, M. Paucton, is said to have proposed the Archimedean screw as motive power for ships. If, as the *Aftonbladet* states, experiments were made with a screw propeller by John Stevens, an American, in 1804-5, and a Swedish naval engineer at Carlskrona in 1810-11, and two other engineers, Delisle and Savage, in 1813 proposed two different constructions of screw propellers, it is evident that no doubt can be entertained of the idea of the motive power in question already existing before the time that Samuel Owen, in Stockholm, tried and succeeded to put vessels in motion by means of that power.

In a pamphlet entitled "Letters about Steamboats," printed in 1816, there is an account given of these experiments. It is therefore easy to see that reasons have not been wanting for the assertion that Owen was the inventor.

The writer of this pamphlet states:—"Owen knew the inconvenience of paddle-wheel at the sides of steamers;" these inconveniences are enumerated, and then the article continues: "Mr. Owen conceived quite a different idea—that of moving a vessel by means of one wheel of different construction and placed under water at the stern. As an experiment, he affixed to the stern of an ordinary rowing boat a small wheel about 1½ ft. in diameter with four blades placed in the same position as the sails of a windmill. This wheel, placed outside the boat under water, turned on an iron shaft which passed through the stern and was worked by two men inside by means of a winch. The boat actually moved forward by means of the turning of the wheel, with a velocity of 180 fathoms in 5 minutes, which speed some persons in vain tried to obtain by ordinary rowing and same amount of exertion."

"The result being so far satisfactory, it was decided to make experiments on a larger scale and to employ steam power.

"For this purpose a smack was selected, which was altered last winter (1815) in the following manner:

"The stern post was made perpendicular, the keel lengthened about 4 ft. beyond the stern, and at the end of it another stern post was made (provided with hooks for the rudder), to which the sides of the boat were extended. Thus an open space of about 3½ ft. was obtained. The boat was made deeper, and, as much as possible, adapted for the purpose, with a view to ascertain whether a wheel constructed as above, and affixed to the end of the boat, could give her the same speed as if she were provided with wheels at the sides in the English way. The steamboat thus constructed was ready this summer (1816), and measures in length above deck 31 ft. 9 in., at the water mark 31 ft. 3 in., is 11½ ft. wide inside, and draws 5½ ft. of water when laden. The engine, including fly-wheel and pulleys, occupies a space of 9 ft., and although the deck was raised 2½ ft. to admit the machinery and a small saloon for 12 to 14 passengers, the space was so small that an entirely new arrangement had to be made with the steam engine, which instead of being fixed, must oscillate as a suspended bell on its supports, which are made hollow and serve to conduct the steam, not only from the boiler to the cylinder, but also from the cylinder to the condenser. The cylinder is of the dimensions required for an engine of 4 horse power; the boiler was also, in consequence of the limited space, obliged to be of smaller dimensions than intended, both as regards width and depth. The water wheel is made of cast iron, nearly 5 ft. in diameter. It has four blades made of birch and the total area of them is 6¾ square feet. They are placed so as to form an angle of 36 deg. against the keel of the boat. One end of the shaft is fixed in the old and the other in the new stern post.

"Such is the description of this vessel constructed for carrying on the experiments. She was so far ready that in July (1816), these experiments could be commenced. The distance between two harbours was carefully measured, and found to be 180 fathoms; this distance was fixed for ascertaining the speed of the vessel. For the above reasons, the steam power was not great enough to act without interruption as it ought to have done. It was found that the engine after working a little while lost speed and stopped, and was obliged to collect steam a few minutes before it could act again. The effect of the slight steam power used on this occasion was, however, sufficient to show that with a larger and more suitable vessel and greater steam power a considerably better result might be expected.

"The result of several careful experiments shows that the boat steamed the distance of 180 fathoms in calm weather, without the assistance of sails in less than 3 minutes, which speed was, according to the calculation of two naval officers present, four knots, or equal to more than two-thirds, or nearly three-quarters of a Swedish mile in an hour.

"It seems very probable, to judge from these experiments, that with a vessel of the measurement of 10 to 20 Swedish lasts (about 19 to 59 tons), built long and narrow and not too deep, provided with a steam engine of from 10 to 15 horse power, well fitted up and easily managed (which is essential) and furnished with Mr. Owen's wheel at the stern, a speed may be obtained of at least one Swedish mile per hour, which is the average speed of the English and American steamers with wheels at the sides."

It was further stated that Owen intended to make other experiments when he had the opportunity, but in the Biographical Dictionary, a remark is made that after having experimented with the so-called propeller, he gave the preference to ordinary paddle-wheels.

The above extract, which in many respects is very interesting and comprehensive, shows that the reason the experiments were not more satisfactory is to be found in the disproportionate steam power as also in the very construction of the vessel and engine. Under such circumstances it is not to be wondered at that Owen, whose time was fully occupied by profitable work, gave up these experiments, which chiefly concerned vessels and motive power—not the means of motion—and which would have required a considerable sacrifice of time and money. If Owen's experiments had been made at a later period, when the manufacture of steam engines and shipbuilding were more developed, they would have given quite different results to those of 1816.

If Owen can not be considered the inventor of the screw propeller, it is an undoubted fact that he put vessels in motion by means of the propeller a long time before John Ericsson, to whom, therefore, the honour of inventing the screw propeller can in no way be ascribed.

PRIVATE BILLS IN PARLIAMENT.

THE "triangular duel" has occupied a large amount of the time and attention of the Committee since our last notice, and is about the only matter for special comment at the present time. The case, it will be remembered, includes the Dublin Port and City Railway, Dublin Central Station Railway, and Great Southern and Western (North Wall Extension) Railway Bills.

On Friday (June 28) general evidence was taken in support of the first of these schemes. On the following Monday the engineering evidence was taken. The first witness called was Mr. Charles Douglas Fox who said:—I am a member of the Institute of Civil Engineers. In the practice of my profession I have had to consider especially the question of providing for suburban traffic. After the death of Mr. Burke, who was the original engineer to this scheme, I became engineer jointly with Mr. Brunlees. My chief reason for accepting the position of chief engineer to this company was that my father (Sir Charles Fox) considered it was the best line for the purposes of the Dublin traffic. The whole of this system is so laid out that there is no back shunting whatever for the through traffic, which I consider of the greatest importance. Whenever we back shunt we cross other lines of railway, and not only that, but we have got one engine on at the wrong end of the train, and have further delay in getting it to the other end of the train. The other lines do not give this system at all. The Great Southern and Western line only joins by a back shunt for the main line and the Central joins the Liffey Branch at the other end. It is essential that any line purporting to deal with the present difficulties of Dublin should effectually deal with the cattle traffic. The gauge of the tramway is the same as the railway, the traffic would be perfectly interchangeable, the estimated cost of the tramway is 10,070*l.*, there is no peculiar engineering feature about it, it is a very simple line, and the Board of Trade have reported in favour of it. With regard to the authorised railways, the main line crosses neither a railway nor a public road on the level. The tramway only crosses the road on a level. With reference to signals, they are a great inconvenience and must always be so, but they must be used to secure public safety at junctions. Our deepest gradient is 1 in 72 to the North Wall, we have no bad curves, 10 chains is our worst curve; we have only about 100 yards of covered way, or tunnel, from Kingsbridge to the North Wall, until we begin to pass under the river. The scheme of the Great Southern and Western does not give any accommodation whatever to the Kingstown traffic. In anything pretending to be a complete scheme for Dublin, that is a fatal blot. As to the Dublin Central Railway the sum of 540,000*l.* is very inadequate to construct the proposed works, and when the work is done it will not subserve the purposes in a way similar to the Dublin Port and City scheme. I think the traffic to be expected will not pay on such a sum.

In cross examination, Mr. Fox stated with regard to the proposed station at North Wall, that the line fell from that junction with a gradient of 1 in 70; it was 1 in 91 on the deposited plans, but there were some clauses of the "Ballast Board" which altered it, they required a more rapid descent. Mr. Fox continued:—Our tramway rises away from the main line after it leaves it in 19 ft. cutting at 1 in 61, and then it ascends with a gradient of 1 in 54 till it gets to the surface, and continues on that gradient until it reaches almost close down to the North Wall. Our North Wall Tramway is to be worked by horse power. The land which the English companies have purchased has a frontage to the river.

On re-examination, Mr. Fox said, all three schemes depend for access to the quay and upon the North Wall upon the tramway, which the corporation, or whatever the body is, have power under the Act of 1865 to construct; we are in this position that we have power to construct it, if they do not. The Central Station Company and the South-Western have not that power.

Mr. Edward Wilson was then examined and said:—I am engineer to the Great Eastern Railway Company, to the Great Western, and several others. I know the railway system of Ireland thoroughly; generally with regard to the engineering features of this line the gradients are good. The cutting and the embankment nearly balance each other; that is a point of great importance, for assuming the cutting to be four miles, you would make four miles of cutting and four miles of embankment, and so make eight miles of railway for the cost of four miles. This line, as laid out, connects in the best manner with other railways. With regard to estimates—to show what reliance can be placed in our own estimates—I could give an instance in which a matter which I estimated at 15,000*l.* cost me 45,000*l.* in practice.

Upon the committee resuming next day, Mr. Bidder stated that Mr. Brunlees was present as joint engineer with Mr. Fox, but unless the Committee wished to ask him any questions, it would be only occupying the time of the Committee in duplicating Mr. Fox's evidence. The Committee thought it was not necessary. After some further general evidence, the case on behalf of the promoters of the Dublin Port and City Bill was closed. Counsel was then heard in opposition, Mr. Denison, Q.C., appearing in support of the petition of the Midland Great Western of Ireland.

The case of the opposition to the Dublin Central Station Railway has been concluded, and the "triangular duel" was also settled. The Committee decided that the preambles of the Dublin Port and Dublin Central Bills were not proved, but that the preamble of the Great Southern and Western was proved; the clauses were then agreed to and the Bill reported. This is a Bill authorising the raising of 150,000*l.* on shares and 100,000*l.* on loan, to make 3 miles and 56 chains of railway to connect the company's railway with the Liffey branch of the Midland and Great Western Companies, and with the works of the London and North-Western Railway, at North Wall, Dublin, with running powers over, and working arrangements with all the lines converging at Dublin. Thus terminated the hardest private Bill fight of the session.

Before the House of Lords Committees the preambles have been proved of the Glasgow and Kilmarnock Joint Line and Caledonian Railway, and the Caledonian Railway (Glasgow Union Railway agreements); but in the latter Bill their Lordships rejected the special agreement provisions. The preamble was also proved of the Metropolitan and South-Western Junction Railway Bill, with amendments providing that only a passenger station shall be built at Barnes Common, and in case the two acres of the common authorised to be taken are more than is required, the surplus shall be resold to the Commoners at the *pro rata* price the company paid them for it. The preamble was also proved of the Lancashire and Yorkshire Railway Bill; but the company declined to accept the conditions proposed in reference to the Bradford portion, and that part of the Bill was accordingly struck out.

THE INSTITUTION OF CIVIL ENGINEERS.—During the quarter ended on the 30th June, the deaths were recorded of 5 associates, viz., Mr. John Samuel Enys (diploma, dated March 12, 1839), Frederick Marrable (March 4, 1856), Augustus Siebe (December 2, 1856), Robert Harry Inglis Synnot, M.A. (February 2, 1864), and Christopher Pattison (December 5, 1871). In the same period 2 students tendered their resignations, which were accepted, and the names of 1 member, 5 associates, and 1 student were erased from the register. Thus in the three months, from all causes, only fourteen of the various grades ceased to belong to the Society. On the other hand the elections comprised 2 honorary members, 8 members, and 60 associates (9 of the latter having previously been students), 1 associate was restored to the list, and 20 candidates were admitted students. The additions were, therefore, 72, and the net effective increase was 58. The roll of the Institution now contains the names of 2142 members of all classes.

TORPEDOES.—Experienced iron shipbuilders, though, perhaps, not with much experience as to torpedoes, have expressed the opinion that as the explosive power of the torpedo may be increased without limit, and as the stroke from even a very moderate charge is proved to be so destructive, any attempts to make an ironclad ship "torpedo-proof" must be abortive; greatly more so, in fact, than to make her "shot-proof"—to a constantly increasing power of gun, because to the increase of the latter some limit is set by the nature of materials and otherwise, whereas there is little or no limit to the power of the torpedo. And those of this opinion come at once to the conclusion that it is not by further loading the already over-burdened ironclad ship with a still stronger hull, or an armour-plated one, that we should proceed; but by contriving means, whether carried by the ship or otherwise, to push aside or away to a safe distance from the hull the torpedo which is encountered, permitting it then to explode or not; or by some means for fishing them out, or otherwise disabling them or their igniting apparatus, by "dredging" or "sweeping" from a distance. All that the more intelligent proposers of any of these methods can say is, that so far as they may be effectual, they oblige the opponent to employ a more powerful and expensive torpedo. The discussions on this subject which have from time to time appeared in the technical and military journals (in England at least), and that raised at the late meeting of the Institution of Naval Architects on Torpedo Papers read before it, evinced such loose or imperfect notions as to the nature of explosion generally, and the laws which govern those subaqueous torpedoes, that real progress either in more effective structural resistance to, or in keeping off to the *minor* limit of safe distance marine torpedoes, is not to be expected until the fundamental conditions of their explosive stroke become better understood generally. Here, as in every other branch of engineering, if we are to make much or safe progress, we must begin by distinctly grasping the conditions of our problem as presented to us by the properties of the substances and the play of the forces concerned.—*Naval Science.*