

President :- A. J. DURSTON, ESQ., C.B.

Report of the Proceedings

THE ANNUAL DINNER

Held on Friday, September 13th, 1895.

THE JNAUGURAL MEETING

Held on Monday, September 23rd, 1895.

The Bristol Channel Centre Dinner

Held on Saturday, October 19th, 1895.

AND THE

SOUTHAMPTON CENTRE DINNER

Held on Tuesday, November 28th, 1895.



PREFACE.

58, ROMFORD ROAD,

STRATFORD, E.

September, 1895.

The Annual Dinner of the Institute of Marine Engineers was held this year at the London Tavern, Fenchurch Street, E.C., on Friday, September 13th, when A. J. DURSTON, Esq., C.B, the President, occupied the chair, and was supported by the guests of the Institute, and by several Past and Vice-Presidents.

The Report of the Proceedings will be found in the following pages.

JAS. ADAMSON,

Hon. Secretary.



INSTITUTE OF MARINE ENGINEERS incorporated.



SESSION

1895-6.

President :-- A. J. DURSTON, Esg., C.B.

ANNUAL DINNER.

CHAIRMAN :

THE PRESIDENT.

The Fifth Annual Dinner in connection with the Institute of Marine Engineers was held on Friday, September 13th, at the London Tavern, Fenchurch Street, E. C., when the President, A. J. DURSTON, Esq., C.B., occupied the chair, and was supported by Professor F. Elgar, LL.D., Colonel John Davis, A.D.C., Major W. E. Gilbert, Mr. R. J. Butler, Mr. James Dunn, Mr. Alderman and Sheriff Samuel, Mr. B. Martell, Mr. J. Corry, Mr. A. F. Yarrow, Mr. F. C. Marshall, Mr. R. Humphrey, Mr. G. W. Manuel, and Professor A. C. Elliott, D.Sc. The vice-chairs were taken by Messrs. A. Beldam (first President', J. F. Flannery, J.P., M.P., J. M. Gray (M.C.), A. Thomson (V.P.), Alderman G. W. Kidd (V.P.), and Mr. A. W. Robertson (V.P.). Messrs. Jas. Weir (Vice-President) of Glasgow, and J. Blelloch, A. Campbell, C. L. E. Melsom (Convener of Recreation Committee), C. G. Newby, C. Noble, J. R. Ruthven, F. W. Shorev, J. T. Smith, S. C. Sage, J. H. Thomson (Chairman of Council), and W. White, (Members of Council), Robert Leslie (Honorary Treasurer), and James Adamson (Honorary Secretary), were also present. There was a good attendance of members and friends. The company who sat down to dinner numbered about 120. The report of the proceedings is as follows.

TOAST "THE QUEEN."

THE CHAIRMAN :- Gentlemen, "The Queen."

"THE NATIONAL ANTHEM."

TOAST "THE ROYAL FAMILY."

GENTLEMEN—I have again to ask you to signify your loyalty to the Royal house, while I propose to you "The Frince and Princess of Wales and the Members of the Royal Family."

"GOD BLESS THE PRINCE OF WALES."

TOAST ... "THE NAVY, ARMY, AND RESERVE FORCES."

PROFESSOR F. ELGAR: Mr. President and Gentlemen -This toast requires very little in the way of preface to commend it to a company of engineers. The Navy, Army, and Reserve Forces are all services with which engineers are very intimately associated. The efficiency of those services depends very much upon the work done by engineers in providing them, not only with weapons but also with the means of transport, and with the various facilities required for the many operations they have to perform. With the navy in particular the Institute of Marine Engineers is intimately associated, because the *personnel* of the navy is to a large extent constituted of marine engineers. I think about one-fifth of the whole personnel of the navy-officers and crews-belong to the engine-room department. They form, therefore, a very important branch of the service, and what is more-a fact we cannot forget this evening-at the head of that important branch is our friend the President of this Institute. We have all admired the great ability, the energy, the tact, and the

pluck with which he has discharged the very difficult and arduous duties of his office. It is fortunate for the navy that during the recent years of stress and change the great department of engineering, upon which so much depends, has been in such capable hands. Speaking as a very old friend of your President, probably the oldest in this room, I cannot but feel, as all who know him must feel, that you have put the right man in the right place. In doing this you have at the same time conferred a great and well-deserved honour upon Mr. Durston, and you have given all the recognition and encouragement in your power to a very worthy and distinguished servant of the country-recognition and encouragement that must be most gratifying to him, coming as it does from the members of his own profession, and that cannot fail to support and stimulate him in the performance of his public duty, and thus aid in promoting the progress and efficiency of the engineering branch of the navy. I ask you, gentlemen, to drink this toast very heartily, and with it I would couple the names of Mr. Butler, Colonel Davis, and Mr. Manuel-one of your past presidents.

(Song ... "OH! OH! HEAR THE WILD WINDS BLOW.")

MR. R. J. BUTLER: Mr. President and Gentlemen-Permit me heartily to endorse all Professor Elgar has said respecting your respected president. I have not the honour to be a naval officer-my connection with the navy is more on the side of the materiel. The changes which have taken place in our navy within the last 10 years have been enormous. The improvements which have taken place have been largely in the direction of increased efficiency in naval ordnance. We get greater power out of our weapons, quick-firing guns have been introduced, and quick appliances have also been added to ordinary manual-worked guns. Smokeless powder has also been introduced, and higher speeds than hitherto have been realised, with economy in the consumption of coal, and economy in weight. It is true, perhaps, that the reduction in weight and the increase in speed in the smaller type of vessel have been largely obtained by the use of "the water tube" boiler. If it had not been for these boilers the results now obtained would have been impracticable. With ships built last year, speeds of from 26 to 27 knots have been realised, and those to be built will probably attain a much higher speed. In all these some type of the water tube boiler, with high forced draught, will be fitted. Large sums of money have been voted in recent years for the construction of ships, and it is a satisfaction to be able to say—judging from the reports of naval officers—that the money has been well spent. And we have every reason to believe that if an emergency should arise our officers and men will make the best use of our ships and material, and will emulate the deeds of our forefathers.

COLONEL JOHN DAVIS, A.D.C.: Mr. President and Gentlemen-In a naval assembly like this it might seem, at first sight, as if the toast of the "Army" were a little out of place, except as a national toast. But it is here not out of place. The army and navy in olden times were inseparably connected, and the old regiment -the Queen's-a battalion of which I have the honour to command-was, on the glorious 1st of June, 1794, on board His Majesty's fleet, and helped to win that great and memorable victory. Mr. Butler has spoken of changes in the navy. It is a time of change also in the army, and I regret exceedingly that the grand old duke who has done his duty so nobly and well at the head of the army is now about to retire. He has occupied for a long time the foremost position in the army with great credit, and no more loyal and brave gentleman ever served Her Majesty. He retires with the good wishes and loyal thanks of every subject of He is to be succeeded by one who will the Queen. worthily carry out the changes which the Administration have thought fit to make. Lord Wolseley has, in all his career, done gallant service. In every action, and in every command he has had, he has been successful, and he has also done well as an administrator of the army, and so become fitted to succeed to the

post he is now to occupy. There are other grand soldiers, too, coming forward. I need only mention Sir Evelyn Wood, Sir Redvers Buller, and, not to mention many others, one soldier for whom I have a great regard—Sir Francis Granville. In thanking you for coupling my name with this toast, I will only add that I believe the army has benefitted in a great measure by the genius and skill of engineers and for many inventions that have helped to win battles in recent years.

Mr. G. W. MANUEL, R.N.R.: Mr. President and Gentlemen -- I thank you on behalf of the Royal Naval Reserve. I can only say the Reserve well deserves the distinction, although as yet we are not tried veterans. We have to carve our name yet, but so far as the Reserve has gone, especially with the officers, I think they have shown that when the time comes they will be equal to the officers of the Royal Navy. They have been tried on several occasions, and occasions sometimes of particular danger, and they have stood well, and have received the thanks of the Lords of the Admiralty. For ourselves, as engineers of the Royal Naval Reserve, we can say but little. In fact we are not in touch, as yet, with the work of the navy. Ignorant as we are of many things which all engineers ought to be acquainted with before the time actually comes for going on board a man-of-war, our ignorance is not our fault, and we will show, so far as our knowledge of things we do understand is concerned, that we will do our duty. We feel something like a locomotive, with steam up, but chained in a shed-we cannot get away. The officers in the Reserve number 1,370. Of these, a small party only are engineers; they number at present about 300. Their services, however, are important, and I will say this-those services cost the country nothing. Out of the total number of officers 1,070 are paid or will be, after receiving certain drill which can be gone through in a year. That money comes to $\pm 18,000$ a year. I only wish to point out that the engineers are untried men. But we have been appointed engineer officers, and have a right to do our duty. We think that if the Admiralty leave us ignorant of what we ought to know about a battleship, it is their fault. I wish we could be tried so as to become fit as engineers to go on board anything, when the call comes, from a torpedo boat to a line-of-battle ship. We feel we should like to be able to step on board any class of vessel ready to go to our work at once. We should like the engineer officers to be tried men, and have a connection, more than in name, with the navy. Gentlemen, we are proud as engineers. I do not think many ships in the Royal Navy could go to sea without engineers, though of course the naval officers do their duty in their own way. I hope that what I have said will not be taken amiss, even by the Admiralty. 1 am very pleased to see our President here to-night. I have been associated with him in the Admiralty at different times, and J feel that in the position which he holds there he is the right man in the right place

TOAST ... "THE HOUSES OF PARLIAMENT."

MR. ARCHIBALD THOMSON: Mr. President and Gentlemen-I feel a privileged man to-night as I look down the toast list and find my name as proposer of the "Houses of Parliament." I feel that I am very highly honoured. We all know and fully appreciate the greatness of Parliament. When we remember that these gentlemen-the members-voluntarily come forward and give their services, and work in every shape and form gratuitously, we must feel that we are greatly indebted to them. I trust the day is a long way off when Members of Parliament will receive remuneration. There are plenty good men and true who are able and willing to come forward and do this duty for honour, and the benefit of their country, as they have done before for centuries past. If I had to treat of all the important duties they discharge I should hardly know where to begin. They not only legislate for this nation, but also to some extent for nations and empires beyond the seas. We often hear that the Parliament of this country is the greatest assembly in the world;

by calling it the greatest I do not mean as far as numbers are concerned, but I certainly think it is the most important assemblage. Without attempting to say one word on either side in politics-because I do not profess to be a politician-I only understand politics from my own little ken. I think I may venture to assert that the nation has just come through a great contest, and that it has put down its foot in a most decided manner, in which the greater portion of the nation is thoroughly satisfied with. I must confess I have a very great opinion of the happy mixture they have made, I think we have got good men from the two great parties of the State, and I am prepared to expect something good from them. I think this a most opportune time for proposing this toast, seeing that the members are all away on their holidays enjoying the rest which they so well deserve, and that before very long they will be gathered together again to commence their onerous duties. In drinking this toast, gentlemen, we only have to wish them "God speed" in their undertakings. If they will only do something to increase freights, I was going to say they might let loose Ireland. Judging from the Board of Trade returns for August, it seems as if we have something bright before us soon. Now what we have to do is to wish God speed to the Houses of Parliament. I think engineers know when they have got the right men in the right place, and I am sure most of them are clear headed, though there may be a few red hot radicals amongst them; we feel we are in the right direction now. Gentlemen, I give you the "Houses of Parliament," coupled with the name of Mr. Fortescue Flannery, a member of our Institute, who, you are aware, has lately taken his seat in the House of Commons.

SONG "THE LAST WATCH."

MR. FORTESCUE FLANNERY, M.P., in reply, said: Mr. President and Gentlemen—I remember that at a former dinner of this Institute this toast was responded to by my friend Mr. William Allan. From his long experience in the House he was able to tell us much about its procedure, and to describe it. I cannot pretend to any experience, and therefore must be brief. As to the House of Lords, engineers know very little about it—less of its interior than, as a class, they deserve to know. It may be that in the future we shall have other engineers there than Lord Kelvin, one of the past presidents of this Institute. I should not wonder if, in course of time, Sir, when you have improved the administration of the engineer branch of the navy, you should ultimately find yourself reposing on those scarlet benches. You would carry with you there the esteem and respect of your brethren in the profession, and you would find in the House of Lords that there is a place where House of Commons critics cease to trouble and water tube boilers are at rest. With regard to the House of Commons, I have found that if a member really understands the subject on which he is speaking, and has any real contribution to make to the debate, he is invariably listened to with respect. As engineers we are well represented-not so much numerically as by a good representation. I have spoken of Mr. William Allan-he has gone up by leaps and bounds in public estimation because he has stood up for the profession Then we have Mr. John Penn, representative of one of the oldest engineering establishments in the world. Then we had - I did hope we should have been able to say "we have"—the great engineer, Sir Edward Reed. Whatever our politics, I am sure we are sorry the House should have lost that great representative of marine engineering who so sturdily stood up for engineers. Then Colonel Denny, who was with us last time, and who is now one of the engineering babies of the House of Commons. I remember the graphic description he gave of the dangers run by engineers and stokers battened down in a close stokehole in the hour of battle. Then we have a strong representative in Mr. Doxford, of Sunderland, and another in Mr. Richardson, of Hartlepool, both of them marine engineers of the highest authority. There are others, but I have mentioned sufficient to convince you that your interests are well represented in the House. I believe there is no class of men who, in proportion to their numbers, are better able to sustain the greatness of this country than engineers, and if this Institute will pull itself together and make itself what it ought to be, the representative power of the thousands of engineer officers in the Royal Navy, and of the 30,000 in the mercantile marine, its influence will be felt in the councils of the nation, and many abuses will be removed by Parliament if pressure be brought to bear. I believe when, a few years hence-I hope it may be six or seven-we look back on the work of the Parliament now beginning, it will be seen that it has done much for this country which depends, more than any other, on commerce and shipping—done much good for this generation and for generations still to come.

TOAST ... THE INSTITUTE OF MARINE ENGINEERS.

MAJOR W. E. GILBERT, iu proposing the toast of the evening, "The Institute of Marine Engineers," said:-Mr. President and Gentlemen I have had conferred upon me the honour of proposing this toast. All I can say is that I congratulate the Institute upon the position it is in, and I am sure that year by year it will improve and go on flourishing. The nation is much indebted to marine engineers in many ways, and I am certain that with their assistance it will make marked progress. I beg, therefore, to propose the toast, and to couple with it the name of the honorary secretary, Mr. James Adamson.

SONG ... ("MARY OF ARGYLE.")

MR. JAMES ADAMSON: Respected President, Major Gilbert, and Gentlemen—I rise with pleasure, in the name of the Institute of Marine Engineers, to respond to the toast which you have so enthusiastically received. I thank the proposer for the kind expressions to which he has given utterance—expressions which convey to the Institute an assurance of his sympathy with its work. And, gentlemen, assurances of sympathy have not been wanting on your part in the reception you have accorded the toast. Standing, as I do, at the junction of the channels of these two waters of sympathy, I thank you on behalf of the Office Bearers and Members of Council for the presence and support which you have accorded us at this our festive board. Peace has gained much and possibly has learned more from war, and, amid much of the foolishness by which the chivalry of the Middle Ages was surrounded, there was a true ring which helped to shape the manners and mould the morality of later days. The noble and elevated spirit of the soldier displayed before the nation tends to elevate and ennoble,-considering it apart from the carnage and misery which no doubt war brings in its wake,-and I think on this occasion, when we are honoured by the presence of those who represent the Leaders of our Legions, and when the representations on the walls around remind us of the olden chivalry, it becomes us to sentinel our approaches well and consider whether we cannot upward and forward, with loftier aims press and more extended labours in connection with the Institute under whose banner we meet to-night. It is now seven years this month since first the preliminary arrangements in connection with the foundation of the Institute of Marine Engineers were commenced. On more than one occasion since then, in connection with the rise and progress of the Institute, men well qualified to write and speak on the subject have declared that its progress has been phenomenal. Gentlemen, let us go forward in the work to which we have set our hands. Let our progress in the future even surpass the work in the past, as has been already indicated by Mr. Flannery in his speech to-night. It may be said that the Institute of Marine Engineers can now stand alone, and has justified its foundation as one of the institutions of our country, coming forward to support and extend in fresh fields year by year the pillars of peace and maintain the buttresses of war. Gentlemen, we have lost one of our most honoured members but lately -a past president who, from the earliest days of the

Institute took a warm interest in it, and when we think of the words of encouragement given to us, and no less the deeds of encouragement shown to us, by our late friend Dr. Denny, and when we consider the pleasant associations which we have had with him in the pastwe regret they are of the past-I say we cannot but linger on their remembrance, because they are pleasant The gift of Dr. Denny made possible memories to us. the "Denny Medal," which is awarded each year for the best paper of the session. One of those medals has gone to India, another to Valparaiso, and a third to Cardiff, as but recently the medal has been awarded to Mr. T. W. Wailes, for his paper on "Wrecks and Sunken Vessels." We are now about to resume our session. We are hoping that our respected president will come and give us his inaugural address at the Institute premises on the 23rd of September. Our drawing classes, held on Tuesdays and Thursdays, will resume in October, also occasional lectures on the first and third Mondays of each month specially for junior members, and our papers and discussions will be held on the second and fourth Mondays of each month, the first paper being read on the 14th of October. This paper has been contributed by one of our members resident in Hong Kong, on "Internal Friction in Steam Engines," suggested, I believe, largely by the paper with which Mr. Northcote favoured us. And now, to comply with the wholesome rule set to measure within the prescribed space at our disposal this evening. I thank again the proposer for the kind way in which he has referred to the Institute. His words were brief, but well chosen, and we ought well to consider them. If we do so, then from this night we may date a new epoch in our history. I ought to mention that the conversazione-the popular function in connection with the Institute-will be in the beginning of December. And now, as I sit down, I say, May the Institute flourish more and more in the days to come; may we seek after those things which are noble in connection with our profession, and use the opportunities which are within our reach, day by day, and year by year; and so may we go on, extending and prospering, as time passes over us here and hereafter.

TOAST ... "THE SHIPPING INTEREST."

MR. A. BELDAM (First President of the Institute): The toast I have to propose is "The Shipping Interest." Referring to the low freights, and their cause. I consider that in recent years the increase of tonnage. and the increase of speed has been greater than the expansion of trade. The improvements in shipbuilding have been so important that steamers built only eight or ten years ago are now at a great disadvantage, and it may be said that the engineer is rather a puzzle to the shipowner, inasmuch as the improvements continually being made by him sometimes brings the shipowner to his wits' end, when he finds that steamers, even although only built a comparatively short time, cannot compete with those of the present day; the result being, he must put himself on an equal footing with others who have gone in for the steamer up to date, or he cannot carry his freight to leave a dividend for his shareholders. By doing this he naturally depreciates, to an extraordinary extent in value, his existing fleet of steamers; indeed, few take into consideration the fact that six or seven years represent the time earning power of the modern cargo steamer. It has been said that the price of wheat greatly affects the freight market, in this I quite agree, and believe that if the condition of our agriculturalist could be improved and made to flourish, it would not only favour the shipping interest, but every industry would feel the benefit of it. Foreign competition also has got to a great pitch, and our English shipowners feel it very keenly. I have great pleasure in coupling the the toast with the name of Mr. John Corry.

(SONG ... "FOUR JOLLY SMITHS.")

MR. JOHN CORRY replied: I thank you for the cordiality with which you have received this toast. The Institute of Marine Engineers is so intimately connected with shipping that their interests are practically the same. The shipowner depends upon the

marine engineer for his propelling power as much as he depends upon the shipbuilder for the hulls of his ships. I regret to say that the industry with which we are all so closely associated is not now, and has not been for a considerable time, in a flourishing condition. We are living in the hope of better times, but as yet, the signs of a revival are not very apparent. One of the greatest difficulties a shipowner labours under at the present time is the task of keeping his ships up to date. The advance and improvement, especially in machinery, has been so great and rapid, that a steamer built a few years ago, although still sound in hull and machinery is practically antiquated, so much so that I consider the depreciation usually allowed of 5 or 6 per cent. per annum, is not an adequate allowance to make, and that less than 10 per cent. will scarcely cover the actual shrinkage in value. Engineers perhaps may think that it is to the interest of shipowners to make the greatest possible improvements in engines and boilers; it might be for the man who built the last ship, but certainly not for the trade as a whole. We have, however, battled with difficulties in the past, and are prepared to face them in the future. We have to contend with foreign competition and bounties, but the real cause of the depression is over production of tonnage and the consequent competition. The great facilities now existing for the building and financing of ships have encouraged a class of men, who have very little practical knowledge of shipping, to compete with what I might call the legitimate shipowner who builds vessels to fill up vacancies, and for the natural extension I would like to see the latter class increase, of trade. but unfortunately they are becoming fewer.

TOAST "THE VISITORS."

MR. J. MACFARLANE GRAY proposed "The Visitors." The Institute was always glad, he said, to welcome visitors who were interested in the subjects discussed. There were many present that night – guests of members. The Institute welcomed them, and also welcomed its honorary members, some of whom

were too much of the nature of "visitors." Thev would like to see them more frequently. They had also present a large number of distinguished guests, each one eminent in some profession kindred to engineering, and therefore kindred to engineers by a kinship depending, not upon having the same blood in their veins, but upon having the same kind of wrinkles in their brains. The great engineering family was a sort of brotherhood of the wise, because it was alone where Wisdom dwells with Prudence that men found out knowledge of witty inventions, and whatever was the outcome of the dwelling together, that was engineering. Colonel Davis testified by his presence that he recognised the kinship - seeing in, say, the efficient repair of a 28-inch shaft in its place, in a winter voyage on the North Atlantic-a good deal of the same kind of genius, of resourcefulness, loyalty to duty, bravery and indomitable pluck that have recently been displayed so conspicuously in the Chitral Expedition. The qualities are the same in each-the Himalayas and the Atlantic were merely differentiating circumstances. Amongst the distinguished guests named by Mr. Gray were Mr. Frank Marshall, of St. Peters, Mr. Robert Humphreys, Mr. Yarrow, Mr. John Corry, and Mr. James Dunn (with whose name the toast is coupled) Mr. Dunn, the speaker said, was acting at Whitehall in the place of Sir William White, one of their past presidents, and he was also very much associated with their present They were glad to see him, and they expresident. pressed at the same time regret—a regret which he, Mr Dunn, more than any other must feel, that Sir William White had been compelled to rest awhile, and their prayer was that he may be, before long, back to all his posts of eminent service to his country and honour to himself. They also welcomed the presence of Mr. A. Wood and Mr. R. Butler, of the Admiralty, as a token of that closer union which must be established between the two great navies if one navy was ever to be called upon to protect the other. Then they had Dr. Elgar and Major W. Gilbert. The last-named, in proposing the toast of "The Institute," had said much

in their favour. The value of Major Gilbert's kind remarks was, curiously, enhanced when they were known to be based on the fact that, officially, he knew nothing at all about us, because he was chief constable of the Metropolitan Police at Scotland Yard, where, of course, he had never seen a marine engineer. The speaker asked them to join heartily in drinking the toast of "The Visitors."

(Song "The Arab's Troth.")

MR JAMES DUNN responded: I thank Mr. Gray for the kind and characteristic way in which he has proposed the toast, and the company for their very cordial acceptance of it; but I desire specially to thank the Council of the Institute for their courtesy in inviting us to meet so many distinguished engineers, members of an Institute which, though comparatively young, has made its mark during the less than seven years of its existence, by an introduction of subjects of vital interest to the profession, and of dealing with them in a masterly manner. The judgment and discretion shown in the choice of presidents augurs well for the success of the Institute. One of the number we shall never see again, but the name of Peter Denny will always be held in pleasing remembrance. Another of the past presidents is absent on account of illness, and we can all join in the sympathetic expressions of Mr. Gray regarding the indisposition of my esteemed chief, Sir William White. I thank Mr. Gray and assure the company that your kindly expressions shall be duly conveyed to Sir William. We are delighted to see in the chair to-night a gentleman who fills the distinguished position of Engineer-in-Chief of Great Britain's Fleet. A more distinguished or responsible position it would not be easy to name. You have shown by your selection of presidents that you hold enlarged and comprehensive views of a cosmopolitan kind. You chose a naval architect in the person of Sir William White, a shipowner in the person of Sir Thomas Sutherland, and were further proof needed, we have it in the fact that you, a body of men who

have agreed to unite to promote engineering in all its branches, are patiently listening while another naval architect is talking, and having an opportunity afforded to give expression to a feeling that has long taken possession of him, a feeling of admiration for the ability shown, the marvellous strides made, the wonderful results achieved, and for the bravery again and again displayed, a quality to which Mr. Flannery has referred in appreciative terms. I claim to be permitted to express an opinion, because although not a marine engineer, my association with the engineer covers a large area; indeed, I have been connected with engineers in a more or less degree in the design of every seagoing fighting ship which at the present moment is carrying the British Flag. Such a thought, such a fact, makes one almost startle when looking back and calling to mind the wonderful advance that has been made within a period covered by my own personal knowledge and of that of the majority of gentlemen present. I would now refer more particularly to marine engineering; but had time permitted I might have spoken of the ship, and of the gun. I might have told you that the first iron armour clad seagoing warship, the Warrior, was built within the memory of most of the company present, when the world was astounded to learn that iron plates 41 inches thick were placed on her sides. Since that time, however, we are using, instead of $4\frac{1}{2}$ inch, 24 inch! and at the present time, owing to the great advance made in the quality of the material and mode of treating it, we are able to use 12 inch plates, having greater resisting power than had the 24 inch plates of a few years ago. The Warrior also carried the heaviest gun then made--a 68 pounder; in the course of time we got a 100 ton gun, throwing a shot of 2,000 lbs., but to-day we are mounting guns which, although weighing less than 50 tons, will hurl their projectiles with greater piercing power than did the gun of 100 tons. With regard to engineering, where in the Warrior we required 200 tons of weight to produce 1,000 horse-power, and required a ton and a half of coal per hour to sustain it, we now are able

to secure 1,000 horse-power with a weight of 100 tons, and to sustain it with less than half the weight of coal formerly required; and to go yet further still, the gentleman on my left, Mr. Yarrow, has recently succeeded in getting at the rate of 1,000 horse-power with every 25 tons of weight. Such results entitle the marine engineers to the highest credit, they are going ahead by leaps and bounds; and I venture to express a hope, that they will still let the naval architect go hand in hand with them. The Institute of Naval Architects in the 10th year of their existence embraced the marine engineers in full membership. I will not prophecy what the Institute of Marine Engineers will do ere it reaches its tenth year.

TOASTS "KINDRED INSTITUTIONS."

MR. J. HAWTHORN: I am sure I am only expressing the feelings of the members of this Institute when I say that we are pleased to see so many members of kindred institutions, whose home is in London, amongst us here to-night, and to feel that the Institute of Marine Engineers has become one of the great family of engineering institutes. We are all children, so to speak, of one family, and in the exchange of transactions we simply have an interchange of ideas, all working towards the well-being of the great profession of engineering. Shall I say that I dare hope to see the day when there will be only one Institute, namely, the Institute of Engineering? The whole of the several institutions being united in one grand Institute, worthy of the world, having a noble building in London, in which we should find each branch of the profession of engineering simply a section, such as the electrical section, mechanical section, marine section, civil section, each and every one doing their best to maintain by original research and by discussions on original subjects the technical supremacy of Britain's greatness. I couple with the toast the name of Mr. Martell of Lloyd's Register of Shipping.

(SONG "QUEEN OF THE EARTH.")

MR. B. MARTELL, in acknowledging the toast, said that perhaps the Council of the Institute might take

into consideration the remarks of Mr. Dunn, and consider whether they could not elect naval architects amongst them. If they could, naval architects would consider it an honour to become members of their Institute, just as the Institute of Naval Architects consider it an honour to elect marine engineers. With regard to the toast, he felt it was a great compliment to have his name associated with it. He did not believe with some that in such institutes they did not get the best out of their members, for the reason that if they really had anything of worth to communicate they would keep it up their sleeves until they could benefit themselves. He had not found that to be the case. Those who had any acquaintance with the working of such institutes must admit that they were of enormous value to the country generally, and to the professions in particular. If he wanted an illustration of that he need only refer to the "Transactions" of that Institute. It was a matter of great congratulation indeed to see these institutes multiplying and progressing in the country.

TOAST ... "THE PRESIDENT."

PROFESSOR A. C. ELLIOTT proposed the health of the President: He said it was at once a difficult task. and an easy one-easy, because the toast had only to be mentioned to secure its hearty acceptance, but not easy to find words in which to express appreciation of their President's qualities. Mr. Durston was not only Chief Engineer of the Navy, but the most distinguished Chief Engineer. Upon his shoulders the heaviest burden had fallen, because of the recent Naval Armaments Act. When the speaker looked to the fact that one of their Past-Presidents was Chief Constructor to the Navy, and the present President was Chief Engineer of the Navy. he seemed to see the finger of Fate pointing to the time when the Institute of Marine Engineers would embrace the Royal Navy. The toast was "The President," might he live 1000 years.

THE PRESIDENT, in response, said : Gentlemen—I am particularly grateful for the manner in which Dr. Elliott has proposed my health, and for the cordiality

with which you have received it. The flattering terms in which you gentlemen have spoken of me I can only ascribe to the good work done by the Admiralty machinery contractors and my colleagues at the Admiralty and dockyards, and by my brother officers-over 800 of them-of the naval service with which I have the honour to be associated, and in whose work it is my highest privilege to be allowed to join. With regard to the Royal Naval Reserve, Mr. Manuel feels we do not use them as we should do. He said the Naval men are veterans and the Reserve men are not. Gentlemen. they are as great veterans as one could wish, for they do their duty to the country, and what more can men do? We look upon them as one of our pillars. Gentlemen, with regard to the position I occupy to-night, as Engineer-in-Chief of the Navy, I am first of all a marine engineer, I am a member of your Institute, and to be elected its President is, I am sure, a special mark of the good feeling existing between the mercantile and the Royal Navies. I thank you for the honour you have done me in electing me, and can only express the hope that my efforts, however feeble, may tend in the right direction of increasing the efficiency of this Insti-Your Institute has recently suffered a great loss tute. in the death of Dr. Denny. Your consolation is that he passed away full of years, and enjoying the honour and respect, not only of marine engineers, but also of all with whom he was brought in contact. We experience another loss to-night in the absence of my most intimate colleague Sir William White. He is laid by from efforts exerted in the cause of his country -efforts as brave as those of any hero. During the past few years the country has required that the efforts of the Director of the Naval Construction should be unceasing. He has freely given these efforts, more, no man could do. I am sure you will join with me in an expression of sympathy with him in his suffering, and in a hearty wish for his speedy recovery. On a recent occasion, in replying to a toast, an admiral of the United States Navy expressed his opinion that "Jack " -the man behind the gun-possesses the same good

qualities as ever. I venture to remind you that the "Jack" with whom you and I are most acquainted-"Jack Stoker," the man before the fire—is of the same stuff as his brother before the gun. His duties require that he should be so, and it is gratifying to know we have testimony from eminent naval and mercantile officers. that this is a fact. His duties, unfortunately, are nearly as laborious as ever, and if marine engineers can devise and put into practice some means by which his labours may be reduced, and his surroundings improved, they will deserve well of their country. Mr. Howden, Messrs. John Brown & Co, and Mr. Martin have improved his surroundings somewhat, but much vet remains to be done. I submit it as a matter worthy the attention of the Institute. The development of the Atlantic traffic is remarkable, passengers can now cross the Atlantic in short periods, cross the American Continent by the Canadian Pacific Railway, and again ship in steamers under the British Flag for Japan and China. We hear of a line from Australia to Canadian Pacific Ports. At no distant date by the efforts of the mightiest empire in the world, next our own, a great work will be completed, namely, the girdling of the northern hemisphere by the completion of the great Russian railway from St. Petersburg to Petropaulowski, from which latter port it is only a short voyage to Japan. Some say this is a purely military scheme, but I submit there are interests far higher than those to be obtained by military objects only, and these interests are all powerful, I mean the interests of commerce, in which members of this Institute are vitally concerned. The President concluded by saying that this girdling of the earth in the interests of commerce was the best means of ensuring the unity of nations and developing human brotherhood. He ventured to predict that in that grand work marine engineers would play no unimportant part.

(SONG "AULD LANG SYNE.")

SCXX92

INSTITUTE OF MARINE ENGINEERS incorporated.

SESSION



1895-6.

President-A. J. DURSTON, Esg., R.N., C.B.

INAUGURAL MEETING

HELD AT

58, Romford Road, Stratford,

ON MONDAY, SEPTEMBER 23RD, 1895.

PREFACE.

58, Romford Road,

STRATFORD, ESSEX,

September 23rd, 1895.

The opening Meeting of the Autumn Session, 1895-96, was held here this evening, when the President (A. J. DURSTON, Esq., R.N., C.B.) delivered his inaugural address.

The President on taking the chair, was warmly welcomed to the premises by the members assembled at 7.30 p.m., and then proceeded to give his address.

At the conclusion of the vote of thanks and response by the President, there was a short interval for refreshments, and the remainder of the evening was devoted to a Smoking Concert. A number of excellent songs were most successfully rendered by Mr. John Bennett, Mr. E. Burchall, Mr. J. M'Auliffe, Mr. A. Hurley, and Mr. J. B. Johnston, while Mr. Alderman Kidd was loudly applauded for two recitations. Mr. T. F. Noakes officiated as pianist. The musical arrangements were under the direction of Mr. John Bennett, and before the close of the entertainment the performers were accorded a very hearty vote of thanks for their services.

Telegrams were received from Mr. Asplan Beldam (first President of the Institute), and Mr. J. H. Thomson (Chairman of the Council), expressing regret at their inability to be present.

JAS. ADAMSON,

Honorary Secretary.

INSTITUTE OF MARINE ENGINEERS incorporated.

SESSION



1895-6.

President-A. J. DURSTON, Esg., R.N., C.B.

OPENING MEETING

MONDAY, SEPTEMBER 23rd, 1895.

THE PRESIDENT :--- Gentlemen, --- When the committee of the Institute of Marine Engineers honoured me by asking me to undertake the office of President for a year I accepted with some diffidence, as I knew that I should necessarily compare unfavourably with distinguished past presidents. As Engineer-in-Chief of the Royal Navy, I had, however, a sincere desire to foster as much as lay in my power a feeling of cordial relationship between the engineering branches of the Royal Navy and the mercantile marine, and I felt a sense of duty that compelled me to accept with gratitude an office offered with so much courtesy. I may perhaps add that having been a repeated recipient of the hospitality of the Institute, I had been enabled to observe that the cares and responsibilities of office did not appear to press too heavily on the gentlemen who so worthily filled the presidential chair.

WORK AND OBJECTS OF THE INSTITUTE.

In addressing you to-night I have to tell you that my duties have been altogether light and pleasant, and I have to congratulate the members on the continued prosperity of the Institute-both as regards the parent establishment and the flourishing foreign and provincial centres. The papers read and the discussions thereon have fully maintained the high standard set up at the earlier meetings of the Institute. This, I may say, is a matter of the first importance in connection with this Institute. A good paper is not one that necessarily involves much scientific investigation in its preparation. The intelligent observations of a competent sea-going engineer on the working of the machinery in his charge may, when read and criticised by other men equally familiar with their subject, call attention to facts highly valuable to the designer and builder of machinery. Speaking as a designer of marine engines for the Royal Navy, I can assure you, gentlemen, that the information contained in the reports from commanding and engineer officers serving afloat is very much appreciated, and we avail ourselves at the Admiralty of information obtained from this and similar practical sources to the fullest possible extent. This Institute also induces and promotes social intercourse, and it provides for the healthful and rational recreation of its members: these are very desirable objects, but it is on its published "Transactions" that its professional status must ultimately rest, and I therefore appeal to every member to do his utmost to assist the committee in placing good readable papers before the meetings.

HIGH PRESSURES AND WATER-TUBE BOILERS.

We are now possibly on the eve of important departures from present practice in marine engineering, and you are aware from the discussion of the subject in the House of Commons that several vessels in the Royal Navy have been, or are being, fitted with water-tube boilers. The general question of the use of higher steam pressures, which necessarily involve, in my opinion, the use of water-tube boilers, will be of interest to all members, and if it be shown by experience that increased pressures can be obtained with water-tube boilers with safety and efficiency, and that a considerable gain in

economy results from the use of such high pressures, no doubt the mercantile marine will be forced by competition to their adoption, assuming, of course, that any practical difficulties are shown by experience to be overcome when proper appliances are fitted. One very important reason for the adoption of very high pressures exists in the navy, however, to a much larger extent than in the mercantile marine, and follows from the fact that with naval machinery, although possessing the capability of exerting great power, the usual power exerted on service of the naval ship is but a small proportion of the full power. It is well known that such small powers cannot be developed in a large engine with economy, and one advantage of the provision of very high pressures for the maximum power lies in the reduced size of engine which results, and which will have a beneficial effect in making the engine more economical at those low cruising powers which the vessel exerts during most of her life. Besides this special advantage which accrues in the navy, there is of course the general advantage of lightness. There are certain types of war vessels where the development of the highest possible power for short spurts is of paramount importance, and this highest possible power is required on the lowest possible weight of machinery. I need hardly mention in this assembly that increased steam pressures and piston speeds follow as a natural consequence, and for this special type of vessel water-tube boilers are essential. As examples of this type of vessel, the new torpedo-boat destroyers, where speeds of 27 to 30 knots are required, may be mentioned. I mention the subject in connection with the Institute, as it is possible that the water-tube boiler may be fitted to some extent in the mercantile marine, and that the design, construction, and working of watertube boilers will, in the near future, occupy the attention of many of the members of the Institute. The meetings will offer convenient opportunities for discussion and interchange of opinion, and the "Transactions" will circulate the information obtained among members abroad, or at home, who may be unable to attend the reading and discussion of papers.

LEAKY TUBES IN BOILERS.

I imagine the members do not desire to be troubled with any information involving great technical detail, but there are a few other remarks I will make of a general character on subjects in which all members of the Institution are interested. These refer to practice in the navy and navy experience. and may be of use to members of the mercantile marine in dealing with their own problems. First, regarding the important question of leaky tubes in boilers, and experiments on the approximate temperature at which this occurrence takes place. Some experiments were made at Devonport Dockyard in order to throw light on this, and also to ascertain the temperatures which were actually produced under practical conditions. The results of a preliminary series of experiments were given in a paper read before the Institute of Naval Architects in March, 1893, and some of the leading points contained in that paper are, shortly, as follows :---First, tubes remained tight in a tube plate up to a temperature of about 750° F., but leakage must be expected when this temperature is much exceeded. Secondly, as regards the temperatures which were attained under different conditions of working, it was found that when boiling water under atmospheric pressure in a plain vessel the temperature on the hot side of plate was only 280° with clean fresh water, but rose to above 550° when the vessel was coated internally with a laver of grease 1-16th of an inch thick. The effect with boiling water under pressure was obtained by experimenting with a small boiler. This boiler, consisting of a cylindrical shell with tubes and a brickwork furnace at one end, was worked with a steam pressure of 145 lb., air pressure three inches, the rate of evaporation being about 12 lb. of water per square foot of heating surface per hour. Two trials, each of about five hours' duration, showed a temperature on fire side of tube plate of about 750°. At a third trial a small percentage of oil (.07 of feed) was introduced into the boiler, and the temperature rose to between 750°

and 1.060° on the fire side. At the fourth trial a small additional percentage of oil (05) was introduced. and this caused the tubes to leak; the temperature became about $1,060^{\circ}$ on the fire side, and between 680° and 750° at the centre of the tube plates' thickness The experiments representing the mean temperature. were conclusive in showing the importance of keeping the water side of the heating surface free from greasy deposit, and the water free from grease, and only confirm what is now well established in practice. To attain this end as nearly as possible, feed water filters are now commonly adopted in H.M.'s ships, and also every effort is made to reduce the quantity of oil used for lubricating internal parts of engines to a minimum. As a means of preventing an excessive tube plate temperature near the tube jointings the cap ferrule was introduced, a fitting which was fully described in the paper above referred to; and it only remains to add that up to the present, experience has shown that this fitting has been very beneficial in preventing leaky tubes, and that the ferrule deteriorates but slowly on service.

DISTRIBUTION OF TEMPERATURES.

The Devonport experiments were continued after those described in the paper of March, 1893, with the object of obtaining fuller information on the distribution of temperature over the tube plates and tubes. The result of one of those trials may be given. The boiler was worked with the steam pressure at 145 lb. per square inch, and air pressure at 3 inches, and the resulting temperatures of the fire-box tube plate were, on the water side 400°, middle of plate 617°, fire side of plate 750° to 1.060° . The temperatures of the tubes themselves were, on the fire side 680° F. at fire-box end, 617° middle of length, and below 480° at smokebox end. During the series of experiments which have been made at Devonport several other points were investigated, and some conclusions indicated, among which the following may be worth noting :- Brass and copper tubes are more liable to leakage than those of iron or steel Tubes of Lowmoor iron are as liable to leak as steel tubes. The loss of efficiency arising from a thin coating of grease deposit was a substantial amount, averaging 11 per cent.

HIGH TEMPERATURE CAUSING LEAKAGE.

An occurrence in one of the new torpedo-boat destroyers may also be mentioned as confirming the view that when the temperature is raised beyond 750° , *i.e.*, about the temperature of melting zinc, leakage of tubes will occur. The vessel in question is fitted with four boilers arranged in two stokeholds-two boilers in each—one main feed-pump and one auxiliary feedpump being provided for each pair of boilers. During a full-speed run a defective tube burst in the forward boiler, but this fact was not immediately recognised by those in the stokehold. The water disappeared from the gauge glass, and in the endeavours to maintain the usual water level in this damaged boiler, the water became so low in the other boiler that the tubes were seriously overheated. Some idea of the temperature reached can be obtained from the fact that the solder securing the ends of the wire on the main steam pipes, and a zinc slab in the steam collector of the boiler were melted, so that the temperature of steam had been above 750° Fahrenheit. When the accident was realised, the defective boiler was shut off and water pumped into the overheated boiler; the tubes of this latter leaked considerably at the steam collector joints, and required subsequent re-rolling throughout, but no other repairs. This incident took place in a water-tube boiler where the generating tubes enter the top collecting chamber below the normal water-line. But a still more recent case of shortness of water and consequent overheating has occurred in a boiler where the generating tubes all enter above the water-line, and in this case also tube leakage resulted, so that in every case the same result may be expected to occur if the critical temperature is reached. It is satisfactory to note that in the case of the tube bursting, the safety appliances, viz., automatic

ash-pit doors and automatic stop valves, on the boiler where the tube burst, acted efficiently, and no injury of any kind occurred; indeed, those in the stokehold first ascertained what had taken place from inquiries made by those on deck.

BURSTING SOUND TUBES.

Experiments have also been made with a view of ascertaining the steam pressure required to actually burst sound boiler tubes of small diameter, and the results obtained are of interest. A copper tube, one inch external diameter and 15 B.W.G (.070 inches) in thickness, was taken from a boiler of a torpedo-boat destroyer that had been steamed under forced draught at the full power to a large extent, partly filled with water, and the ends closed. It was placed on a smith's forge, inclined at an angle of about 20° to the horizontal, and a pressure gauge fitted at upper end. On being heated, the pressure rose to 200 lb., and the blast was applied. The pressure rapidly increased to about 1,500 lb., then rose to about 2,000 lb., the tube bursting 61 minutes after pressure was first shown on gauge. The bursting pressure was not definitely noted, as the limit of the pressure gauge was exceeded, but as far as could be judged, only to a slight extent. The tube had apparently burst at the bottom next the fire; but the whole portion that was subjected to heat was split open and practically flattened. Taking the bursting pressure at 2,000 lb., this would correspond to a stress of about 14,700 lb., or 6.55 tons per square inch. By calculation, the temperature of the steam would probably be about 640° Fahrenheit. A similar experiment was made with a new steel tube intended for a torpedo-boat destroyer boiler. This tube was $1\frac{1}{4}$ in. external diameter, and 12 L.S.G. (104 in.) thick, and had been coiled cold into a spiral of about 6 inches diameter. This tube, which was half filled with water, burst at a pressure of 4,788 lb. per square inch, *i.e.*, $42\frac{3}{4}$ cwts., in which the gauge was graduated; in this case, the tube separating and only flattening out locally. This pressure corresponds to a stress of about 28,800 lb. or 12.85 tons.

per square inch. The temperature of steam in this instance would probably be about 800° Fahrenheit. Although it was endeavoured to approach the circumstances of actual working, it must be borne in mind that in these experiments the tubes were partially filled with water and only slightly inclined to the horizontal, whereas in water-tube boilers where such small tubes are used the tubes are generally more nearly inclined to the vertical, and in all cases there is a stream of water, or water and steam, passing through the tubes when generating steam.

PROPORTIONS OF BOILER POWER.

Coming now to another question, respecting which every member of this Institute will have some data obtained from his own experience-I refer to the proportions of boilers for the powers to be developed there appears to be still a great deal of misapprehension in some quarters as to the proportions adopted in the navy, and it may be desirable if I explain what this practice is. For the ordinary tank boiler, the size of boiler fitted is such that one horse power is developed from each $2\frac{1}{2}$ square feet of total heating surface on an eight hours' trial, termed the natural draught trial. For a shorter trial of four hours' duration, called the forced draught trial, this power is increased by 20 to 25 per cent., so that for this short period the heating surface is at least two square feet per i h.p. On actual service, the minimum which it is insisted must be developed by the engines and boilers continuously for as long as the coal will last in the vessel, is 60 per cent. of the natural draught power, so that at this minimum power it will be seen that the heating surface is about four square feet per i.h.p. This continuous power is clearly that which corresponds to the sea-going powers of the mercantile marine. Although the Admiralty lay down this minimum power, there is no limitation of the amount obtained up to the full natural draught power, and on trials made expressly to ascertain the amount of power which can be continuously maintained

the minimum of 60 per cent. is generally considerably exceeded.

The table exhibited shows the results of a series of 14 trials, and by inspecting the column No. 7, showing the heating surface for power actually developed, it will be seen that the Royal Navy and mercantile marine practice on this question is much the same.

INDUCED V. FORCED DRAUGHT.

No doubt members will have seen much discussion respecting the merits and demerits of what is known as the induced draught system of increasing the rate of combustion in boilers. Induced draught was first tried in the navy afloat on H.M.S. Vesuvius in 1875. In her case a 6-foot fan, running 570 revolutions, was used in connection with a boiler having 42 square feet of grate surface, producing about the same draught as an ordinary chimney. In this ship was also tried the effect of discharging the gases through a horizontal chimney with the outlet astern. Mr. Martin, who deserves credit for his persistent advocacy, and has largely associated himself with this method of increasing the rate of combustion, made some further experiments with the system, and showed that a considerable draught could be obtained with it. In 1889 it was decided by the Admiralty to make a comparative set of experiments with a boiler fitted with this system of draught, and subsequently with navy forced draught, and a locomotive boiler at Portsmouth (grate surface 20, tube surface 1,000) was selected for the purpose. The results of these trials showed—(a) That with fans used to produce the induced draught there was no difficulty in obtaining high rates of combustion. (b) That as compared with forced draught there was an appreciable gain in evaporative efficiency. (c) Moreover, the open stokehold, if properly ventilated, has advantages in comparison with the closed stokehold. It was therefore decided to proceed further with the system and try it on board a ship, and for this purpose H.M.S. Gossamer was selected, one of her boiler rooms being fitted with induced draught, the other retaining the forced draught sytem. An extensive series of trials was carried out in that ship, the net result of which was to show that while on other grounds there was little to choose between the two systems, the great convenience and comfort due to the conditions involved in working with an open stokehold in lieu of a closed stokehold were very valuable. In view of these results further practical adaptations of the system have been made. H.M.S. Torch, a gunboat, has been fitted on this plan (grate 88.5 square feet, tubes 2520 square feet), and still later, H.M.S. Magnificent, a first-class battleship (grate 820 square feet, tubes 21400 square feet), and both these vessels have passed satisfactorily through their trials, and extended experience of the actual working of the arrangements at sea will soon now be obtained.

TRIALS WITH BELLEVILLE BOILERS.

I may add that the Sharpshooter, fitted with Belleville boilers, has just returned from the seventh of a series of one thousand knot trials. This distance was selected as that which, with the proportion of boilers in use, would practically use up all the coal conveniently accessible in the bunkers. The power exerted by the boilers on this seventh trial per square foot of heating surface of the boilers in use, would represent in the *Powerful* a power of 23,500 i.h.p., and on the first trial of the series made the power exerted would represent 18,000 i.h.p., the continuous steaming power of the *Powerful*. These trials, occupying from 60 to 70 hours, will be continued until we obtain a power representing 25,000 i h.p., the maximum of the *Powerful*.

ROYAL NAVAL RESERVE ENGINEERS.

There is another subject, gentlemen, on which I may be permitted to offer a few remarks, as illustrating the connection between the Royal and mercantile navies. Many members of this Institute are Naval Reserve
officers, and are therefore interested in the requirements of the Royal Navy. We have at present about 200 engineers of the mercantile marine enrolled as Roval Naval Reserve engineers, and the opinion has been often expressed that a certain proportion of these gentlemen should be given an opportunity of joining the Royal Navy for a limited period of training, in order to become familiar with the discipline of the engine department of a ship of war, and to acquire a knowledge of what may be termed extra professional duties, such as those in connection with locomotive torpedoes and hydraulic gun machinery. It has hitherto been held that engineers in the mercantile marine are employed on much the same duties as those they would perform if called upon to serve in the Royal Navy, and that consequently no additional training is required, but this is a question that necessarily requires careful consideration. Although a naval training is not required to the same extent in the case of a reserve engineer officer as in the case of the reserve executive officer, yet to enable the reserve engineer to undertake the duties and responsibilities involved in the charge of the engineer's department of a war ship, some previous service in the Royal Navy would be of the greatest possible advantage. If a certain proportion of the reserve engineer officers were given the opportunity of serving for a period in the engineroom of a man-of-war, and were afterwards paid the same retainer as in the case of executive reserve officers of corresponding rank, it would in my opinion tend to promote a feeling of patriotism and content on the part of the Royal Naval Reserve engineers-(cheers)and as it would also afford an opportunity of the naval engineer becoming acquainted with his brother of the mercantile marine, it would also promote a very desirable feeling of good fellowship-(renewed cheering). I cannot, in view of the official post I hold, discuss this matter very freely, but having observed that some prominence has been given to it of late, and notably so in a paper read before the Royal United Service Institution on May 10th, 1895, by Commander Caborne, R.N.R., I have ventured to express my personal opinion on the desirability of affording engineer officers of the Royal Naval Reserve an opportunity of becoming acquainted with the routine work and discipline of a man-of-war in time of peace, in order that they may be prepared to at once accept onerous and responsible duties if called upon to serve in the Royal Navy in time of war or sudden emergency—(cheers). Finally, I would say to our younger members, do whatever you have to do to the best of your ability. Do not be

Ѕнир.	Туре.	Load on Safety Valve, lbs. per sq. in.	Duration of Trial in hours.
Royal Sovereign Royal Arthur Sans Pareil, Sirius Pallas Resolution Cossack Mohawk Fearless Spartan Bonaventure Partridge Vulcan	Vert. Triple Vert. Triple Vert. Triple Vert. Triple Vert. Triple Vert. Triple Hor. Compound Hor. Compound Hor. Compound Vert. Triple Vert. Triple Hor. Triple	$\begin{array}{c} 155\\ 155\\ 155\\ 155\\ 155\\ 155\\ 155\\ 130\\ 130\\ 120\\ 155\\ 155\\ 145\\ 155\\ 155\\ \end{array}$	$72 \\ 72 \\ 50 \\ 64 \\ 73 \\ 48 \\ 48 \\ 48 \\ 48 \\ 72 \\ 72 \\ 48 \\ 48 \\ 48 \\ 72 \\ 72 \\ 48 \\ 48 \\ 48 \\ 72 \\ 72 \\ 48 \\ 48 \\ 48 \\ 72 \\ 72 \\ 48 \\ 48 \\ 48 \\ 48 \\ 72 \\ 72 \\ 48 \\ 48 \\ 48 \\ 48 \\ 48 \\ 48 \\ 48 \\ 4$
Buzzard	Hor. Triple	140	48

TRIAL AT MAXIMUM

CALCULATION OF HEATING

Heating surfaces calculated on the water sides, as follows :---

High Boilers :--

Tubes-between tube plates.

Furnaces-down to their centres.

Comb-Chamber—crowns and sides down to centre of wing furnaces.

Tube Plate-down to centre of furnaces.

Back-down to centres of furnaces.

(Smoke-box tube plate not included).

discouraged because what you may be doing at the present moment appears unimportant, and your ambitions do not appear to be realised. Persevere in giving of your best to all your work, and in the end you will find that all reasonable ambitions are satisfied. and if you do not become one of the apparently exceptionally fortunate ones, you will have won your own self-esteem and that of your fellow men, and there can be no higher reward-(loud cheers).

CON	TIN	00	US	PO	WER.	

I.H.P.	Heating Surface (sq. ft.)	Heating Surface per I.H.P. (sq. ft.)	Coal per I.H.P. per hour (lbs.)	Full N.D. Power.
8,180	20,034	2.44	1.84	9,000
8,821	24,828	2.81	1.85	10,000
7,051	19,980	2.83	2.23	7,500
4,555	15,918	3.29	2.03	7,000
3,620	11,109	3.06		4,500
8,085	21,178	2.61	2.1	9,000
1,435	6,836	4.76	2.51	2,200
1,998	6,836	3.42	2.7	2,200
1,888	6,439	3.41	2.46	2,100
6,777	15,918	2.34	1.96	7,000
7,083	15,600	2.2	1.76	7,000
719	2,087	2.9	2.1	700
7,236	15,868	2.19	1.86	7,200
1,232	3,892	3.1	2.4	1,400
		1 1		

SURFACES OF CYLINDRICAL BOILERS.

Low Boilers :-

Tubes as above for High Boilers.

Furnaces (

Comb-Chamber-crowns and sides down to bottom row of tubes.

Tube Plate-down to just below bottom row of tubes.

Front plate of Chamber-down to centre of furnaces.

(Smoke-box tube plate not included.)

It is now my pleasing duty to present a certificate to Mr. T. McLean, a graduate, for meritorious progress in mechanical drawing, during the session 1894-95, and also to present him with the Leslie award, a very handsome book on mechanical drawing.

Mr. McLEAN having advanced to the table, and received the certificate and book.

The PRESIDENT, addressing him, said :- I congratulate you on your excellent progress, and I hope your future will be attended with the same good progress, as in the past. In connection with this subject, the thanks of the members of the Institute are due to Mr. Newall, who has so kindly undertaken, during the past two years, to carry out the instruction in drawing, and I am sure they regret losing his services. I know you will all join with me in expressing the best good wishes for his future. As in other positions in life, Mr. Newall is to be succeeded by another gentleman who comes in to fill the breach, and we wish Mr. Brett also good luck in his undertaking. The classes will be resumed on Tuesday, October 1st, I understand, and will be continued on Tuesdays and Thursdays during the winter, with occasional lectures. on the 1st and 3rd Mondays of each month, the 2nd and 4th Mondays being devoted to papers and discussions.

Mr. G. W. MANUEL: It is now my pleasing duty to ask you to give a very hearty vote of thanks to our President, Mr. Durston, for his very able address. I am quite sure he is quite right, that we do not want to go much into figures on a night like this. At the same time, having heard the address, I think you must all feel that among the Presidents whom you have had before, you have now chosen one of the most able men that you could have as President of your Institute. I feel sure that you must all have observed this yourselves, all the more because Mr. Durston comes to us with all the practice in naval marine engineering, which a great

many of us know very little about. We students and members of the Institute of Marine Engineers want to know all we can, and we could not have a better teacher than Mr. Durston, because a teacher with his experience is one to whom we can look up. His knowledge is not mere theory, but the result of practice in modern marine engineering, gained by actual trials. He has asked you to study the question, and I think we could not have a better opportunity than under our President. I hope that when the members do take up this question of water tube boilers, or the question of advanced naval marine engineering Mr. Durston will be able to assist us, because in the mercantile marine we have done very little towards it ourselves, and as yet it has not been with very favourable results. These water tube boilers have been used in the merchant service, but it has only been in a solitary instance here and there with results which do not go to inspire general confidence. With regard to the Navy, they have gone in very largely for the water tube boilers, and there is no doubt that the matter is well thought out before a such a boiler is ever put on board one of Her Majesty's ships. I hope we may have Mr. Durston here often, and that he will assist us in the study of this question. While we have our social amusements to gratify us, study is the great aim we have before us, and I think the study of this question should be the great one before us this session. Let us go into the matter thoroughly, and thresh it out individually for ourselves, and at the end of the session I think we shall all be wiser and better men. I heartily endorse, and am very pleased at Mr. Durston's desire for a closer connection between the engineers of Her Majesty's Navy and those of the merchant service, particularly the engineers of the Royal Naval Reserve and their serving a short time on Her Majesty's vessels in time of peace. Nothing has given me greater pleasure than to hear that we have in Mr. Durston one who holds forth the right hand of fellowship to engineers of the Royal Naval Reserve, also a desire for a better preparation for their duties before being called to serve their country in a case of emergency,

which, I hope, will be met with in a proper spirit. I quite agree with him that we may be very good engineers in the mercantile marine, but there are many varieties of machinery and boilers that have been adopted in the navy, and adopted wisely, to fulfil special purposes requiring special training, and it is wonderful the results now obtained. Really, I think, as naval reserve engineers, we have a great deal to learn, and united with the experience in Her Majesty's Navy, the mercantile marine engineers will be advanced beyond previous attainments. We can already say that we have done a great deal, but there are still many things about which we are all anxious to learn. I will not say any more, but I ask you to give Mr. Durston a very hearty vote of thanks for his able, practical and kind address. He has gained our sympathies already, and I call upon you, gentlemen, to accord him a hearty vote of thanks.

The proposition was seconded by Mr. W. H. NORTHcort and adopted by acclamation.

The PRESIDENT:—Gentlemen, I sincerely thank you for the very kind way in which you have received my address. I can assure you that you have my sympathies, and it is a great pleasure to me to know that I have yours. Our friend, Mr. Manuel, like most engineers, I think I may say, is a modest man. The other night, Mr. Manuel, referring to you at the dinner, said you were not such veterans as we in the navy. Well, when I think of Mr. Manuel, with the assistance of some hundreds of you, gentlemen, taking ships from here to Australia and back, and keeping time, and more than keeping time, I do not think we need question the quality of the veterans you already possess. I beg again to thank you for the kind way in which you have received my address.



INSTITUTE OF MARINE ENGINEERS incorporated.

SESSION



1895-6.

BRISTOL CHANNEL CENTRE.

President-PROFESSOR A. C. ELLIOTT, D.Sc.

FIFTH

ANNUAL DINNER

HELD AT THE

ROYAL HOTEL, CARDIFF

On Saturday, October 19th, 1895.

PREFACE.

CARDIFF,

18th November, 1895.

The Bristol Channel Centre Fifth Annual Dinner was, without a doubt, the most successful that has been held, in point of attendance and all other respects.

The event was also notable for two reasons:—In the first place, the Centre was honoured by the presence of A. J. DURSTON, Esq., C.B., R.N. (President of the Institute) while a member of the Centre, Mr. T. W. WAILES, received, at his hands, the Denny Gold Medal, as an award for the best Paper contributed during the Session.

The following Report was furnished by the Reporter who attended the function.

GEORGE SLOGGETT,

Hon. Secretary, Bristol Channel Centre.

INSTITUTE OF MARINE ENGINEERS incorporated.



SESSION

1895-6.

BRISTOL CHANNEL CENTRE.

President-PROFESSOR A. C. ELLIOTT, D.Sc.

FIFTH ANNUAL DINNER.

The Fifth Annual Dinner of the Institute of Marine Engineers (Bristol Channel Centre) was held on October 19th, 1895, at the Royal Hotel, Cardiff. There were about 150 persons present. The gathering was presided over by PROFESSOR A. C. ELLIOTT, D. Sc., President of the Centre. The dinner was served in the Banquetting Hall of the hotel. The principal guest of the evening was MR. A. J. DURSTON, C.B., R.N. (President of the Institute of Marine Engineers). Other guests included Mr. J. M Maclean (M.P. for Cardiff); Mr. D. A. Thomas, M P. (President of the Cardiff Incorporated Chamber of Commerce); Rev. Canon C. J. Thompson, D.D. (Vicar of Cardiff); Mr. Councillor W. J. Trounce, J.P. (ex-Mayor); Professor A. W. Hughes, M.B., F.R.C.S.; Mr. Ivor James (Registrar, University of Wales): Captain Ralph Pomeroy (Dock Master, Cardiff); Captain T. H. Sloggett (Board of Trade); Mr. Councillor Ramsdale, J.P.; Mr. Jas. Adamson (Hon. Secretary, London); Mr. J. MacFarlane Gray; Dr. T. G. Macormack, M.A., M.B.; Mr. Edmund Handcock, Junr.; Mr. G. Padfield; Professor G. C. Richards, M.A.; Professor Galloway, M.E.; Mons. Paul Barbier; Mr. J. A. Jenkins, B.A. (Registrar of the University College, Cardiff); and others.

The arrangements were in the hands of the Members of Committee, who included, besides the President, Mr. David Gibson (Vice-President); Messrs. R. Davison, Jas. Ferrier, R. J. Field, John McCallum, W. Simpson, and A. E. Smithson. Representative to Council— Mr. David McCallum. Hon. Treasurer—Mr. C. L. Ryder. Hon. Secretary—Mr. George Sloggett.

TOAST LIST.

THE CHAIRMAN (President B.C.C.), proposed "The Queen."

"GOD SAVE THE QUEEN."

THE CHAIRMAN then proposed "The Prince and Princess of Wales and the Royal Family." He said for centuries the heirs to the British throne had had conferred upon them the hereditary title of Prince of Wales. The present holder of the title had endeared himself in no part of the United Kingdom more than in the Principality. He was not only the Prince of Wales, but he was a Prince in Wales. The latest guarantee of his love for the land from which he took his title, had been in his acceptance of the office of first chancellor of the newly established University of Wales.

"GOD BLESS THE PRINCE OF WALES."

COUNCILLOR RAMSDALE proposed "The Navy, Army, and Reserve Forces." He was a very sorry substitute, he said, for Mr. John Gunn, whose name was down to submit the toast. Mr. Gunn was a tower of strength in the town of Cardiff, and appreciated by every rightminded citizen. He had intended to say a word or two on the much maligned municipality of the town of Cardiff, but he left that to his friend Councillor Trounce. who was the essence of wisdom, and who had a superabundance of knowledge appertaining thereto. This toast was one which every Briton was proud to honour. The Navy had borne a noble part in the history of the country; the Army had never failed us, and the Auxiliary and Reserve forces would help us in the hour of need.

A. J. DURSTON, Esq. (the President of the Institute) who was enthusiastically greeted, regretted the causes. which had left him to respond for the whole of the toast. instead of part of it. For the army, he could only say that the recent Chitral expedition had shown that our men possessed all those qualities which the nation had ever admired. The reserve forces were made of the same good old British stuff as their brothers in the navy and the army. They had shown on many occasions in the incidents of civil life that they possessed all the necessary qualities, and that when the time came they would be quite ready to give a good account of themselves. As to the navy, although he only spoke as a non-combatant officer, he felt sure of their indulgence in referring to a subject of such national-nay, even world-wide-importance and interest as that of Her Majesty's Navy. The poet had said, he observed, "Britannia needs no bulwarks," and this sentiment should be echoed by every subject of this mighty empire. Again, "Her home is on the deep," and the realization of that idea we might safely leave to the dash and daring and high sense of duty for which our naval commanders had ever been distinguished. (Applause.) The recent enlargement of the navy had exhausted the powers of the naval training colleges and training ships to furnish the necessary addition to the personnel, and as they would have seen in last Tuesday's Gazette, many members of the mercantile marine and Royal Naval Reserve had been given commissions in Her Majesty's Navy as lieutenants, sub-lieutenants and midshipmen. The engineer branch of the navy consisted of over 800 engineers, over 2,000 artificers, and over 15,000 stokers. The entries of artificers and stokers had been very satisfactory, and came from an outside source, as usual. The ranks of the engineers had been supplemented by entries direct from engineering shops throughout the country, who had also had training in such technical colleges as that in which Professor Elliott played so important a part for South Wales and Monmouthshire. (Applause.) Then they had the marine engineers and their brother engineers of the Royal Naval Reserve to fall back

noble service to the navy. He was practically the founder of the Institute of Naval Architects. Whatever else we have to say, Parliament lost a good engineer when it lost Sir Edward Reed." With so many words, he (Dr. Macormack) commended the toast to the goodwill of the company, and coupled with it the name of a gentleman who, he believed, was a countryman of his own, Mr. J. Maclean, M.P.

MR. J. M. MACLEAN, M.P., who was heartily received, said he felt he had a very serious responsibility cast upon him in responding for both Houses of Parliament. With the House of Peers he had no personal connection, and he did not think it was at all likely he should ever have any connection. What had happened recently must have convinced everybody that the time had not come when the nation was tired of the House of Peers. (Hear, hear.) He had always maintained that, if the House of Peers did not exist already, the country would be obliged to call it into existence, if only for the purpose of providing governors for democratic colonies and husbands for American millionairesses. (Laughter.) He thought it would be generally admitted that many of the members of the House of Peers possessed other qualifications than those to command the respect and confidence of their fellowcountrymen. Nobody who had had anything to do with Parliament in the way of going there as a witness, or anything to do with the passing of Bills through both Houses of Parliament, would dissent from the opinion he expressed, that some of the best men of business in either House of Parliament were to be found in the House of Lords. They could not find better examples of such men than the peers who lived in this neighbourhood. It was very natural that this should be so, for, although some members of the nobility gave way to the temptations of their position and lived idle and luxurious lives, there had always been a large number of the members of that House who had felt keenly the responsibilities and duties of their high position. They had been trained from their youth to

the administration of great estates and a knowledge of public affairs, and they had been animated by the desire to maintain with credit the good names handed down to them, and to hand them down unsullied to posterity. Passing to the House of Commons, he felt thankful that on this occasion he was addressing a nonpolitical assembly. He had been called upon so often to return thanks as a representative of a political party for the House of Commons, not only in Cardiff, but formerly, when he was in the House, that he had sometimes felt himself in danger of falling into the vein of Alexander the Great, who after dinner "fought all his battles o'er again, and thrice he routed all his foes, and thrice he slew the slain." (Laughter.) There was nothing personal in the toast which had been proposed that evening. In fact, if he had been inclined to feel jealousy on such an occasion, he might, perhaps, have complained, in a slight degree, of the tone used by the proposer of the toast in his eulogy of the gentleman whom he had the honour to defeat at the last election. but he entirely concurred in the praises which the proposer of the toast bestowed on Sir Edward Reed. (Applause). Nobody could doubt his eminence in that profession to which he had devoted himself, and he (Mr. Maclean) had never hesitated to own his eminence in that respect. (Hear, hear.) There was a Scotch proverb that the world was made up of all sorts of people, and the same thing was true of the House of Commons. There were people representing different political parties and creeds, and there were people who belonged to one profession or another. He believed there were a good many people who had been connected in their time with the profession of journalism, and who were supposed to know every subject under the sun. (Laughter.) The House of Commons was a very important factor in public affairs. There they had the greatest legislative assembly that had ever existed on this earth. There was no legislative assembly in any other part of the world which possesses one-tenth of the power possessed by the House of Commons. Only think what a sense of responsibility rested upon them

when, by a single resolution passed by them by a majority of one, they affected the destinies of several hundred millions of human beings throughout the world. That was a thing which must weigh upon them very much, and must moderate the exuberance of their spirits, when they thought they were going to do great things for one particular party, or even for themselves. He would say this for the House of Commons, it was pre-eminently a fair assembly. Every man got a hearing there. He was listened to with respect in the first instance, and if the House found he had anythingto say it listened to him with respect afterwards; but if it found that he was simply some Boanerges of a political platform, who had come up to Westminster puffed up with his own wisdom and eloquence, the House came to the conclusion that he was a mere windbag, and walked into the lobby whenever he began to speak. (Laughter.) It had a very moderating and sobering effect on all of them to rise in that assembly to make a speech, because they were confronted with men who could take advantage of the slightest slip that they could make, and who could dissect all their arguments. He could assure them it compelled a man to think very carefully what he was going to say, and not rush into any extremes when he had to address an assembly of that kind. That was the kind of assembly for which he had the honour to respond. (Hear, hear.) Although he could not personally pretend to have any special knowledge of the engineering branch of the profession, nobody would exceed him in his desire to do anything that might be for the good of the mercantile marine and the Imperial Navy with which it was connected. He thought, in all matters affecting the Bristol Channel Centre of the Institute, the members representing this part of the world would be found only too eager to compete with one another in serving the interests of that centre. They should all do what they could to make the importance of this part of the country felt, and have its interests attended to. They were now brought nearer to London in railway travelling, and people in London were beginning to find out that

Cardiff, which was three-quarters of an hour nearer than Manchester, was not at the other end of the earth. Perhaps, in the future, they would have the interests of this great Bristol Channel—which was the centre of such an immense traffic, and which supplied most of the coal for the English Navy and mercantile marine more closely attended to when the people of London began to understand what an important centre of wealth and population Cardiff was. (Applause.)

REV. CANON THOMPSON proposed "The Institute of Marine Engineers." He was so impressed with the importance of the toast that he was aware of a little trembling in the nether limbs. Nor was this to be wondered at when he told them that he had received a visit from their Secretary, who came to coach him with regard to what he had to do that evening, and to duly impress him with the importance of the Institute. He reminded him that he was entrusted with the all-important subject of the evening, and told him he was to say this, that, and the other in proposing so important a toast. So he undertook to do what he could with the toast. It was said—he supposed it was true, but he had given the Docks a very wide berth for a long time-that shipping was very bad in Cardiff. Well, if the present company was a type of bad trade and unprosperity, so far as marine engineering was concerned, his name was not what it was. Now, he had the greatest pleasure in proposing this toast of increased prosperity to the Institute of Marine Engineers; and upon many grounds For example, if it were not for the marine engineer, they would not be able to get to Weston; and as for the Bristol Channel traffic, he should like to know where that would be? Some people, perhaps, thought that a marine engineer was a kind of amphibious person, who lived for the most part of his life, like Vulcan, in a deep cavern of the earth. That was the poetical and romantic idea which belonged to marine engineering. He had the great pleasure and privilege of listening to a lecture by "Professor" Wailes-the very lecture which had secured for him the very great credit of being decorated, as he would be that evening—so that he knew something about the science itself. To take for a moment a proper view of the objects and purposes for which this Institute was established, what part the marine engineer played in the immediate present, and what part he must play in the immediate future, was a subject deserving of every possible consideration. Scientific naval warfare of the future would be, surely, more than anything else, a matter of scientific engineering. The engineer must be the principal person, not exactly to direct, but to control and carry to a successful issue the great conflicts of the future, which he trusted might never exist, save in the region of hyperbole. But if they did descend into the lower atmosphere of fact, then the marine engineer must be the most important person to take part in such diabolical proceedings. Then, was it not of profound importance that, in every possible way, the science of marine engineering should receive the greatest possible attention, should be studied as if it were one of the most important arts associated with our modern life, and that every effort should be expended upon bringing that profession to the highest possible pitch of perfection? He believed if they were persistent in their efforts, they would not be disappointed in the attainment of that standard. They were now intimately associated with the great institution to which Cardiff, to its honour, had succeeded in giving a shelter and a home—he meant the University College. The name of Sir Edward Reed was mentioned just now-and rightly mentioned - in connection with a long and most honourable association as the representative of Cardiff, and also in connection with the great science of which they were all students. It was hardly language of exaggeration to say that Sir Edward Reed was, perhaps, one of the most accomplished naval engineers which this century had produced. He remembered Sir Edward making the statement to the British Association that our engineers, while they were capable of accomplishing almost anything on solid earth-erecting aqueducts, building roads, blasting and tunnelling through the solid rock-vet were dreadfully afraid of water. They did not like water at all. ()fcourse, he was not thinking of water as a beverage, otherwise such a sentiment would scarcely be accepted by the company present as a true one! But they were terribly afraid of water; they did not know how to deal with water; and he understood Sir Edward Reed to say that the kind of engineering which was required at the latter part of the 19th century was marine engineering. Coming from so high an authority, if that was not an inspiration for everyone present, he did not know what it was. It placed their branch of the great science at the very pinnacle and summit; and it rested with themselves to justify the statement which Sir Edward Reed ventured to make, and which he (the Rev. Canon), following after him, ventured to repeat. "The Institute of Marine Engineers" was the subject of the toast. He did not know whether, as yet, they had a local habitation as well as a name in Cardiff, but if not, it was to be hoped they would soon have one, like the Society of Architects and the Society of Civil Engineers. And if they did, they would add one more to those many institutions, illustrious alike in achievements and utility, which were fast making Cardiff a great name—one of the greatest names--in the country to which they belonged. And it was time we all addressed ourselves to this matter; because only the other day, when he was in the north, a lady, moving in a somewhat high circle, said to him-" Cardiff. Cardiff? Is not that somewhere near York?" Now, we wanted to do away with all such notions as that; and the Institute of Marine Engineers, in following up what they would doubtless adopt, would do a great deal, with other societies and institutions, to give Cardiff precisely the position in the Empire which it deserved, and which we all ought to determine it should inevitably obtain. In submitting to them "The Institute of Marine Engineers," he was going to exercise his priestly authority, and order them to honour the toast by all standing up. (Cheers.)

THE CHAIRMAN, who was received with enthusiastic applause, said, in acknowledgment of the toast, that it

was no little matter to be blessed by Canon Thompson -(laughter)-and to receive from him words of sound advice. The reverend gentleman had undertaken many works in his time for the benefit of mankind, and great had been his success—(applause)—and it was peculiarly fitting that such words as he had spoken should have fallen from him that night On former occasions, he (the Chairman) had dilated upon the Centre system, which was once peculiar to the Institute of Marine Engineers as distinguished from the Institute of Civil Engineers, the Institute of Mechanical Engineers, the Institute of Naval Architects, and the Institute of Electrical Engineers. He had prophesied that those institutions would follow their example, and they flattered themselves by saying that imitation was the sincerest flattery-(hear, hear)-for in that week's issue of engineering papers he found an announcement to the effect that the Institution of Civil Engineers' Students' Association of Yorkshire would hold their second annual dinner at Leeds at no long time, and that the chair would be taken by Sir Benjamin Baker, President of the Institute of Civil Engineers, and that all members and associate-members who could conveniently attend were expected to be present. (Hear, hear, and applause.) Centres of the Institute of Marine Engineers had been established-as they knew-at Cardiff, then Southampton and Bombay, an announcement that would be peculiarly interesting to their friend, Mr. Maclean, who still retained a great interest in Bombay, and in the affairs of the Indian Empire. (Applause.) Some time ago, well back in the history of the Bristol Channel Centre, his friend, Mr. Joseph Williams, propounded a conundrum. He asked why was the Bristol Channel Centre like the House of Lords, and the parent institute in London like the House of Commons? His answer was, because they in Cardiff read Bills that had been passed by the parent institute. But during the last and the previous session they had reversed all that. (Hear, hear, and laughter.) Cardiff had become the House of Commons, and, to a large extent, the parent institute in London had become the House of Lords,

because they had, in a large measure, been busily engaged in reading Bills, or Papers, that had been sent up from Cardiff. (Applause.) One of these Bills was so good that it had been adjudged the best Paper of the session, and been awarded the Denny Gold Medal-a paper read by a member of the Bristol Channel Centre. (Renewed applause.) The success of a technical or scientific institute depended in a considerable measure upon the President. The older institutions had castiron rules and traditions; and it frequently happened in these institutions that young men, comparatively young men, who had done great service to their profession, who had risen above the shoulders even of their elders. by the accidents of life and sometimes by death itself. were cut off before their names were even mentioned in connection with the presidential chair. In the Institute of Marine Engineers they pursued a different system. Their presidents were chosen simply for their professional standing. This had been of no small advantage to them. They had had Asplan Beldam, Lord Kelvin, George Manuel, Dr. Denny, Sir Thos. Sutherland, and Sir William White, whose magnificent work was written in steel in the annals of the Navy. the designer of what was practically a new fleet of battleships, and fighting craft of all descriptions. They sympathised with Sir William White in his indisposition, which they were delighted to know from Mr. Durston was likely to be only temporary. (Applause.) Now they had Mr. Durston, the Engineer-in-Chief of the Royal Navy. (Applause.) In addition to Mr. Durston's great duty as an executive officer, he had laid upon his shoulders the design, execution, and the working of those mighty engines, that mighty machinery which had to put life into the creations of Sir William White. Mr. Durston had discharged that duty to the satisfaction of his colleagues at the Admiralty, to the satisfaction of the Houses of Parliament, to the satisfaction of the country at large, and to the satisfaction of his professional brethren. (Applause.) It was a noble duty. The Institute was proud of its nobly discharged. President. (Applause.) He should like to say one

word about Mr. Durston's presidential address. The presidential address, which, of all others, had attracted the most attention, was written in the thick of his arduous and responsible work. But it appealed to engineers because it was written in the thick of a great work. (Hear, hear.) It was written by an engineer for engineers. Clear statements, clear conclusions--it was the ideal of an engineer's document. (Applause.) In conclusion, he desired to say a word of welcome to the visitors, and, in the name of the Institute, to thank them for their presence, and for their support of a movement which they hoped to make as wide as the limits of the Empire, because they desired to live to see the day when engineers sailing in all parts of the world would acknowledge allegiance to the Institute of Marine Engineers, and salute their brothers as members thereof. (Applause.) He thanked the company for the hearty way in which they had responded to the toast, which he took to be a happy augury of the future of the Bristol Channel Centre and the Institute in general. (Loud applause.)

MR. JAMES ADAMSON (Hon. Sec.) said he considered the Institute of Marine Engineers highly favoured in respect of its public appearances during the present session. First, in that at the Annual Dinner, held in London last month, the toast of the evening was proposed and received amid thoughts connected with a glance from the sword of war and the noble aspirations called forth by the names of heroes who have made their lives memorable on the pages of our national history, not only for the work they had done, but for the principles underlying it, not for the carnage they had wrought, but for the greater misery they had prevented. Science was, and had been, the handmaid of war, and it was becoming that an acknowledgment of indebtedness be made ere the time comes when the service should be reversed, and in place of the "Science of War," we should speak of the "War of Science." When, indeed, the policy of the individual, as of the State, should be constructive rather than destructive.

Second, in that their President, whom they were delighted to have with them to-night, was the head of the Engineer Department of the Navy, and held a position which would add eclat to any society of engineers with which he might be connected, more especially a society of marine engineers. (Applause.) The attention given by the technical press to his inaugural address showed the esteem in which he was held, and the importance attached to his utterances. Third. in that that evening they were honoured by a gleam from the sword of peace, and illuminated by the rays of light proceeding therefrom, urging them to nobler attainments in the future than even they had dreamed of in If the sword of war pointed them to noble the past. aspirations, that of peace pointed them to the most noble of all, and if the auspices of the former be good, those of the latter are better than the best they could conceive. (Applause.) Science was the handmaid of Peace no less than of War, yet some of the professed exponents of science had bid defiance to the Man of Peace, decrying dogmatism with one breath and claiming it with the next; forgetting, amid their splendid but human intelligence, that the sum of knowledge is more boundless than the ocean, and the reachings of intelligence more limitless than the space of our imagination, and the struggling towards knowledge and intelligence was as the struggling of the finite towards the infinite. Did we not often find that the heterodoxy of one age became the orthodoxy of the next? The lessons set before them, in contemplating the ideas conveved by these three points alone, were of the highest moment to them in connection with their progress and advancement as a body and their prestige as an institute. The foundation of the Institute rested (Applause.) upon this basis, and bore upon its corner stones the principle that knowledge was an ever-increasing quantity, added to by thoughtful experience, and that the sum of many experiences may be reckoned up for the advancement, not of one only, but of the many. Time forbade that he should enlarge upon their aims and aspirations, their hopes and fears, their nobility of purpose and their freedom from the trammels which warped the judgment and impaired the intelligence; but he would suffer the portals of his lips to open while he said that such views were before them, and, reaching forth towards them, might the Institute progress and go on, preserving itself from the small-mindedness which tends to mediocrity and fossilization, and pressing forward to the higher attainments of which it is capable. He thanked them, in the name of the Institute, for the good wishes expressed, and for the hospitable welcome accorded to the toast. (Applause).

PRESENTATION OF THE DENNY MEDAL.

MR. A. J. DURSTON then proceeded to the ceremony of presenting Mr. T. W. Wailes with the Denny Gold Medal. He said he felt it a great honour to have been requested to present, on behalf of the Institute of Marine Engineers, the Denny Gold Medal to Mr. Wailes for his very able and interesting paper on "Raising Wrecks and Sunken Vessels." The matter was no less interesting by reason of the fact that this was the first occasion upon which the medal had been presented to a member of the Institute in Britain. This circumstance must be very gratifying to them. as showing the great progress of the Bristol Channel Centre, seen in the fact that a member of their Centre had been the first to obtain this medal; and it seemed -- if they would allow him to say so-as if they intended to keep it in this quarter of the Kingdom. There appeared to be every evidence that the members of the Centre were working shoulder to shoulder to help forward the good work of the Institute of Marine Engineers. On behalf of the Institute he wished Mr. Wailes many years' possession of this valuable testimonial, and hoped he might go forward to further successes.

The presentation was made amid cordial cheering.

In acknowledging acceptance of the medal, MR. T. W. WAILES expressed his regret that his command of the English language did not permit him to adequately express his feelings. He thanked them from the bottom of his heart for the hearty reception they had extended to him. He was bound to confess that if it had not been for the spurring on of Dr. Elliott and Mr. Sloggett, the paper might never have been written. They it was who persistently urged him to write a paper for the Institute; and when he at last consented to do so, he felt he had made a mistake. However, his motto was, whatever he undertook to do, to do it thoroughly, and never half-heartedly. As to the merits of the paper, he had not assumed the rôle of prophet; he had prophesied nothing. He had only told them what he had been connected with, what he had seen done, and what he had helped to do; and he only hoped that the little endeavour he had made, and which had gained this medal, would result in the vounger members of the Institute being spurred on to greater efforts to become masters of any matter they took in hand, and to successfully surmount all obstacles in their way. One result of the Denny Medal coming to Wales, which he hoped would follow, was that marine engineers who stood aloof from the Institute would rally round it, and help to make it one of the most brilliant Societies in the country. He knew they had members all over the world; and he trusted they would always be proud of their Institute. There was one point upon which he should like to touch. In a time of war, or in the event of casualty to the ships of H.M. Navy, were they in a position, at the present moment, to send out the best salvage appliance? He contended that the British, being the greatest naval and mercantile service in the world, should possess the most modern and powerful and adequate salvage appliances. More than that: there ought to be some means of affording tuition to ships' officers. This could not be altogether obtained on paper, and he suggested that whenever a vessel stranded upon our coasts, officers should be sent to see how that vessel was raised, see what was done, and report to head quarters in London. Then gentlemen occupying distinguished posts in the navy should be required to pass an examination in practical salvage work. He again thanked the company for the honour done him.

PROFESSOR RICHARDS gave "The Municipality of Cardiff." He said when he looked upon the enormous progress which that town had made, he asked himself, could this progress have been so great without owing much to the wisdom of its rulers? As a matter of fact. it was utterly impossible for the town to have progressed to the extent that it had done had it not been wisely governed. There was scarcely a society or an association of any note which did not want to come to Cardiff, because it knew it would be well received and sumptuously regaled; and the Corporation had amply sustained the reputation of the town. Speaking as one connected with the University College of South Wales, he could say there could not be a Corporation within the limits of the United Kingdom which had shown so deep and abiding an interest in educational matters as that of Cardiff. Throughout the history of that College, the Cardiff Corporation had been the best friend that Institution had had; and it might be relied upon that it would continue its best friend. No town could look with greater pride upon the establishment of a great Technical School, and upon the number of students obtaining benefits under that system.

COUNCILLOR W. J. TROUNCE responded to the toast, observing that Cardiff was making more rapid strides, commercially and intellectually, than any town in the Kingdom.

PROFESSOR GALLOWAY proposed "The Ports and Trade of the Bristol Channel." He mentioned that last year the export of coal from the Port of Cardiff including Barry and Penarth—amounted to the immense quantity of 15,000,000 tons.

MR. D. A. THOMAS, M.P., Chairman of the Cardiff Incorporated Chamber of Commerce, replied to the toast. He said at that late hour he would be best consulting their wishes by making his remarks as brief as possible. Indeed, he felt disposed to move that the debate be now adjourned. He did not know that he could present the condition of the staple trade of Cardiff to them in a very rosy hue; but, for his own part, he entertained a very hopeful view of the future, and he believed that view was shared very largely by those who were most competent to express a judgment upon it. Every trade barometer was rising, every trade index was pointing to better times—the railway returns, Board of Trade returns, and revenue returns; and it could not be long before the district participated in the good times which were evidently being enjoyed in other places.

CAPTAIN POMEROY, Dockmaster, Cardiff, also briefly acknowledged the toast.

"The University College of South Wales and Monmouthshire" was submitted by Mr. J. McFARLANE GRAY, who said they were asked to honour this toast because the Centre had its rooms at the College. It was peculiarly appropriate that the engineers should hold their meetings there; it was a contact of theory and practice. (Hear, hear.) The theoretical and practical men were becoming more closely associated. Engineers sometimes said theory was wrong, but it could never be wrong. When men began to look at the world and behold the wonderful things in it, they asked themselves-"How does all this come about ?" What were they looking for? They were looking for a theory. and they came to say-"All things are of God." Theos; and Theos was the theory of the Universe. The theory of anything was the bit of God that was in it; and this could never be wrong. Education was nowhere better described than in the old Jewish Book which told us that if the axe be blunt, and we did not set an edge there, we must put forth more strength. It was the same with knowledge. There were schools where axes were ground in an ordinary way, but at University Colleges axes were given the temper of attainment and the sharpness of resource. The University College at Cardiff was doing very good work; and their thanks were especially due to Principal Jones-(applause)-

who was one of the greatest scientists of the day. What was a most exact determination of the *ohm* had been made by Principal Jones; and it was regarded as such all over the world. (Applause.) He strongly urged all young engineers to lay up a store of knowledge. Their greatest wealth was not what they put in their pockets, but what they put in their heads. (Applause.)

PROFESSOR HUGHES responded. He expressed his regret that the response was not represented by Principal Viriamu Jones, because no man in the whole principality had done more to knit together the technical and the general instruction given in their University Colleges. He was gratified to know of the great sympathy which existed between the University College of South Wales and the Bristol Channel Centre of the Institute of Marine Engineers. This toast would become more important year by year, especially now that they had not only a University College in South Wales, but a University of Wales which granted degrees in engineering.

MR. EDMUND HANDCOCK, JUNR., proposed the health of the Chairman, to whom, he said, the success of the Bristol Channel Centre was so largely due.

THE CHAIRMAN, in returning thanks, submitted the health of the President of the Institute.

MR. A. J. DURSTON, in acknowledgment, said his position as president of the Institute had been a very pleasant one, and its duties extremely light. They, the members, were men who knew what was wanted, and did it for themselves. It was not the work that he himself was privileged to do for which he was thankful, but the work performed by his brother officers was that to which he considered he was indebted for their kind and hearty reception. The work was most interesting; but the man who was at the head of it was too apt to get most of the credit. He felt it a great compliment to have been elected their president for the year.

The proceedings shortly afterwards terminated.

INSTITUTE OF MARINE ENGINEERS INCORPORATED.

SESSION



1895-6.

SOUTHAMPTON CENTRE.

President-C. S. DU SAUTOY, ESQ.

ANNUAL DINNER

HELD AT THE

MASONIC HALL, SOUTHAMPTON

On Tuesday, November 26th, 1895.

PREFACE.

THE ARTS' SOCIETY HALL,

ABOVE BAR, SOUTHAMPTON,

30th December, 1895.

The Second Dinner in connection with the Southampton Centre of the Institute of Marine Engineers was held in the Masonic Hall, Southampton, on Tuesday evening, November 26th, presided over by A. J. DURSTON, Esq., C.B., R.N. (President of the Institute).

J. GRIFFITHS,

Hon. Local Secretary.

INSTITUTE OF MARINE ENGINEERS incorporated.



SESSION

1895-6!.

SOUTHAMPTON CENTRE.

President :-- C. S. DU SAUTOY, Esq.

ANNUAL DINNER.

The Annual Dinner of the Southampton Centre of the Institute of Marine Engineers was held at the Masonic Hall, Southampton, on Tuesday evening, November 26th, 1895. A. J. Durston, Esq., C.B., Engineerin-Chief, of the Royal Navy, and the President of the Institute for the year, in the Chair. The company included Mr. C. S. Du Sautoy (President of the Centre), Mr. H. Wilding (Manager, American Line), the Rev. J. K. Mellis (Chaplain, Seamen's Mission), and Messrs. A. J. Day (Day, Summers & Co.), J. Griffiths (local Hon. Sec.), John Clark (Southampton Dock Company), Dayer (Board of Trade), J. P. Lungley (Union Steamship Company), A. Beldam (first President of the Institute, London), H. E. Du Sautoy, J. Scott, A. Crichton, M'Gregor, Captain Shiel, Messrs. Atkinson, Day, jun., Hindmarsh, Mollett, Kydd, Barr, J. Slater, A. Brown, Willey, A. Napier, C. W. Murray, A. G. Liston, G. Cutler, Macintosh, Paterson, Peskett, H. Forbes, Parry, Leevers, R. Beldam, Hughesdon, and others. Mr. Steele, R.N. (Board of Trade), and Mr. H. P. Arthur (Superintendent Engineer, Royal Mail Steam Packet Company), occupied the Vice-Chairs. Dinner over, the Chairman proposed the loyal toasts, which were duly honoured.

TOAST .. "THE ARMY, NAVY, AND RESERVE FORCES."

Mr. A. J. DAY (Vice-President): I give you this evening the toast which I proposed last year at the Inaugural Dinner of the Southampton Centre; it is the Army, Navy and Reserve Forces to which I refer. At the time there was a strong feeling throughout the country as to the urgent necessity of increasing the strength of our Navy. Fortunately, both political parties were then of the same opinion as to the country. and no difficulty was experienced in getting the necessary Since last year some very powerful money voted. additions have been made to the Navy, and there are now in course of construction some of the finest war vessels the world has ever seen. It is satisfactory to know that the present Government intend to follow the policy of their predecessors. Lord Salisbury said last week that the first duty of any Government was to take care of the naval defences of England, and I am sure every Englishman will agree with that. It was a question some years ago, having got the ships, how were they going to man them; but if any difficulty arises on that account, Government will have to fall back upon that successful cradle of navigation and marine engineering -the mercantile marine. It is hoped that the recent changes made in the Army administration will tend in the direction of improvement and efficiency. It is most gratifying to see the references which have been made recently to the Reserves, and particularly to the efficiency of the Volunteers. I couple this toast with the name of Mr. L. Steele, R.N.

Mr. L. STEEL, R.N. (Vice-President): Hon. Chairman and gentlemen—It seems to me a matter of regret that the duty of responding to such a comprehensive toast has not been entrusted to one more competent to do it justice than I am; however, having been connected with the Navy for a goodly number of years, I have much pleasure in responding to the toast, though do so with some diffidence, for, having retired from the Navy for twenty years, it is more than probable many of you

are more conversant with the subject than I am myself, however, I will endeavour to acquit myself of the duty imposed on me in a very few remarks, which I trust may not be too critically considered on an occasion such as the present. It is at all times pleasing to note the lively interest which not only Parliament but the country at large takes in the efficiency of the Navy -our first line of defence-for we know there have been times when the vast interests of the service have not unfrequently been committed to those to whom party considerations seem to be of almost primary import, but this has now, to a great extent, been altered, to the great satisfaction of everyone who takes an interest in the welfare and prestige of our country; and we now find that in another place the debates on the efficiency of the service are, to a great extent, lifted beyond the regions of party politics, and become a consideration of the greatest moment to every patriotic man wherever the English tongue is spoken; and those ministers who are responsible to the country for the proper maintenance of the Navy have thus a mandate, so to speak, to uphold and maintain our naval supremacy inviolate and up to date, which means, I take it, that we must be able to hold our own and to spare against any two combined fleets of Europe (a large order, no doubt), but when we come to consider that this country in the glorious days of old has been victorious against even stronger combinations, I think John Bull has only to put his shoulder to the wheel to do the same again and be successful, for we have no doubt but that the patriotic spirit which actuated our naval heroes in days gone by will ever be reflected in its fullest splendour by those to whom we have committed our very existence as mistress of the seas, and by everyone who delights in the past, and no doubt the future, glory of our Navy. It has been stated we have the ships, men, and money too, though naval men of high position say, that in the event of war being imposed upon us, we could not get trained men in sufficient numbers to man the additional ships which would be required to be put in commission, and when we consider that it takes a considerable time

to qualify a man for the duties required of him in the various types of vessels which compose our fleet, there would seem to be grounds for this assertion. However, be this as it may, we doubt not but that the Admiralty would be empowered to devise some scheme whereby to get the men. It is very gratifying to know that in every department of the service we have got most efficient and highly trained officers, on whom we can safely rely in any emergency for faithfully discharging the duties entrusted to them, though to the general reading public these duties are but very imperfectly understood. Those who are conversant with their engrossing attention do accord their high appreciation of the courage, skill and ability, and self-sacrifice which actuates them in maintaining the honour of their profession as British naval officers. Under the ordinary conditions of life in the service, I think we must admit that our confrères in the Navy have disadvantages compared with several of its branches, but when we come to consider the responsibility of having some fifty boilers of exceptional type, and heaven knows how many sets of engines, we are at once convinced that these disadvantages must be greatly magnified, and we cannot help thinking, I say it advisedly, that the status of the engineer does not seem to be commensurate with his responsibility. As I have said before, our officers are highly trained, and under the most varied conditions, still, with all this training we know that a vast amount of confidence is required to enable the staff to grasp the situation; but as our worthy Chairman is quite au fait on this matter, and has the interest of the profession at heart, we have no doubt he always says a kind word when he can.

As to the Army, I am not at all conversant with its requirements, but this we all must acknowledge, that our soldiers in every clime and under any conditions maintain and uphold the noble inheritance bequeathed to them by that distinguished army of heroes who have made the name of Great Britain honoured and revered all the world over; and we know that if the country does its duty fairly to our soldiers, Tommy Atkins will never disgrace that often tattered but unstained banner, which in all cases accompanies them to victory.

As to the Reserve Forces, we have only to look through the mercantile navy list to find out the thousands of tons of shipping which could be made available for war purposes in the event of these ships being required; and as the country places the most implicit confidence in the patriotism of their officers and crew, we entertain no doubt whatever that they would be able to give a good account of themselves when carrying out the duties that would devolve upon them in the event of war being forced upon us. With these remarks, I beg to thank you for the honour you have done me in coupling my name with the toast.

TOAST ... "THE CHAIRMAN."

Mr. L. STEELE, R.N.: Gentlemen-I have the honour to propose the next toast, and I feel it is one which will be received with the greatest enthusiasm by every member of this meeting, our much esteemed Chairman, whom not only the Institute of Marine Engineers, but kindred institutions, delight to honour. It is a very trite saying, "Tell me what a man's associates are, and I will tell you what thet man is," and we need no greater test of what our worthy Chairman is, when we find him honoured to fill the high office of Engineer-in-Chief of the Navy, the blue ribbon of his profession in the service, and for which he has also been honoured by having the ribbon of the Bath conferred upon him, then again we find him specially honoured by the Institute of Civil Engineers, of which he is a prominent member; still more, he is on the Council of the Institute of Naval Architects, of which he has long been an active member, and last, though, perhaps, not least, he is the honoured President for the year of the Institute of Marine Engineers. I need not say, gentlemen, how highly honoured we felt in having had last year Sir William White, K.C.B., the Chief Constructor of the Navy, for our Chairman, but,

if possible, we still feel more highly honoured in having the Engineer-in-Chief of the Navy for our President, he being more immediately in touch with our profession. We trust he may long be spared to carry out the duties of his high office at the Admiralty, and when the time has arrived for the retirement he has alluded to, we trust that the fact of his having been President of this Institute may afford him happy recollections when smoking his pipe of peace in the bosom of his family. I would here state, with some degree of reservation, that the high office he now holds being untrammelled by politics, we are confident he will recognise there is a common duty to every loyal and dutiful citizen to do the best he can to the best of his judgment and ability, and promote the best interests of those with whom he is immediately connected in the service. Gentlemen, I ask you to rise and pledge our worthy Chaiman's health in a bumper.

The PRESIDENT duly acknowledged the compliment in a few appropriate words.

TOAST ... "THE SHIPPING INTEREST."

Mr. A. BELDAM (Past President, London), proposing "The Shipping Interest," said-This interest is a rather difficult problem just now, where there is any interest at all. There are a great many reasons and complications which give rise to low freights. One main reason is the over-production of tonnage. More steamers are built than the trade of the country warrants, with the result that many competitors in the race for freight lower the rates below remunerative prices, in order to keep their vessels going; while such rapid strides are made in marine engineering that steamers become of an obsolete type before they have served their owners long enough to be written down in value, to meet the heavier expenses of running. It will be understood by this assembly the depreciation in value which a steamer suffers is much greater now than formerly, which is due to the improvements that have been introduced in the more recent types of machinery, and the modifications

in the vessels themselves, in order to obtain greater economy and more carrying power for weight and measurement; all this, however, depreciates the value of steamers built only six or seven years ago to such an extent that the shipowner finds it impossible to write off sufficient each year to cover the great expenses arising out of keen competition. The outlook may be dull, but I give you this toast, hoping and wishing for better times and greater success to the shipping interests. I couple the toast with the name of a well-known gentleman, Mr. Wilding.

Mr. H. WILDING (Manager, American Line of Steamers): The shipping interest does not feel quite so gloomy as Mr. Beldam has suggested. It feels it is on the upward turn, and the outlook is not quite so melancholy as it was a little while ago. No one connected with the shipping interest, and has the welfare of that interest at heart, could be but in full sympathy with an organisation such as the Institute of Marine Engineers. The fact is, the shipping interest and marine engineering are inseparably connected; they become more and more mixed, and I do not think it is a very long flight of imagination to look forward to the time when an engineering education will be considered an essential to any man who has either to build a ship or to command it. The shipping interest is rapidly growing into an engineering interest; the craft that sail the ocean are ships no longer, but are huge machines. and their construction a matter of engineering from first to last. Pretty well everything in a ship has to be done by machinery, and we have nearly arrived at the time when even the firemen when he wants to come on deck will ask to be brought there by machinery. The shipping interest is compelled to be in sympathy with an institution like the Institute of Marine Engineers, which has for its object the making of better engineers In one respect engineers show, in its very best form, the trait of resourcefulness in untoward circumstances-circumstances which have to be dealt with promptly, and with nothing like the appliances

they would have at their command on shore. They adapted themselves to circumstances, and accomplished things that were a surprise to everybody, and, indeed, things that sometimes appeared to be superhuman. Mr. Beldam has spoken of the rapid development of the science of marine engineering which rendered obsolete, in the course of a few years, a ship, which in type of construction and in her engines was considered perfection at the time she was built. That is just the worry of those responsible for building ships, and for ship management. But it is, after all, a very hopeful sign, for it is an indication of that spirit of Englishmen always to go one better; it is a spirit which has kept England to the front for many years, and will, I believe, keep her to the front still. As soon as other countries come up to our level, then we go ahead again, and keep ahead. The other side of the question, however, is this-and you will excuse me if I may for a moment appear to criticise your professionthat whilst the men at the head of the profession are constantly developing it and bringing out new appliances, there is a long string of men who do not keep themselves level with the front rank, and who, when new productions are put into operation, are not prepared to make the best of them. An organization like the Institute of Marine Engineers helps forward the younger engineers to attain front rank in adaptability to the new circumstances of their profession. At the present time your President is carrying out a great experiment in the shape of water tube boilers; I believe that experiment will be a success, and if it should prove so, it will make as great a change in engineering in this country as compound engines did, and all those who who hear me know what that means. The younger men, then, have to keep themselves level with the President, and when he and those like him develop new thoughts, and shipowners are found who are sufficiently venturesome to put them into practice, they should see to it that they are prepared to do everything that falls to their hands to do.
TOAST ... "THE INSTITUTE OF MARINE ENGINEERS.

Mr. A. BELDAM (Past-President): In the absence of Mr. John Dixon, Superintendent of Southampton Docks, it falls to me to propose "Success to the Institute of Marine Engineers." It may be of interest to you to know the origin of the Institute. It was on a very cold winter's night, in the year 1888, that some score or so of marine engineers met at Stratford, in response to a circular, to consider if they could not form some kind of institute where they might have papers read and discuss matters of practical interest to the profession. They resolved to form the Institute, and, to my surprise, I received, within a post or two, a letter, asking me to be its first president. I knew the Institute was a step in the right direction and gladly accepted the office. They then called a public meeting, in February, 1889, when the first paper was read, and from eighty to one hundred members joined within a year. The committee which was formed, and whose names were identified with the Institute from its inception, as will be seen on record in the first volume of the Transactions, worked very hard till they got the Institute incorporated by the Board of Trade within the first year of its commencement, a feat which I believe to be unprecedented, as I am not aware of another exception. It has gone on growing, and has been honoured with having as Presidents such men as Mr. Manuel, Dr. Denny, Lord Kelvin, Dr. White (the Chief Constructor), Sir Thomas Sutherland, and our present excellent Chairman, The Institute owes much to the Mr. Durston. Committee and the Honorary Secretary, Mr. Adamson, who has been the moving spirit in it, and from whom a telegram has just been received, saying how sorry he is he could not be present to-night. The Institute has two centres-one at Cardiff and the other at Southampton-and the number of members is now nearing 1,000. Many of the papers read at the meetings are worthy of the Institute of Naval Architects or the Society of Mechanical Engineers, and enthusiastic discussions take place. We are proud to have as President so distinguished a man as Mr. Durston, whose name I couple with the toast.

The PRESIDENT, who was heartily received, said he thanked them very much for their kind references to himself and his work. In regard to what had been stated, he would say, wait till the work was accomplished and it had shown what it was worth. He hoped and trusted it would be successful, but he attributed their selection of him as President to a recognition of his work done in the past, and he did not wish to take it in any degree as a recognition of work which was in hand at the present moment. All he could say of that was that his brother officers were with him in the matter, and if honest endeavour and their best abilities could command success, success was assured. Having spoken of the modesty of Mr. Beldam in not referring to his own services to the Institute, and of the great debt of gratitude the Institute owed to Mr. Adamson, the Honorary Secretary, the President went on to refer to the status of engineers in the Royal Navy. a point which had been raised by Mr. Steele. He said that in the last year, commencing with the 1st of April this year—the resolution had only just taken the shape of hard cash—£9,000 had been devoted towards the improvement of the pay of the senior engineers of Her Majesty's Fleet. It was represented to their Lordships, and was felt and acknowledged by them, that the responsibilities of senior engineers, at least on board ship, did not meet with proportionate recompense when compared with the officers of the other civil branches of the Navy, and the consequence was the sum of money he had named was voted. He pointed out that this gave senior engineers, who otherwise could have retired on £400 a year at fifty years of age, but being called on to serve till fifty-five had been receiving nothing extra, £450 a year. He also spoke of the abolition of certain mess grievances affecting the engineering branch of the service, and said he hoped similar improvements would be introduced into the mercantile marinefor the results would be beneficial, not to engineers alone, but to those whom they served also.

TOAST ... "THE SOUTHAMPTON CENTRE."

The PRESIDENT: It gives me great pleasure to

propose the toast, "Success to the Southampton Centre of the Institute of Marine Engineers." My recollection does not cover such an extended period as those of your friend, Mr. Archibald Thomson, whose entertaining and instructive reminiscenses of Southampton formed such an agreeable episode at the dinner held last year to inaugurate this centre of the Institute. Mr. Thomson traced the growth of the port from what might almost be termed prehistoric times, so far as steam navigation was concerned. I can only go back to those early days of prosperity when the P. and O., the Royal Mail, and the Union Steamship Companies were monarchs of all they surveyed, not only at Southampton, but all along their lines of route. A passenger then was not conveyed to Hong Kong, the West Indies, or the Cape for the simple cost of his food, and if one were to name the annual salaries paid to chief engineers of mail steamers in those days, some of the gentlemen present might possibly think they had been born too late in the century. Men competent to take charge of the machinery of a mail steamer were not so numerous in those early days as they are at present, and they commanded good salaries both at home and abroad. A great deal of my professional life has been passed at Portsmouth, where I served my time under Mr. Andrew Murray, whose brother was for many years chief marine surveyor of the Port of Southampton. From 1883 to 1887 I was Chief Engineer of Portsmouth Dockyard, and thus had opportunities of becoming acquainted with the state of affairs at the neighbouring port of South-The natural advantages of the place as a ampton. commercial port were patent to everybody, and the London and South Western Company, by acquiring the docks, and by their energetic management, had developed the natural advantages of the port to a remarkable extent. All this must act powerfully to attract other Atlantic passenger lines, and it will probably be only a question of time for Southampton to become the only port of departure for the American mails, with at least one first-class steamer leaving daily for New York, and one arriving from that port.

Referring to the transfer of the Indian troop service from Portsmouth to Southampton, so far as human foresight can enable one to form an opinion, the prosperity of Southampton is assured, and it will become the premier passenger port of the near future. The taste for travelling, so wonderfully developed and increased of late years by the improvements in the bicycle, by which - as stated by Sir Benjamin Baker, in his inaugural address as President to the Institution of Civil Engineers—the power of the human being for locomotion has been quadrupled, will lead to a greater demand for ocean-crossing facilities, and, consequently, the increased prosperity of Southampton. How these increased facilities are to be met, and by whom provided, is a question of interest to the members of this Centre of the Institute. The growth of the Centre should naturally follow the growth of the port. The engineers of the first-class steamships leaving or arriving at Southampton, or making it a port of call, are among the elite of sea-going marine engineers, and, with such an extended field of possible members, combined with energy and perseverance on the part of the officers (and in these respects the Southampton Centre appears to be peculiarly fortunate), the future of the Institute should be assured. That the many social and intellectual advantages it offers are appreciated should be shown by an ever-increasing list. Our American cousins, or brother engineers of our own or other nationalities, will receive a hearty welcome. The days of shyness or coyness in communicating experiences are, or should be, of the past, like the devices of our old mechanics to hide pins and other connections, so that a stranger should have a difficulty in taking machinery to pieces for examination or repair. Nothing can be lost by interchanging experiences, and much may be learned by doing so. In this way we may add our little portion to render life more enjoyable and war less possible. I have referred to the development of human power by improvements in the cycle, and said that increased facilities would be demanded for ocean travelling. It appears to me that any increased facilities must largely

come from further improvements in the propelling machinery of our ships, or their motive power, whereby we might obtain the same power with a reduced number of men and a reduced consumption of fuel, and I will suggest to you, as I did to the members of the Institute in London, that you, as marine engineers, from observation at sea, must indicate to the designers on land the direction in which such necessary improvements might take place. The present system of supplying fuel to the boiler furnaces, and of firing the latter, leave much to be desired. And now there is one other subject on which I should like to offer a few remarks. An adequate supply of Royal Naval Reserve officers, to provide for the requirements of the Navy, in case of war or other sudden emergency, is a matter of the highest national importance, and of particular interest to members of this Institute. It will be seen by the statement of the First Lord of the Admiralty, explanatory of the Navy Estimates, 1895-6, that an increase in the number of Royal Naval Reserve Engineer Officers and some modifications of the terms of their engagements were subjects that their Lordships had under consideration. Since my connection with the Institute I have learnt the views of many mercantile marine engineers with regard to the relationship existing between the engineer officers. of the Royal Naval Reserve and those of the Royal Navy. There appears to be a general consensus of opinion that a closer relationship should exist, and that an opportunity should be given to the Royal Naval Reserve engineer officers to serve with the fleet, on terms similar to those applied to executive officers of the Royal Naval Reserve. This question has been much discussed by interested bodies and individuals at various times. It has hitherto been accepted by the Admiralty that, as the work of engineer officers of the Reserve, in their ordinary avocations, is to a great extent similar to that which they would be required to perform if called out by Royal Proclamation, there is no necessity for special naval training, as in the case of executive officers. As an inducement to mercantile marine engineers to enrol themselves as engineer officers

in the Reserve, specially high rates of pay are established as compared with the corresponding ranks in the Navy, whereas the executive officers, if called out, would only receive the same pay and allowances as the corresponding ranks in the Navy. The latter, however, have the privilege of serving for a year with the fleet, and become entitled, under certain conditions as to drill, &c., to a yearly subsidy during the remainder of their service as officers of the Royal Naval Reserve. There appears to me to be a growing desire among Royal Naval Reserve engineer officers to come into closer touch with the Navy than mere enrolment affords them an opportunity of doing, and there does not appear to be any insuperable objection to their receiving naval training on similar lines to those of the executive officers. Although the ordinary duties of an engineer of the mercantile marine might qualify him to keep watch in the engine room of a man of war, or to make good any defects that might arise with the propelling machinery, yet there is much war machinery of special type, such as locomotive torpedoes and hydraulic gun mountings, with which the Royal Naval Reserve engineer can have no acquaintance unless by training in the Navy. There is also the routine of the engine department of a man of war to be acquired, and the spirit of naval discipline and command to be developed. There are thus obvious reasons that can be advanced in support of the desirability of a naval training for engineer officers of the Reserve. Such a system has already been tried with the firemen, to the mutual advantage of both fleets. As Engineer-in-Chief of the Royal Navy, I cannot, of course, discuss the matter very freely, but I might be permitted to say personally that I shall welcome any change in the regulations that will tend to still further induce the best of the younger members of the Institute to enrol themselves as Royal Naval Reserve Engineers, and also to bring them, when enrolled, into closer relationship with their brethren of the Royal Navy.

MR. C. S. DU SAUTOY, R.N.R. (President, Southampton Centre): The Centre is likely, in the near future, to be a very strong one. In the year, or rather, in the year and a half that has elapsed since our inaugural dinner, much progress has been made towards establishing it on a firm basis. Through the influence of our honorary member, Mr. John Dixon, we have obtained, at a moderate rental, most excellent rooms for the use of the Institute during the winter months. These rooms have been furnished, and will be open every week evening except Saturday. During the past session all the meetings were held there. Next in importance to the rooms is the formation of a Scientific Reference Library, and a special fund is started for that purpose. With Mr. Steele as honorary treasurer, that fund has progressed very favourably. and a large number of the most modern scientific works in connection with the engineering profession have been purchased. The honorary treasurer has a goodly sum in hand, with which other books will be purchased shortly, and the committee will be glad to receive any modern useful work that any member would like to present to them. While dwelling upon the advantages of the Institute to the members, I also refer to the rules under which young men may be admitted as graduates and associates, and we hope the president and office-bearers of the head Centre are satisfied with the progress being made by their off shoot at Southampton. We were making progress, and we hope that when we next assemble round the festive board we shall have further progress to record.

Mr. C. MURRAY (Member): Mr. President and gentlemen—The toast which has been entrusted to me is one which I am sure you will very heartily support. Our "Visitors," by their presence with us to-night, express in a practical way their interest in, and sympathy with the principles and aims of the Institute of Marine Engineers. We appreciate this kindly feeling and thank them for it. I therefore, propose the health of "The Visitors," and couple with it the name of Mr. J. K. Mellis. The Rev. J. K. Mellis responded on behalf of "The Visitors."

Mr. A. BELDAM : With your kind permission, before the singing of "Auld Lang Syne," I should like to make reference to Dr. White, C.B., Past President, who at the inaugural dinner of this Southampton Centre, held here last year, was Chairman, and so full of life, and who spoke so very nice and hopeful of the parent Institute, and of this Centre; how he impressed upon us the opportunity we had of making this Marine Engineers' Institute grand and noble, by making it attractive by its library, its papers, its classes, and by general experiences imparted in conversation; especially would it be good for the younger engineers. This evening has brought back the recollections of his genial and kind face, his cheerful and jolly manner amongst Since then he has been confined to a sick bed, 118. and at one time was in a most critical condition, but we are glad to learn he is now making good progress towards recovery. It is with this feeling of esteem, Sir, that I would like to propose the following resolution, and trust you will convey the sentiments of this meeting to Dr. White and his family.—" That a vote of sympathy in his illness and a hope for a speedy recovery be passed to Dr. White, C.B."

Mr. ROBERT BELDAM: I have very great pleasure in seconding the proposition just put before us, and I am quite sure we will all unite most heartily in wishing Sir William White perfect restoration to health and his duties at the Admiralty.

"Auld Lang Syne."

