

ADJOURNED DISCUSSION ON

Mr. James Shirra's Paper on
"Salinometry, or the Use of Sea Water
in Marine Boilers."

CHAIRMAN: MR. W. LAWRIE (Chairman of Council).

CHAIRMAN: It is with considerable regret that I have to announce that Mr. Hawthorn has written to say that he will not be able to be with us to-night to open the discussion, as he is suffering from a bad cold. It is a very great pity in many ways. Mr. Hawthorn knows something of the subject under discussion, and he and Mr. Shirra were such deadly champions on the last occasion that I am sure we would have had some further interesting remarks from him. But as we have not very much time to discuss the subject, I shall be very pleased if any of the members would kindly start the discussion.

Mr. COOPER: I think I made practically all the remarks I want to make when the paper was read. Of course at that time I had not seen Mr. Shirra's reply or further reply. It seems to me that Mr. Shirra is rather contradictory in some of his statements unless he is simply using the remarks as a quotation from the outer critic. In one part of his paper he is very exact and exacting, and in the next part he seems to say that something is "near enough," and the one remark I wish to make is in connexion with his statement on page 33, in the second paragraph, where he says:

"A thousand ounces per cubic foot is near enough for sailor men and stevedores. Engineers who work to limit gauges of .0001 of an inch should remember that such accuracy is suspiciously unpractical, and that in some people's opinion a shovel and an oil can are their proper instruments of precision."

I confess I do not know what this sentence means, unless on the presumption that it is from the ignorant critic still, as it may

be. If Mr. Shirra means that it is unpractical to work to one-ten-thousandth of an inch, he must have been a long time away from home. It is not unpractical to work to a limit gauge of one fifty-thousandth of an inch, and one ten-thousandth is ordinary shop practice, and when he states that engineers who work to that limit should, in some people's opinion, be accorded a shovel and oil can I do not understand him. That is why I said at the beginning of my remarks that Mr. Shirra is rather contradictory; he has been very exacting in other parts of the paper, but here he throws ridicule upon those who are exacting in other work. Personally, I can hardly think Mr. Shirra means what this sentence implies; it appears to me to be entirely different from the whole tenor of his paper. He is evidently a man who has studied the figures in connexion with the subject, and who believes in accuracy, and why he should pour contempt on people who are accurate in some other line I do not understand, unless on the grounds I have supposed.

Mr. G. W. NEWALL (Member): On listening to this paper this evening, I got the impression that a young engineer who went down into the stoke-hold after having read it through and struggled with all the many figures it contains, would have a nightmare the first time he turned in. In the case of a novice just taking his fifth, sixth, or seventh position on one of our large steamers, after having absorbed what we have heard to-night of this paper, I certainly think the nightmare would be the result. There seem to be a great many figures here that are rather confusing. I do not see how they could be condensed into a more simple form, but, as an ancient seagoing man, I can see they want a good deal of digesting. It is about twenty-eight years since I wielded a salinometer, and this paper has brought back many memories. I remember the time when the salinometer was something of a mystery to us juniors, when we would go down below to take a reading for the first time and scarcely know which end of the salinometer to put in the salinometer pot, or make some other mistake. But of course we used to do the best we could, and I have heard it mentioned that some engineers could always take the reading without going near the test cock. The difficulty of getting accurate readings suggested to me the question as to whether we could not improve upon the salinometer as we have it to-day. It occurred to me, as the paper was being read, that a good method

would be to have a balance made, pivoted on very nice points or knife edges, with a bar on one side of same with notches in it representing "32's." On the other end would be a vessel to hold a measured quantity of water, and the extra amount of salt or other matter in it could then be indicated by moving a weight along the notched bar. I do not know whether this could be made to work in practice, but if it could, it would be a simpler matter to obtain a reading than at present. A second idea that occurred to me was whether it would not be possible to attach to the boiler itself a vessel into which the water could be run, and all that would be necessary would be to put the salinometer into it, and take the reading. These are only ideas that struck me on hearing the paper, whether they are useful or not I do not know, but I think they would be an improvement on the method used at the present time.

Mr. W. McLAREN (Member) : I have nothing to say on the subject of the paper itself, but there is one experience of my own that might be of interest. We have given us in the paper the densities of sea water around different parts of the coast and in different parts of the globe, and that recalled to me that on one particular Sunday, in the Bay of Biscay, we drew up water practically fresh. For some time I have been trying to get a booklet written by the first chief engineer I went to sea with, in which he gives the running of boilers for three or four years from Gibraltar to Huelva in Spain and back again. He practically gives a history of anything interesting that happened, and gives a table of the water densities for over two years, one of the entries being that we struck fresh water in the Bay of Biscay about eighteen feet below the water line. I might say that I think it would have added to the interest if Mr. Shirra had written more, even for the use of us older engineers, on how to run the boilers, because, after all, that is the main thing, we do not need to go too deeply into the use of the salinometer. Mr. Hawthorn has referred to the thickness of scale in the old boilers. I know of one donkey boiler that was so salted up that it was necessary to cut the tubes out, clean her and re-tube her again.

Mr. W. J. GILL (Assoc. Member) : It has occurred to me that the density obtained by using the salinometer pot is not quite correct, as the water in the pot is not at the same density as

the water in the boiler. The water in the boiler is under high pressure, and when it is drawn off into the salinometer pot some of it vaporizes quickly and afterwards condenses, adding to the volume of the water to some extent. The density would therefore be lighter than that in the boiler.

Mr. NEWALL : I think the last speaker's idea would rather point to greater density in the salinometer pot. If you pour off water at a higher temperature it is the fresh portion of the water that evaporates, so that there is less fresh water left and the solution in the salinometer pot would then in that case be slightly denser than that in the boiler.

Mr. GILL : I have experimented with a vessel containing salt water which was heated, and the steam conducted to another vessel where it was condensed, the water in the latter vessel, of course, containing no salt at all.

Mr. NEWALL : A solution of salt and water is taken from the boiler into the salinometer pot, while the fresh water is taken away from the solution contained in this vessel by evaporation, and therefore the water in the salinometer pot is saltier than in the vessel or boiler the water is drawn from, and consequently slightly denser.

Mr. W. J. GILL : The point that I wished to explain in describing the experiment was that some of the steam gets condensed and is added to the water in the pot, the addition of the fresh water making a smaller proportion of salt to the total volume. In addition to this, the pressure on the water in the boiler would add to its density.

CHAIRMAN : I am one of those the writer refers to as having "skipped" the arithmetical portion of the paper, not for want of a desire to master it, but for want of time. The paper has been long enough in our hands, but it has been at a time when I have not had an opportunity to look at it. I think we must all agree that Mr. Shirra has given us a valuable paper. I must say when I looked at the title of the paper to begin with I thought it had made a somewhat belated appearance, but on coming to read the paper through there is not the least doubt that there is a good deal of information contained

in it; and I do not think that engineers can have too much information, even if it is a little late in the day. I quite agree with the author of the paper that it is just as well to know these things, and I think it must be a very useful paper.

There were one or two things remarked in reference to Mr. Hawthorn's statements about being able to dig out the scale in the low-pressure boilers with a spade. I was in one ship, with a jet condenser, where if we got 9 lb. of steam on the boiler she was doing very well, going fast, and I have seen her down to five, but when the boilers were opened up the scale was fairly hard, certainly not so hard as it is in boilers to-day, but there was some difficulty in removing it. When I look at the information contained in this paper I think of the trials of the junior engineer in those old days, when the blow-off cock was set to a mark and juniors were not supposed to touch it, and the same with the injection—the handle was marked too, and we were told not to shift it down. I am a little afraid that we used to shift both when it suited us. There is no doubt running the boilers on the rule of two to three "32's" worked out fairly well, although sometimes there was a scale of one-eighth of an inch, and I have known it slightly thicker. To-day there is a different set of conditions altogether, and I am sure that the information given by Mr. Shirra will be very useful to the Members of the Institute, and that his paper will form a valuable addition to our transactions. He has evidently studied the subject very closely and knows more about it than probably nine hundred and ninety engineers out of a thousand.

Mr. J. R. RUTHVEN (Member): I have much pleasure in proposing a hearty vote of thanks to Mr. Shirra for his replies to the previous discussion. I was greatly interested in reading the paper when it first came to this country, and thought that the author had gone into the subject in a very thorough manner.

Mr. A. H. MATHER (Hon. Treasurer): I have pleasure in seconding this vote of thanks. Mr. Shirra is evidently an enthusiast on the subject, and in the second part of his paper he has dealt very fully with the questions raised. Mr. Newall made a remark this evening that seemed to follow out an idea which I heard expressed some time ago, of a salinometer which could be used that would be easier than the present method of

Letters and telegrams were received, expressing regret at being unable to attend, from Sir Thomas Sutherland, Sir Wm. Arbuckle, Agent-General for Natal, Hon. C. H. Rason, Agent General for Western Australia, Captain Chalmers, Board of Trade, Mr. W. Beardmore and Mr. W. H. Dugdale, President N.E. Coast Inst. of Engineers and Shipbuilders and others.

SIR JOHN GUNN: Mr. President and Gentlemen, the toast which I have been asked to propose is an exceedingly important one; it is called "The Shipping Interests." You will at once appreciate the comprehensive nature of that toast. I confess that when I saw it printed on the card it quite alarmed me, and I hardly knew where to begin and where to finish. One thing I am quite certain of, however, and that is, that the close relationship which exists between shipowners and marine engineers will ensure for this toast a hearty and cordial reception. There was a time when British shipowners were looked upon as being carriers for the world. That was to a large extent true, for some thirty years ago we carried about 85 to 90 per cent. of the whole commerce of the world. Now the position is changed and we must accept the inevitable, but I hope the shipowners of this country, and the officers and men of the mercantile marine in particular, with the aid and the designing power and knowledge of marine engineers, will still hold their own. If we are not the carriers for the world, we have, at all events, the honour of being the leading shipowners of the world. I find, on looking into some figures from a return given by the Board of Trade, the registered tonnage over sea for the—

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| United Kingdom and the Colonies is | 12,332,000 |
| Germany | 2,454,000 |
| France | 1,350,000 |
| Japan | 1,128,000 |
| United States | 955,000 |

Now, gentlemen, we have nothing to say against the increased tonnages of our neighbours and competitors, with one condition, providing that it is honestly earned. As British shipowners, we want only fair play, no preference, no bounties, simply let us have honest fair play, so that the commerce of this country may be carried in British bottoms, and we shall hold our own against all comers. We are still, I am

glad to say, the largest carriers. We carry now between 50 and 60 per cent., and, as we have recently seen, we have still the best and the highest reputation for carrying the live cargoes of human beings from this country all over the world. The recent performances of the *Lusitania*, and later of the *Mauretania*, have given us the right to say that we hold the priority in the shipping interests of the world. I trust that priority may long continue, that engineers and shipowners may act in combination and that the new developments which we see taking place around us in all phases of engineering, may continue to give us the pre-eminent right of being considered the leading nation in the world for carrying its commerce. I have great pleasure in associating with this toast the name of my friend, Mr. James Dixon, Chairman of Lloyd's Register. I give you the toast "The Shipping Interests."

MR. JAMES DIXON: Mr. President, Sir John Gunn and Gentlemen. This is not the first occasion upon which I have had to respond to this toast, and probably it may not be the last, but I find it this evening a little embarrassing to have the toast of "The Shipping Interests" proposed by so well-known a person in the shipping world as my friend, Sir John Gunn, because he is able to exhaust the whole subject, and leave me very little to say in reply. Last week I was responding to this toast in the North, warmly proposed and warmly received, but notwithstanding, I am sorry to say that in the week that has elapsed I fear the health of shipping, from the point of view of the freight market, has not improved—in fact, it is rather worse than a week ago. To me it is very surprising; indeed, I do not remember a rise of 10s. to 12s. per quarter on the Corn Exchange accompanied by such dulness in shipping. I suppose one must attribute it to shipowners themselves, they have over-produced, like a great many other people. But in our over-production we have, at any rate, proved ourselves friends to the marine engineers, and when we build ships of such colossal size as those with which the gentleman on my right—Mr. William Watson—is associated, where instead of half a dozen engineers, there are some thirty or forty in one ship, I think I may claim that we are giving very great support to that profession. We are suffering just now, when I say "we" I refer to shipowners, in the stokehold department. That is a very heavy

item of expenditure. I do not mean, with my experience in the coal trade I would never venture to suggest, that the gentlemen present are responsible for the prevailing high price of coal, but I do think that great economy might be effected in that department, especially in the direction of some system—long wanted, often tried, never successfully—of mechanical stoking.

Shipowners—by shipowners, I mean gentlemen who sit in offices and manage ships—are not, as a rule, a sea-going class; it may be that they are too busy, possibly there may be a reason of a more personal and delicate nature, but at all events, I am an exception to the rule. When I go on board a ship the first person I like to interview is the chief engineer, and generally he is a Scotchman: I do not know why, but so it is. Now, really, I am saying this in all seriousness—there is no flattery about it. I am not an “expert” and therefore you may accept my testimony. First thing in the morning I have to depend upon the engineers for my hot water bath—sometimes the hot water is not turned on, but one refrains from using strong language when it is remembered that probably the poor men are looking after the refrigerating of the butter, fish and other delicacies for breakfast. Later on, when night falls, I know I am depending upon some engineer for the light by which I read. After dinner, what more pleasant companion than an engineer to walk up and down the deck with, full of anecdote and experiences, and when I go to bed, the pleasant, soothing pulsation of the propeller makes music in my dreams.

While I have been singing the praises of the marine engineer, I think perhaps I have been losing sight of a very important branch of naval science most ably represented here to-night in the gentleman sitting only two from me—Sir William White—the science of naval architecture, and I must say that although marine engineering has gone forward marvellously in the last twenty years, we cannot get on without the naval architect. Now there was no more jealous discriminator of the line of demarcation between the naval architect and the marine engineer than the late Benjamin Martell. He was a naval architect all over and always stood up for that profession, and when he retired from a life of hard work some of his friends thought that they would like to do something in his commemoration. I was spoken to in connexion with

this, and took a personal active part in the movement. In the result a very handsome sum of money was subscribed, which was invested and used in founding the Martell Scholarship in Naval Science, administered by the Institution of Naval Architects, and it is very gratifying to know that two other scholarships have since been founded by the Institution, tenable for three years, so that each year there is a competitive examination. The Society over which it is my privilege to preside, Lloyd's Register, give two or three scholarships in Naval Science in Glasgow University and have recently established three scholarships in the Armstrong College, Newcastle. Now I am coming to the point. Do you not think, gentlemen, I am suggesting for the consideration of your Council, that an institution like this, the Institute of Marine Engineers, is a proper body for taking into consideration the advisability of establishing a scholarship in some university in Marine Engineering? Fifty pounds a year does not seem much, but it is a great deal for a young man who is training, and if the suggestion commends itself to the executive of this Institute, I shall be very glad to assist, and I think I may be able to render some material assistance to a well-devised scheme.

Gentlemen, I thank Sir John Gunn very much for the kind way in which he has proposed this toast, and you for the way in which you have received it.

MR. JAMES T. MILTON: Mr. President and Gentlemen, I have had entrusted to me the proposal of the toast "The Institute of Marine Engineers," a toast which, I am sure, you will all drink with great enthusiasm. This Institute is one of the youngest of the scientific institutions of the country, but although young—it has not yet reached its majority—it is a very vigorous and prosperous institution, and we all hope that, as it has succeeded in the past, so it will prosper in the future. Marine engineering is a very progressive profession, especially just now, and the profession owes a great deal to an institution like this, an institution composed mainly of marine engineers, who meet together for their mutual education, to confer with one another, and to compare notes of their experiences; and when I say "marine engineers" please do not think I mean only the engineers who have to deal with the main engines of ships, the Institute welcomes amongst its members all engineers of mechanical training who are engaged

in work connected with all kinds of machinery used on board ship. Mr. Dixon has mentioned some of these subsidiary but very important, industries. The refrigerating industry, for instance, is one which necessarily means specialization on the part of a large number of people, but through the refrigerating industry a trade has grown up in carrying most valuable cargoes of a very depreciable sort from the opposite side of the world.

Where should we be, in our warships and merchant vessels, without the electrical engineer? In the majority of warships there is a central installation, and the electricity is conveyed all over the ship and transformed into mechanical energy in the different parts. The *Mauretania* and *Lusitania* could not work without the electrical engineer, the forced draught fans being worked by electricity.

The Institute of Marine Engineers, therefore, welcomes as members engineers of all kinds.

In proposing prosperity to this Institute, let us remember that the Institute is already prosperous, and prosperous because of its efficiency. The Institute was founded for educative purposes, and it well fulfils the purposes for which it was founded. At the many meetings held every session, more, I think, than in most institutions, papers are read, lectures given; visits are paid to works—and that in itself is a great educative influence, for it enables the members to see what other people are doing—demonstrations on scientific matters are given at the rooms; all these must be of great service in educating the members of the Institute generally. And then let us remember that a great proportion of the membership of this Institute is spread all over the world. It may be a bad thing, perhaps, for the Institute in some respects that many of their members cannot be present at the meetings, but when we think of what has recently been done in the matter of sending the transactions out more frequently, and when we know that these transactions, containing the papers and discussions, are sent all over the world, and that members, when they have read them, will probably pass them on to other engineers, we see that these educative influences have a world-wide effect. In urging further efficiency in the Institute let me ask you members to think of what it means to a lecturer to have a good attendance at the meeting. I was one of those people who, in its early days, were privileged

to lecture to your members, not as the author of a paper, but as a lecturer, and there are many popular subjects that can be dealt with better by lecturers than by having set papers, but nothing helps the lecturer or the writer of a paper so much as to know that he has an appreciative audience. It may be a hard thing for some of the members here to turn up on an evening instead of spending the time in domestic matters, but it would be a good thing for them, and a great help to the lecturer. Perhaps the subject may be one that you do not take any interest in—turn up all the same, probably you may hear in the lecture or discussion something which may prove helpful and useful in time to come, and if you know all about the matter, then go there, take part in the discussion, and let those who do not know what you know have the benefit of your knowledge. I might say a great deal more on this subject, but I think that you will agree with me that the prosperity of this Institute does lie in the efficiency with which it carries on its educative work.

Amongst your past presidents and vice presidents there have been most distinguished men. No institution can look back on such a list of past presidents, containing the names of men of science like Lord Kelvin, the greatest naval architects in the country and in the world, men distinguished in all branches of engineering, commercial gentlemen who have made their names known world-wide in the commercial world, men who know from every-day experience how important is the marine engineering industry to the commerce of the country. The Council contains distinguished men, engaged in the design, the upkeep and the every-day work connected with all kinds of machinery. Altogether, the Institute is a great credit and very important to the country. Although young it is prosperous, and it will prosper more if all marine engineers will do their best to support the Council and Office-bearers in furthering the interests of the Institute. I give you, gentlemen, the toast "The Institute of Marine Engineers" and may I couple with it the name of the most indefatigable office-bearer that any institution has ever had, Mr. Jas. Adamson.

THE HONORARY SECRETARY: Mr. President, Mr. Milton and gentlemen. It is one of the annual pleasures of the executive members of the Institute to listen to the plaudits evoked by the reception of this toast when the wine and wit are

flowing freely around our festive board, and on behalf of the Office-bearers and Council I have to thank you for the renewed expressions of your appreciation to-night, and for the repeated pleasure. I have also to thank you for your presence here to welcome our President amongst us at this semi-public function, and to celebrate another anniversary in the history of the Institute, now in the last of its teens and about to enter upon a course which augurs well for its future success, the course of its third decade.

Our President, on the occasion of his visit to our premises to re-open the session at the beginning of the month, referred in his address to the operations of the Institute and the important bearing these have had upon the shipping industry,—other speakers have endorsed this to-night—its progress and the work accomplished during the last nineteen years, the increasing membership and our good financial position, so that I need not enlarge upon these points, rather would I seek to enlist the help and enthusiasm of every member present in aiding the executive, to whom has been entrusted the duty of carrying on the work on behalf of the members.

Every member can assist in one way or another—there is ample scope, as well for those through whose veins course the fires of youth as those on whose maturer judgment reliance may be placed to not only advocate the good but indicate the best. The arms of the Council can be sustained and supported greatly by the sympathetic help or advice of individual members. Any plans or recommendations to improve the Institute in any of its channels of communication will be warmly welcomed and sat upon with a view to bring forth improvements.

It is essential to the progress and advancement of every undertaking of the nature of the Institute that the members should co-operate most heartily and enthusiastically, and the more hearty and enthusiastic the members are, by so much the more will the undertaking prosper. I seek therefore to bespeak and arouse that spirit which will adventure much in the direction of keeping the Institute of Marine Engineers in its progressive advancement. Are we proud of our occupation and the achievements which have added laurels to it, and not to it only but to our native land? The time passed within our generation has seen advances undreamt of in the days of our fathers, in all branches of mechanics, and in no occupation more than in our own have these advances demanded

more effort, more painstaking and more realization of responsibility. We know not what the future has yet to unfold but this we do know, that it behoves us to study and to analyse more and more closely the materials we have to deal with in our daily life, not only the crude materials provided by the external world, and shaped to the various ends of science, but we have to deal with the internal—the sentient material which has to be trained to think and to learn to hold in subjection, within limits, the finished mechanism. The Office-bearers and Council are alive to the importance of training the rising generation to think correctly and to act with judgment. By means of lectures, essays, papers and discussions, combined with healthful recreation, we seek to keep up the standard of thought and action, and any suggestion or recommendation for the good of the members—the marine engineers of the country—the Council will gladly welcome. A special room has been prepared in our premises and allotted to the Junior Section of the membership on the suggestion of one of our early members, whom I am glad to see here to-night; and I would most heartily urge upon the attention of every member present a consideration of the direct claims of the Institute upon him, and as we have handed down to us a legacy from those who have passed on before, so it is laid upon us to improve our heritage, and hand it on to those yet to come, with not only undiminished lustre, but added splendour. Let such be our aims—such our efforts—sinking individual ease and selfish aims in the desire for the uplifting of all those elements which go towards the advancement and improvement of the race and the standard by which man is judged, if not always by his own, by the generations that succeed him. As the humanity of the man is the criterion of his excellence, so let us keep this ideal ever before us, and apply it to the work set before the Institute, so shall we go forward and bear with us those whose best interests we seek to advance, and in doing so we are assured we are advancing the hope of our country, and the aspirations of those whose ventures float upon the face of the waters and cross the ocean to all lands.

And now, ere I sit down, I should like to refer to the frank offer which has been placed before us to-night by the Chairman of Lloyd's, Mr. James Dixon, and I am quite satisfied that the Office-bearers and Council will weigh wisely and well the words he has said and take up the gauntlet which has been

thrown down at this our Annual Dinner, and I hope that the words spoken will bear fruit in after days to the glory of the Institute of Marine Engineers. I would also seek to further emphasize the hint which has been thrown out by Mr. Milton, and I was very glad that Mr. Milton referred to it. It is a great impetus and a great help not only to the writer of a paper, but to the lecturer who comes amongst us, to see before him a large audience, and I hope that the exhortation will be laid to heart most earnestly by all the members whom I see before me. Let us sink as much as possible individual ease and come out to the Institute, and if we do know the subject better than the lecturer, let us show it by our remarks in the discussion which follows. None of us are too old to learn, none of us too young to give a hint, and therefore I appeal to both so that our discussions may result in good to all concerned. I have much pleasure in responding to this toast, and I hope that our gathering together to-night augurs well for the future of the Institute.

Sir WILLIAM H. WHITE: Mr. President and fellow members of the Institute of Marine Engineers, I am to propose to you the toast of "Our Guests." So long as I remember this Institute, and I remember it almost from the beginning, there has been one distinctive feature—that is the Annual Dinner. It had existed only a very short time when it was resolved that no year should pass without a dinner. As the Institute has grown, and the years have passed, the numbers at the dinner have increased, and the length of the menu has increased also, until to-night we have attained a bill of fare which would have been a credit to an American hotel. Of course, in thus lengthening the menu, and adding to the pleasures of the table, we have been thinking chiefly of our guests. It is a fixed idea in the Institute of Marine Engineers to be unselfish. The Honorary Secretary urged upon you in the eloquent address to which we have just listened that members should sink their individuality and work for the Institute in every way; and hospitality is a sacred as well as a most pleasant duty. Looking through the list of toasts, I find that I have been put down to speak after a song which described "A jolly old Cavalier." I suppose that is intended as a delicate allusion to the fact that I was a president of the Institute a great many years ago. The gentleman who is to respond to this toast is to be

followed by a song which describes him as "Prince Charming." One may think that arrangement carries compliment to our guests too far, when a venerable past president is termed "A jolly old Cavalier" and a visitor, who will, I trust, long remain a constant visitor at these annual gatherings, has the title of "Prince Charming."

To-night all of us—guests and hosts—are under a great obligation to the committee and the convener of the committee for the excellent arrangements of this beautiful dinner; and on the behalf of all I wish to express our thanks to Mr. Taylor and his colleagues. One great reason why we established these dinners was to have the pleasure of inviting guests. From the first there was a desire that all friends of the marine engineer should have a knowledge of the work done by the Institute, the aims, objects and character of its membership. We have never failed to have amongst us representative men of all classes and ranks of society. To-night is no exception to that rule. Notwithstanding the lamented absence of many whom we hoped would be here, we still have a representative gathering of men eminent in many walks of life. I am only speaking your feeling when I say that there is no section of our guests whom we are more glad to welcome than the representatives of the Colonies, of whom there are so many present. I well remember, when Sir Fortescue Flannery was president, the presence of many colonial representatives was a feature of the gathering. Amongst them was a man, who was an engineer, as a Premier, and had shown what he could do in most responsible positions, I mean the late Richard Seddon. Many of us will long remember the words he spoke and the power he showed in addressing his fellow-engineers. We welcome most heartily the gentlemen who now represent the colonies here in the home land. We look upon them as our brethren. They may be representatives of nations yet in the making, but we believe and hope, and I am sure they will share that hope, that whatever the colonies may become, however great their destinies may be, they may still form parts of that great empire which we all love.

Another class whom we are glad to see to-night is that of the past presidents—I am speaking as a member of the Institute, but I desire also to acknowledge, on behalf of my fellow past presidents, how much we value this annual invitation that brings us here as your guests to share the pleasure of

looking into your faces and hearing how the work of the Institute is progressing. We are "extinct volcanoes" and have no more to do with the active management of the Institute, but we have not lost our interest in it. I voice the feeling of all the past presidents when I say that no class rejoices more in the prosperity which attends the Institute, although we have played our part and left the stage.

One class of guests is always held in especial honour here; that fact has been emphasized already in connexion with the toast of "The Shipping Interests" responded to so ably by Mr. Dixon. Amongst the members of the Institute of Marine Engineers there is of course a perfectly disinterested and unselfish feeling of regard for shipowners. We are always glad to see as many shipowners as will grace our table, and we all regret to-night that that veteran shipowner and Past president, Sir Thomas Sutherland, has been prevented from attending.

No one could represent the shipping interests to-night better than the Chairman of the Company which stands pre-eminent at the present moment, the gentleman whose name I couple with this toast. Mr. Watson, as Chairman of the Cunard Company, comes after men who have made history in steam navigation, and he is a worthy successor. His lot is cast in times of no small difficulty and responsibility. When one thinks of what he has had to do in following his lamented predecessor, the late Lord Inverclyde; when we think of the vast undertaking which this truly patriotic association, the Cunard Company, has entered into, and which Mr. Watson has to supervise, I feel confident that you will receive and respond to this toast most heartily, and in drinking the health of "Our Guests" desire to show the regard in which you hold the men who now have to bear the burden and heat of the day.

I should like to make brief allusion to words I spoke as president of the Institute. My text in that address was "the human element in engineering." I said that in the last resort it all came back to the men who put the coal upon the fire and the engineers who supervised the working of the machinery. To-day a great experiment is being made, and I am glad to say successfully made, by the Cunard Company, in leading the world once more in steamship construction. One of the hardest tasks that Mr. Watson has to face is that presented by the efficient organization and working of engine-room and

stokehold complements of these two great ships. Upon the marine engineer and the stoker must depend in a great measure economy in coal consumption and efficiency of the engines ; in other words their action determines whether or not the ships shall fulfil the intentions of the design, and prove a commercially profitable investment to the Company that has had the courage to undertake them. I give you the toast " Our Guests " and with it couple the name of Mr. William Watson, Chairman of the Cunard Company.

Mr. WILLIAM WATSON : Mr. President, Sir William White and you gentlemen who have so cordially received the toast, I give you, personally, my most hearty thanks. I thank your President for inviting me to come and sit at your hospitable board again this year, and on behalf of the other guests, I hope they will allow me to offer their thanks also. I think perhaps some one ought to have preceded me in responding to this toast, and so saved the allusion to myself in such very high terms. I am not accustomed in speaking to bring forward anything with regard to the Cunard Company, but it would perhaps be pretentious diffidence on my part, after Sir William White's speech, if I did not refer somewhat to the ships which have now made their advent. They are magnificent specimens of naval architecture and of the engineers' skill. The naval architect is responsible for a great deal, but however great his success, it is upon the skill of the marine engineer that we must depend. These ships and the Cunard Company have loomed very large in the public eye during the last three or four months. We have been subjected to some criticism, not so much at home—indeed I do not think any at home—but from some of our foreign friends. There has been some jeering as to our genesis, we have been told that we were built up by British Government money, that we were paid a subsidy. Gentlemen, that has been stated pretty plainly in other places, but I say it does not lie in their mouths to say it. I say that we are most grateful for the sympathy that has been shown us by the whole of the country, the interest that has been taken in us and the pride which, I contend, the whole country has in these ships and the sincere wish for their success. With regard to what has been said, I have stated on one or two occasions the genesis of these two ships, and I would like to state it once again in a more public place before

you to-night. We have been jeered at that they have been built with Government money. Now the two things hang together. A certain article was wanted—I have nothing to say about the desirability of the want—it was held that such a thing was desirable; the question was how was it to be done? the question of who was to find the money? and the question of how much was to be paid for it? The fact of the Government finding the money was to save the country's money. If we had borrowed the money on the Cunard Company's name alone and paid four per cent. for it, we should have demanded a greater annual subvention. Because the Government could raise money cheaper for us they got what they wanted—I say nothing about the desirability—and they got it for a smaller subvention than if the Cunard Company had to raise the money. Therefore, I say the two things hang together. Again I do not consider it a subsidy for building ships, and enabling a commercial undertaking to succeed. Sir William White spoke of the patriotism of the Company; well, I say that we are paid a certain sum for services rendered, and to be rendered when called upon. With regard to the money that has been advanced by the Government, after all, the Cunard Company has to face the bill at the end, and, be it success or be it failure, it is at our risk.

Now I do not want to go any further into that point, but last year I remember I returned thanks for this toast, and I remember, after many speeches had been made eulogizing the skill and energy of our engineers, I tried to excite some sympathy for those working engineers on board ships. Now I have nothing to say to-night on that matter, but in the opinion of an expert of the "highest authority" it is considered that no one could produce anything superior to what has been produced in those two ships. We took a great deal of trouble and put ourselves to a great deal of expense, and enlisted the assistance of all the recent engineering and shipbuilding science in the kingdom to attain the very best article. But since the article has been produced I find that there is an enormous number of people whom, I think, the marine engineers must have overlooked. There is no finality, we have heard, in shipbuilding and marine engineering, but I can assure you that I am amazed at the number of propositions that are put before me of a far superior article. It is quite alarming, and I hope you engineers will go no further; at any rate, give us a little time. Only

within the last week one of my colleagues had a letter to say that the writer estimated that those ships would cost £20,000 a run, but if we would only listen to him the cost would be reduced to £1,800 a run. I got a letter myself only three or four days ago, and it was there enunciated that by using a certain invention which was put before me for consideration, the coal consumption would be reduced by half and the speed would be doubled. Can you imagine my alarm? Sir William White has told you of the difficulties and responsibilities that rest upon me—I tell you, gentlemen, since I was here last year my hair is much whiter. However, I may say we are going to do our best. Our late Chairman, Lord Inverclyde often told us “never to take it lying down.” Well, we are not going to take it lying down, we will not commit suicide even if we are murdered. At the present moment our ships have caused a rate war, I do not know what else has done it, it seems to me to be quite unnecessary. However, as I mentioned just now, last year I asked you to think of those men who are working down in the engine room. I still think sometimes that they need a great deal of sympathy, at other times they give me a good deal of trouble, but to-night I want to ask your sympathy for ourselves. Unfortunately Sir Thomas Sutherland is not here or I should have asked him to allow me to take the liberty of quoting some of his words. Sir Thomas said in one of his speeches that whenever he was introduced to any man or to any Company, he thought it his duty—and he did it too—to look upon them all as possible passengers. I can only ask you to look upon us with a similar feeling—see what your brother engineers have produced and help the Cunard Company. Gentlemen, I thank you very much for your kind hospitality, and the way in which you have received me.

Mr. DAVID J. DUNLOP: I have the pleasure to propose the toast that has been entrusted to me, that of “The President,” Mr. James Knott. Of course I suppose that it is only following the usual custom that this very important toast is last on the programme. My feeling, and I think the feeling of most thinking men, is that a prominent toast of this kind should come really next to the loyal toasts, because, amongst ourselves, what do we care more for than our own prosperity and the guidance that leads us to that prosperity. The selection of the com-

mittee this year has fallen upon Mr. James Knott. I have never had the good fortune of building a ship for him, and I do not know anything about him as a business man, but I have met him and been with him on a yacht, and as a yachtsman he is "right good colour." Before I refer to him personally, I do not know if it would be out of place to look back on the list of presidents that we have had since our Institute was formed. I see right in front of me the first president of the Institute of Marine Engineers, Mr. Asplan Beldam, and I may say that, with the exception of his having washed a good deal of the colour out of his beard, he has not changed during the last eighteen years. That is not peculiar to him, because, out of the Presidents that the Institute has had, there are only two or three who, by force of years, have really gone away from amongst us. There is one peculiarity about the selection of presidents made by the Council, and that is that there is not on the list one man that could be said to be born great. Of course we all know that there are three kinds of great men, there is the man who is born great, the man who has attained greatness, and the man who has had greatness thrust upon him. I suppose the man who is "born great" is the one who, through family or influence, has been placed in the world as a child, and grown up under the impression that he was of great importance, but in all the list there is not one man of whom that can be said. Going back to my friend whom I am glad to see looking so well, Mr. Beldam, I do not suppose, sir, that you would pretend to say that you were born great, possibly your first greatness was when you became president of this very honourable and very useful and most important Institute. Your successor, Mr. Manuel, still lives with us: we all know the work that he did. The third on the list is Mr. Peter Denny, LL.D. We on the Clyde look back to him and to his name as one of our greatest men. I suppose our selfishness on the Clyde is shared by men of all nationalities, because both at home and abroad his name was known, not only as a great engineer but as one of the most genial and kind-hearted men that ever lived. Ambition did not cease when Dr. Denny vacated the chair, for the Council of the Institute of Marine Engineers jumped at the Right Honourable Lord Kelvin. When I first knew Lord Kelvin he was a teacher or professor in the College of Glasgow, but there is not a man in this world, who, on the same lines of science,

electricity and other matters, has attained to the position that Lord Kelvin to-day occupies. He is well advanced in the 80's. I saw him the other day and his intellect is as clear as it was thirty years ago. The most abstruse problem that could be put before him would be worked out as quickly as he could have done it when a young man. I think it is one of the highest honours to this Institute that they should have had as their fourth president such a man to direct and govern their work. I do not need to go over all our past presidents, but I see among them a friend of mine, Sir William White; we know his work at the Admiralty. We know also the work of Sir John Durston, who I see is going to retire, and if they did not always build pretty ships they fulfilled their duties so that their names will always be honourably mentioned in connexion with the Royal Navy. I know that Sir William's plans went beyond the ships of Great Britain, and I am glad to know that his sympathies, since he left the scenes of fighting, have been more on the lines of commerce, and whatever the *Mauretania* may do, I am sure those who built her have been indebted largely to the advice that the late Chief Constructor was able to give them. There is only one other incident in connexion with the past presidents that I would like to refer to, the fact that the son of the third president of the Institute, Colonel John M. Denny, was also president. It is rather singular that father and son should each have occupied this position.

The list does not confine itself to engineers alone, it comprises the names of men who have been captains of industry and leaders of shipping commerce, men who have made use of the naval architect and the marine engineer, and who have brought our merchant navy up to the position that it stands in at the present day. The third class of great men, those who have had greatness thrust upon them, have not, I think, a representative in the list, but undoubtedly some of us believe that through the goodness of the Institute we have been promoted to a high position in being elected President—I say through the goodness of the Institute, because I do not know any institution that for practical value and for good work is superior to the Institute of Marine Engineers. There is no service in the world that requires of a man more constant attention, more ability and more knowledge of almost every branch of science than the calling of the marine engineer.

So much has been said to-night by various speakers that it is unnecessary for me to go over all of it, electrical work, refrigeration, ventilation and other branches.

My remarks, Mr. President, have only been with the view of attempting to show you whom you are succeeding in the chair. You also have attained greatness in your sphere. Beginning from a small commencement, you have risen to be what no other man in the world is—the head of a line of “princes.” I think the wish of all the members in this Institute is, that you might continue your services in that direction and make us all, as marine engineers, a line of princes, more acknowledged by the world, more acknowledged by our own shipping interests, and still better acknowledged by our Admiralty and Navy. I hope, sir, that in the year of office that you have entered upon, you will have a pleasure equal to that which I experienced when I occupied the chair of our Institution, and I hope also, when you have retired from the chair, that you will acknowledge that you have had an education in connexion with marine engineering, as most, if not all, of your predecessors had through a closer association with the Marine Engineer. I offer you, gentlemen, the toast “Our President.”

The PRESIDENT: I thank Mr. Dunlop most heartily for the very flattering manner in which he has proposed this toast, and you, gentlemen, for the very hearty way in which you have received it. I claim some slight connexion with naval architecture. It may perhaps be a little distant, but when I tell you the reason for it I think you will agree with me that I have some little claim to it. Many years ago I made a short yachting trip with one of the greatest naval architects in the yachting line that this country ever produced, the late Mr. G. L. Watson, and we had for company that day my friend Mr. Dunlop. The size of the yacht was four tons. It may be a very slight claim, but it lives in my memory, and I was very pleased to hear Mr. Dunlop propose this toast.

I cannot, however, claim any connexion with marine engineering, excepting through the honour this Institute has done me in electing me President for the present year of office, and if I may ask your indulgence for two or three minutes, I will give you my reason for deeming it an honour. This Institute is a striking demonstration of the strong, sturdy and individual character of the Britisher. It is not to the Government that

he has to look for assistance, because if he does, I am afraid, if he gets it at all he will get it too late. It is to Institutions of this kind we must look to help the young man of to-day. We must not overlook what this Institute has done in the past. It is nineteen years ago since it was founded, and if you add those nineteen years to the age of an engineer just starting life at that time, it will be seen that there must be a great many men now plying their vocation in much better positions to-day than if there were not an Institute of this kind to assist them in years gone by. In this connexion, although much has been said complimentary to your Honorary Secretary, I do not think enough credit can be given for what he and his Council have done. Mr. Adamson has shown an amount of energy that is worthy of all praise. There is no time this evening to describe many of the things to his credit, but when I state that his memory will ever be green in this Institute, it will be sufficient for you to realize what his labours have meant.

The United Kingdom is the nursery of the marine engine, and is far and away ahead of all other nations in this respect. I am sure Sir William White will agree with me when I say that whatever our naval architects have done for us, but for the marine engineer their science would not be so far advanced to-day as it is. All this has been done in a comparatively short time. We have advanced from single to compound engines, from compound to triple, and from triple to quadruple, and now we have the turbine in the finished and successful form that has enabled naval architects to give us the *Mauretania* and the *Lusitania*. Mr. Watson, the Chairman of the Cunard Company, said he hoped the marine engineers would give us a rest. All shipowners hope this, because many of us have been engaged most of our lives in starting at the bottom end of our fleets, and scrapping them upwards steadily owing to the advent of new types of engines. It is more serious for those with large fleets; we no sooner get towards the top end than we have got to start in again at the bottom. Unfortunately, I am afraid we might not hope for the rest Mr. Watson speaks of. The energetic brains of the marine engineer are still busy, they are now engaged on another type of engine, and I do not think the time will be long before we are testing this new invention. There is this to be said also for the marine engineer. He is altering

social conditions, and helping to solve one of the social problems that has been giving much trouble in the more congested parts of the world. Gentlemen like Mr. Watson have now produced ships in which emigrants, in a short time, very safely and at small cost are taken from the congested parts of Europe where labour is in poor demand and where wages are small, to the newer countries of America, where labour is in great demand with much higher rates of pay. This has been largely brought about by our marine engineers, and I therefore think that an Institute of this kind is a national asset, an asset of an invaluable character. From the point of the shipowner, as Sir John Gunn has said, this Institute has largely helped the British shipowner to maintain his supremacy on the sea, and, given "a fair field and no favour," with the assistance of the marine engineer and the naval architect, we are going to maintain that supremacy. This Institute not only has done, but is doing still a very valuable work. It has been founded by individual effort. We hear a good deal about Socialism, but I venture to ask you to compare for a moment what the individual character of the Britisher has done in this respect, and what Socialism would have meant—where our shipbuilding would have been to-day if an experiment of a socialistic character had been tried. We would practically have had none.

In conclusion, gentlemen, will you allow me to say that I am fully sensible of my position and the gentlemen I have to follow. I cannot hope to follow them with the same skill, or add the lustre to the position that they have done, but I do promise that as far as I am able, I shall do all in my power to maintain the traditions of this position, and I hope when I leave it, I shall leave it with all the kindly feeling that I have so far received from all those connected with it. Allow me again to thank you most heartily for the way you have received this toast.



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VOLUME XIX.

PAPER NO. CXLII

MARINE STEAM TURBINE LUBRICATION

By Mr. A. H. MATHER (HON. TREASURER),

READ

Monday, October 14th, 1907.

CHAIRMAN : MR. W. LAWRIE (CHAIRMAN OF COUNCIL).

Adjourned Discussion on Papers read at the Engineering Exhibition, Olympia, W.

NEW METHODS OF EFFECTING
BOILER REPAIRS

By Mr. H. RUCK-KEENE (MEMBER),

Monday, November 11th, 1907.

CHAIRMAN : MR. W. LAWRIE (CHAIRMAN OF COUNCIL).

VENTILATION, HEATING AND BERTHING

By Mr. A. E. BATTLE (MEMBER OF COUNCIL).

Monday, December 2nd, 1907.

CHAIRMAN : MR. E. W. ROSS (HON. FINANCIAL SECRETARY).

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