It was with high appreciation that the consent of Lord Kylsant was received to the invitation to become President, and in placing his Presidential Address in our records, a few lines on his work in the National interests are added.

Born in 1863, he was third son of the Revd. Sir James Erasmus Philipps, 12th Bart., and was educated at Newton Abbot College, S. Devon. His mother was a sister of 5th Baron Wynford. In 1902 he married Mai, co.-heiress of Thos. Morris, of Coomb, Carmarthen, and they have three daughters.

As Mr. Owen Philipps, he started work in a Shipowner's office in Newcastle, proceeding to Glasgow, and then went to London as Chairman of the King Line, which he founded. Gradually enlarging his interests in Shipping, he became Chairman and Managing Director of the Royal Mail Steam Packet Company, Union Castle Line and Associated Companies. Lord Kylsant is also Director of the Southern Railway and of the Midland Bank.

He was a member of the Royal Commission on Shipping Rings, 1906, Chairman of Departmental Committee on Distressed Indian and Colonial Subjects, 1909, and Vice-Chairman of the P.L.A., 1909-13. He is a Past President of the Chamber of Shipping of the U.K. and of the London Chamber of Commerce, and is President of the Federation of Chambers of Commerce of the British Empire.

During the war he served on the Admiralty Board of Arbitration and the Edible and Oil-bea ing Nuts Committee, and was Chairman of Empire Settlement Committee, 1917, and of the Company Law Amendment Committee, 1918.

He was M.P. for Pembroke and Haverfordwest, 1906-10, and for the City of Chester, 1916-22. He is Chairman of the Welsh Unionist Council and Vice-Chairman of the National Union of the Conservative and Unionist Associations.

He is owner of over 6,000 acres of land in Carmarthenshire and Pembrokeshire, is Lord of the Manor of Llanstephen and is Lord Lieutenant of Haverfordwest. He was High Sheriff of Pembrokeshire, 1904, and M.F.H. of Carmarthenshire Hunt, 1912-25. He is Hon. Captain R.N.R., and Knight of Justice of the Order of St. John of Jerusalem. In 1912, he was invested with the Grand Cross of Spanish Red Cross, and the Grand Cross of St. Michael and St. George in 1918. He is J.P. for his Home Counties and Glasgow.

In recognition of his public services, he was raised to the Peerage in 1923, with his present title.

The Kylsant Estate has been in the family for 800 years.

RT. HON. LORD KYLSANT, G.C.M.G.

INSTITUTE OF MARINE ENGINEERS,
INCORPORATED.

Patron: HIS MAJESTY THE KING.

SESSION 1926.

President: LORD KYLSANT OF CARMARTHEN, G.C.M.G.

VOLUME XXXVIII.

Presidential Address.

BY THE RIGHT HON. LORD KYLSANT, G.C.M.G.,

ON

Tuesday, 14th December, 1926.

When I look at the list of distinguished Scientists, Engineers, Shipbuilders and Shipowners who have been Presidents of this Institute since its incorporation thirty-seven years ago, and consider the fundamental and far-reaching importance of Marine Engineering and of the Marine Engineer to the well-being and progress of the British Empire, I am conscious of the honour of being your President.

Among the names of the very earliest Presidents of the Institute are those two eminent Scotsmen, Dr. Peter Denny, of Dumbarton, and Sir William Thompson (better known as Lord Kelvin), to whom as a young man I was indebted for much personal kindness.

I have always considered myself fortunate in having spent over six years of my early business life on Clydeside. Everyone recognises the part Scotsmen have played in the development of Marine Engineering, Shipbuilding and Shipping. It was my good fortune while residing in Scotland to meet some of the men who, whether on the Clyde, the North-east Coast, at Belfast or elsewhere, were largely responsible for the modern development of the British Mercantile Marine — men whose

judgment, enterprise and industry were only equalled by their integrity and high character. I do not doubt that such qualities abound to-day among the members of this Institute, which is the best guarantee for the maintenance of British prestige and achievement.

Another of your past Presidents with whom I was closely associated for many years was my late friend Viscount Pirrie, the Chairman of Harland and Wolff.

It was probably on account of my connection with that Firm and its Marine Engineering establishments that I was invited to become your President, and also because as a Shipowner I am deeply interested in the practical side of Marine Engineering and in the problems of the Marine Engineer.

Development of Transport.

It is little more than a century since mechanical means of locomotion became an economic proposition, and the higher standard of life now enjoyed in all civilised countries is undoubtedly due largely to the utilisation of mechanical contrivances.

On Land.

On land, transport in the past hundred years has been revolutionised by the steam engine; and latterly, even more rapidly, by the adoption of the internal-combustion engine in the motor-car.

At Sea.

The history of Marine Engineering is both interesting and instructive. From modest beginnings it has grown within a comparatively brief period to be one of the great industries and technical professions of the day.

As there is more than two and a half times the area of water than of land on the face of the globe, Marine Engineering has played an all-important part in the phenomenal development that has taken place in the means of transport and the interchange of commodities between widely separated communities.

The evolution of transport by sea proceeded from the sailing ship to the steamer, and the method of propulsion has progressed stage by stage from the old compound engine of the mid-nineteenth century to the triple-expansion reciprocating engine—which was a great step in advance; then to the quadruple-expansion reciprocating engine; followed by

the direct-driven steam turbine and the geared turbine; whilst at the present time modern high pressure steam and motor engines constitute what are perhaps the most interesting and potentially important developments of all.

In the Air.

In the air, the internal-combustion engine has advanced in practical service from what was not long ago regarded as a venturesome experiment to a recognised and comparatively safe means of conveying passengers and mails on regular itineraries.

I am not one of those, however, who believe that the importance and progress of Marine Engineering is likely to be affected within any measurable period by aero nautical developments; or that the sea-going Engineer will be superseded by the Airman, except in the case of passengers desiring to make very fast journeys and prepared to pay the additional expense involved.

Whatever marvels the future may have in store, I am convinced that none of the three mediums of conveyance we now have, viz., by land, by sea and by air, is likely to be supplanted by the others, and that there is ample scope for free and unfettered development in all three spheres, which are really complementary to one another.

The public imagination was deeply stirred by the recent flight of Sir Alan Cobham to and from Australia, an event of outstanding significance which opened up new vistas of future possibilities.

At the same time, without minimising that remarkable achievement, one may recall that, whilst the total time occupied by Sir Alan Cobham on the outward journey from London to Melbourne was forty-seven days, and on the homeward journey was thirty-four days; the time taken in making the passage between London (via Marseilles) and Melbourne by the P. & O. is twenty-nine days. In other words the journey by air took longer than the normal time occupied on the ocean route.

Internal-Combustion Engine.

In Engineering, the outstanding feature of the first quarter of the twentieth century has been the rapid adoption and de-

velopment of the internal-combustion or motor engine, and its general application to practical and economic uses in transport by land, sea and air.

Overseas Communications.

One of the greatest problems of our time is that of still further accelerating, on economic lines, the means of communication between the nations of the British Realm and to and from all parts of the world. So far as ocean transport is concerned, it is the province of the Marine Engineer to solve the problem. The application of the internal-combustion engine to ships is significant in this connection, marking, as I believe, the beginning of a new era in overseas communications.

Marine Motor Engines.

No doubt you are aware that for many years the Firm of Harland and Wolff, under the late Lord Pirrie, devoted special attention to the introduction and development of marine motor engines.

This Firm, after very careful deliberation, adopted a type of motor engine that has already been installed in two hundred and eighty vessels, and with the motor ships at present on order there will be no less than three hundred and sixty vessels installed with this type of machinery, the ships aggregating two million gross tons with one million and a quarter I.H.P.

Motor Vessels.

It is now over ten years since the Shipping Companies of which I am Chairman first placed motor vessels in commission. At the present time they have over fifty motor vessels either in service or building. Those now running have covered altogether seven-and-a-half million miles.

The question of the future of the motor vessel, therefore, is one in which I take a keen interest. As it has attracted much public attention generally and occupies so prominent a place in the discussions of Marine Engineers in particular, I feel you will not consider it inappropriate if I deal with this subject from the practical and economic standpoint. Of its technical aspects the skilled engineers present are far more qualified than I to speak.

Lord Inverforth, in his Presidential Address last year, dealt very ably with the problem from the point of view of his ex-

perience of the merits of cargo motor vessels, so I propose to speak more particularly of passenger motor vessels.

Passenger Motor Vessels.

In November, 1921, the first passenger motor vessel in the world was put in commission, viz., the *Aba*, for the West African Mail Service of Elder Dempster and Co. This vessel has been followed by passenger motor vessels on a number of other ocean routes.

Notwithstanding the success already attained, there are enterprising British shipowners who are apparently still not convinced as to the suitability of the motor engine for propelling passenger ships of nearly all dimensions and speeds.

Considering the advantages offered by the motor engine, it can only be surmised that hesitation on the part of some British shipowners in building motor vessels arises from the same national characteristic of caution as delayed the adoption of the turbine when it was introduced. Yet the Cunard Liner *Mauretania* is a complete vindication of the bold step that was taken twenty years ago in ordering a vessel to be equipped with machinery of such enormous horse-power of the latter type.

It will be remembered by the members of this Institute that the same hesitancy occurred in adopting geared turbines, but many fine vessels, including the *Orama*, *Otranto*, *Minnewaska*, *Minnetonka*, *Arundel Castle* and *Windsor Castle*, as well as the famous H.M.S. *Hood*, have been fitted with this type of machinery and are giving satisfactory service.

The same factor of caution seems to be retarding the more general adoption of the marine motor engine in this country, notwithstanding the economic advantages which it possesses.

Nevertheless, immense strides have been made in a comparatively short period in the advancement and adoption of the motor engine. Only a year or two ago one thousand B.H.P. per cylinder was considered quite a big approach towards high powers, whereas at the present time in Hamburg there is a fifteen thousand S.H.P. engine running with power per cylinder of roughly sixteen hundred B.H.P., and new projects are being devised where the power per cylinder will require to be two thousand B.H.P. and upwards.

In my opinion, it is now established beyond doubt that for most trades and for almost every class of vessel up to the

largest ocean-going passenger ship, the motor engine is not only suitable but more economic in working than other types of machinery. I do not consider it beyond the bounds of possibility that future mammoth Atlantic Liners will be fitted with motor engines.

I believe that the advent of the motor engine has come to be regarded seriously by practical Shipowners, and that its general adoption in most trades will not be delayed beyond a reasonable time. Economic facts and actual results support the view that the further development of the passenger motor vessel is inevitable.

The present year has witnessed the placing in commission in the South American trade of the *Asturias*, the largest passenger motorship in the world, of 22,500 gross register tons, fitted with two sets of double-acting motor engines aggregating over 20,000 H.P. In the South African Mail Service the *Carnarvon Castle*, of over 20,000 gross register tons and 20,000 H.P., yesterday satisfactorily completed her second round voyage.

The passenger ship fitted with motor engines has many advantages over that driven by steam engines, some of which I will briefly mention:

Reliability.

Up to a comparatively short while ago doubts as to the reliability of motorships still existed. These doubts, so far as they were justified, were due partly to some minor failures arising from instances of faults in detail of design, which have been successively eliminated, and possibly to a larger extent to the difficulty in the earlier stages of always obtaining a staff of Marine Engineers familiar with Diesel engines.

Reliability is closely identified with cost of upkeep, and from a wide survey I am impressed with the difference which results in the latter with a well co-ordinated staff of expert Engineers.

The experience of Shipowners who have operated motor vessels is that the passenger motor ship, as well as the cargo motor vessel, is both reliable and dependable.

Vibration.

Contrary to expectations, in the matter of vibration modern motor vessels compare favourably with steamships.

No ship is altogether free from vibration, as much of that experienced arises from the action of the propellers. Even in the case of the faster turbine ships, as is well known, vibration due to this cause has been serious and objectionable. In the case of Diesel machinery vibration from the engines has recently had special expert attention, with the result that, so far as the passenger accommodation is concerned, it is practically non-existent.

Cleanliness.

Owing to the oil being infused and completely burned in the cylinders, no smoke is given off as is the case when either coal or oil is burned under boilers. The motor engine, therefore, enables a passenger vessel to be maintained in a better state of cleanliness, whilst the dust and dirt inseparable from coaling are entirely avoided.

Increased Space Available for Cargo.

Owing to the motor engine occupying less room than the steam engine, with its extensive boiler rooms, especially in the case of vessels of higher speeds, and to the enormous reduction in bunker capacity due to much of the fuel being conveyed in the double bottom, a motor vessel can carry a larger quantity of cargo than is possible in a steamer of the same dimensions and speed.

Cheaper Running Costs.

Experience of operating large passenger motor vessels shows that considerable economy can be effected in actual running costs.

In the all-important matter of fuel consumption, taking ships of the same size and speed, motor engines consume one ton of oil against four or five tons of coal required by reciprocating steam machinery.

In regard to the relative cost of fuel, it is difficult to make an accurate comparison because of the variation in the price of coal at different ports, but normally, in the case of passenger vessels, one ton of oil may be said to cost approximately two-and-a-half times as much as one ton of coal.

The economy in quantity and cost of fuel in motor vessels as compared with steamers can thus be readily appreciated, and the recent coal strike, involving enormously enhanced cost of bunker coal, emphasised this aspect of the matter.

There is also the consideration that, in the case of motor vessels, the long and costly operation of coaling is eliminated, whilst the quality of oil is not so variable as the differing kinds of coal available.

Speed.

The problem of the speed of both passenger and cargo vessels is, as is well-recognised by all practical men, governed by economic considerations.

Whilst, in the case of a steamer, greater speed on long-distance runs is only attainable at the sacrifice of valuable cargo space in order to carry the extra quantity of coal that is necessary, the speed of a motorship, on the other hand, can be increased without a corresponding sacrifice. The bulk of the fuel required to be taken on board in the case of the motor vessel is relatively considerably less and is more conveniently carried, so allowing more space for the conveyance of cargo than in a steamer of the same dimensions and speed.

In cases where speed is all-important the ratio of aggregate cost of higher speeds is less in vessels fitted with motor engines than in vessels fitted with steam engines.

In a ship burning coal, increase in speed also involves a rapid augmentation of the stokehold complement to handle the greater daily consumption, but there is no corresponding increase with motor engines.

These and other obvious advantages lead me to believe that it is the passenger motor vessel which in the future will hold its own as a commercial proposition in the great majority of trades; but there are some other considerations that cause hesitation when comparing motor ships with steamships to which I will refer briefly:

Initial Cost.

The 'first cost' of the motor engine is at present still somewhat higher than that of the steam-driven engine, with the possible exception of the latest high-pressure turbine, but those who have had sufficient experience of both types of machinery are satisfied that the additional capital outlay is more than offset by the results in service.

This difference in cost is more pronounced in engines of smaller powers. The successful advent of the Double-Acting Diesel Engine is reducing that difference to a degree which, at the higher powers, may altogether disappear.

Moreover, the motorship, like the motor car, lends itself to methods of standardisation. The more extensive application of these to motorship construction may prove the solution of the problem of the greater initial cost.

Cost of Upkeep.

I have heard it stated by owners contemplating building their first motorships that they are apprehensive lest the upkeep of motor machinery should prove more costly than in the case of a steamer, probably because of the larger number of working parts.

Whilst this is, of course, a matter which cannot be definitely established without actual experience covering a considerable period of years, I may say that, as the result of my own ten years' experience of motor vessels, I am satisfied that the cost of upkeep and repair of motor engines is not unduly high as compared with steam engines.

As operating motor Marine Engineers gain more experience of the running of motor machinery, there is reason to expect an appreciable reduction in the expenses of upkeep until they are actually lower than the cost of maintaining in good condition the machinery and boilers of a steamer.

Cost of Overhaul.

The question of overhaul is naturally an important one in considering passenger motor vessels.

Owners of motor vessels readily acquiesced in the requirements of the Board of Trade in regard to the opening up of machinery, as they realised that, in the earlier stages of the adoption of motor engines for passenger vessels, it was important and desirable that surveyors should have every possible opportunity of assuring themselves of the satisfactory working of this new type of machinery and, in some cases, possibly, of adding to their personal experience of motor engines.

Looking to the experience now available, I cannot help feeling that the time has arrived when the existing Board of Trade Regulations with reference to the examination of the machinery of motor vessels should be carefully reconsidered, with a view to some further modification of the arrangements that were originally imposed as a precaution in the initial stages of this modern method of ship propulsion.

Shipowners are ready and anxious to fulfil all reasonable requirements to ensure the safety of their ships at sea, but at a time when British shipowners are experiencing intense competition from the owners of foreign motor vessels, all avoidable expense necessitated by official regulations is to be deprecated.

I understand there is no periodic Government Survey of locomotive boilers or machinery, although the failure of a locomotive tyre, coupling rod or connecting rod might conceivably involve quite as serious consequences as any possible mishap to a marine Diesel engine.

Depreciation.

Whilst no definite basis can be laid down until more experience is available in regard to the rate of depreciation required to be provided in the case of passenger vessels fitted with motor engines, I do not think that anything exceptional need be anticipated in this respect.

Marine Engineers and Motor Engines.

The adoption of the internal-combustion engine for ships has brought about great changes in the marine engineering establishments of the country, and has opened up fresh avenues of achievement for the engineer on shore. It has also provided a new branch of skilled employment for the sea-going engineer.

The development of the marine motor engine is of particular interest to the engineering personnel of the mercantile marine, as the operation of the marine motor engine requires special knowledge and skill, and an increasing number of qualified engineers will be needed for motor vessels as they gradually but steadily replace steamers.

I believe young marine engineers will find it to their advantage to qualify as marine motor engineers, and every encouragement should be given them in obtaining the necessary training and experience.

When recently looking through a list of young marine engineers who, after qualifying as marine motor engineers, had resigned, I was interested and pleased to note that a number of them had secured good posts on shore in various parts of the world.

Fuel Supplies.

The adoption of the motor engine has an important bearing upon the great problem of the economic utilisation of the fuel supplies of the world, and the conservation, with some regard to posterity, of the sources of motive power.

At the present time twenty-eight per cent. of the shipping tonnage of the world is burning oil fuel under boilers. I cannot conceive that this is other than a transitory expedient. It is an obviously wasteful method that must inevitably give place to a more scientific and economic utilisation of oil. The production of oil is at present maintained at a level which suffices to meet the world's requirements, but the reserves of oil, because they are locked up in the bowels of the earth, must of necessity be an unknown quantity.

For my part I do not share the pessimism expressed by some famous scientists from time to time on this subject.

The economy in the use of oil in the motor engine illustrates how unnecessary and extravagant is the present method of burning oil under burners.

As the demand for the production of oil for internal combustion engines becomes more pronounced, there is no reason to doubt that this will be met. There are already indications that it will be possible, owing to the developments in the treatment of crude oil, to bring the price of oil fuel, whether for burning under steamers' boilers or for internal combustion engines, more to a parity. If and when this stage is reached, the economic advantages of the motor engine will become more apparent and pronounced.

Production of Oil from Coal.

I would like to take this opportunity of again emphasising the importance, not only to British Shipping but to the Nation as a whole, of continued research in the direction of the commercial practicability of obtaining oil from coal, so as not only to render British Shipping less dependent for its fuel upon oil from foreign countries, but also to help to restore prosperity to the British Coal Trade. I regard this matter as a vital one for all concerned.

General.

Having surveyed briefly the main factors of importance in connection with the motor engine, I think it is fairly obvious,

as the result of practical experience, that there are very distinct economic advantages in most cases in favour of the adoption of this up-to-date type of marine machinery.

Whilst one obstacle in the way of the more extensive adoption of the motor engine in this country is the natural reluctance of our people readily to embrace any new system in place of older ones, which was manifested when earlier types of marine machinery were successively superseded by later forms, it cannot be doubted that another reason for the less rapid adoption of the motor engine by British Shipowners has been the higher initial cost of installation.

I realise that, at first sight, the higher cost of the motor engine may incline Shipowners against its adoption, but if one takes the long view and considers all the factors, it will I believe be found that the additional interest and depreciation involved in consequence of the higher prime cost of the engine are more than offset by the various economies in operation and the greater revenue earning capacity of both passenger and cargo motor vessels.

Foreign Motor Shipbuilding.

Whether or not the adoption of the motor engine by British shipowners for high-class passenger tonnage is to increase rapidly, the fact must not be overlooked that our Continental competitors are relying more and more on passenger motor vessels to enhance their positions in the shipping trades of the world.

In this connection the following comparisons deduced from the latest returns of Lloyd's Register are interesting. Of the combined tonnage of vessels of 100 tons and over (exclusive of sailing ships) under construction in the United Kingdom at the present time, thirty-five per cent. is motor and sixty-five per cent. is steam tonnage.

In foreign countries, the motorship tonnage building is fifty-seven per cent. of the total and the steamer tonnage forty-three per cent. Of the total tonnage building throughout the world forty-eight per cent. consists of motor vessels and fifty-two per cent. steamers.

The significance of these figures has probably not been fully realised, but the result is likely to constitute a handicap to the British Mercantile Marine.

Since the War the competition of foreign countries in the carrying trades of the world has become much more acute than ever before. The seriousness of this competition has been augmented by various forms of State-aid in the shape of direct subsidies, discrimination, etc. To this will be added the large amount of foreign motorship tonnage which will shortly be competing with British Shipping.

Looking to the future, therefore, those who are anxious to maintain this country's pre-eminence in the high-class passenger trades of the world have to consider very carefully whether the motor engine should not be more widely adopted in the replacement of old tonnage.

Great Britain has established and built up many of the great shipping trades of the world and has maintained the leading place among the maritime nations. This proud position is being more than ever seriously assailed by foreign shipowners who, having benefited by our experience, have entered the field and, in some cases, have even gone ahead of us in the provision of up-to-date tonnage.

Empire Communications.

One of the most important subjects dealt with by the recent Imperial Conference was that of overseas communications, and the possibility was considered of further improving the means of transport between the component parts of the British Empire.

This is a proposition which necessarily can be achieved only by means that are commercially and economically practicable.

The Imperial Conference has emphasised once again the nature and resources of the widespread commonwealth of nations within the British Empire, and I hope and believe that we stand on the threshold of a new era of progress and development.

This forward movement can but come through closer Imperial intercourse, which can only be attained by an alert acceptance and exploitation of the most up-to-date discoveries and achievements of the technical expert.

It is in this direction that a great work lies before the Marine Engineer which will help to strengthen the ties of Empire and to develop still further trade and travel, not only between Great Britain and the British Dominions and Colonies, but to and from all parts of the world.

Looking ahead, I am convinced that, so far as British engineering skill and ingenuity are concerned, we may confidently rely upon maintaining and improving the great position of British shipping in the overseas trades of the world, and that British shipping will not be left behind in the race.

Conclusion.

Now that we have just emerged from the most protracted coal stoppage in our history, we may usefully ask ourselves how we stand and what are the prospects for British industry, trade and commerce.

Though this strike has inflicted immense losses on workers and employers in the coal trade and in many other industries dependent upon coal, as well as upon the country generally, it has disclosed more strikingly than before the wonderful latent resources of the Nation and its ability to carry on in the face of great obstacles and difficulties.

Consequently, while we have a lot of leeway to make up, the termination of this great strike finds us in a better position than might have been anticipated.

It has become a commonplace to say that, given freedom from labour troubles, British trade and commerce should enter upon a new era of progress and prosperity, but again and again the condition of industrial peace, upon which such hopes depend, has been unfulfilled.

Surely now, eight years after the Armistice and with the general strike and the coal strike over, we may look for a period when sanity will prevail and all men of goodwill will recognise that the only way to secure and maintain a better standard of life is to co-operate strenuously to promote the industries and trade of the country.

We have passed through a critical and difficult period, but if we have learned the lessons it has taught we shall, I believe, emerge stronger and more able to hold our own in the future.

Shipping reflects the state of the country's trade, and there are now indications of betterment in various directions which I hope will materialise and steadily increase.

British Shipowners, though faced with more serious foreign competition than before the War, are keeping their fleets and organisations abreast of the times and will, in my opinion,

fully maintain their pre-eminence in the carrying trades of the world when the general all-round improvement in trade takes place, which we all hope to see in the not far distant future.

Mr. R. S. KENNEDY (Chairman of Council): It is my pleasant duty to propose that we express our thanks in the usual way to our President. It is hardly necessary to say much to you about Lord Kylsant as his name in Shipping and other circles also is well known. He is President of the British Imperial Council of Commerce, Past-President of the London Chamber of Commerce and of the Chamber of Shipping. In his address he referred to railway work, and I may mention that he is a Director of the Southern Railway. It is neither permissible nor in order for us to discuss our President's address, but one may be permitted to say that by reason of the qualifications I have mentioned we may be certain that we have in this address something authentic and well worth hearing. The Address will appear in our transactions and can then be studied carefully. Lord Kylsant is most highly qualified to speak of the latest means of propulsion. One can certainly say that he has had the courage of his convictions, and we wish his enterprise every success.

We are glad to hear in the latter part of his address that in his view the future holds every promise for the Old Country, and we can assure his Lordship that as far as the Marine Engineers are concerned they will strive to support him and his brother shipowners to keep the Old Country in the front.

It is with great pleasure that I ask you to pass a most hearty vote of thanks for his most able, thoughtful and interesting address. (Cheers).

THE PRESIDENT: I thank you for the very kind way in which you, Mr. Chairman, have proposed, and you, gentlemen, who received this vote of thanks.

I am a very busy man, and I feel that I have hardly been able to do as much, as your President, as I had hoped to do. I very much appreciated your invitation to become your President, and I hope that you will look back on my term of office as one in which the Institute has prospered. (Applause).

———o———

STATUS OF THE ROYAL NAVAL ENGINEER OFFICERS.

In view of the Deputational Meeting to be held on Tuesday, December 14th, the Council of the Institute of Marine Engineers gave consideration to the subject and decided that the opinions formerly expressed and conveyed to the Deputation and to others deeply interested, be emphasised in order to ensure a decided course of action being taken to uphold the rank and status of the Royal Naval Engineers.

A Committee was appointed to discuss the points which have been noted in the Press from time to time, since the question was raised, due to the recent Admiralty transformation of the Regulations. The Committee met on December 9th and arrived at the following conclusions to support the further action of the Deputation in placing the matter before the Admiralty again, that the whole subject may be viewed by the Admiralty in the right spirit and with the grace of courtesy "Pro Patria."

We are firmly of opinion that should the new order be carried out, it will most seriously affect the future entrant, and no doubt will retard the candidates of the best type from joining the Engine Branch of the Royal Navy. This has already been ably put before the House of Commons by Sir M. Macnachten, M.P., and others during the Report on Navy Votes on March 22nd, 1926. (See "The Times" of March 23rd, 1926.)

In Mr. Bridgeman's reply, the subject was glossed over by continued references to uniform, which, in our opinion, does not touch the crux of the question at issue.

It is earnestly hoped that the whole question will be definitely placed again before the Admiralty by the Deputation, and lead to the wisest and best conclusion for our national good.

The suggestion made by the Duke of Montrose that the Engineers Officers should be represented on the Board of the Lords of the Admiralty, was advocated by the Institute of Marine Engineers many years ago, in order to promote homogeneity between the Deck and Engine Departments, and it is now more important than ever that the suggestion should be carried into effect.

JAS. ADAMSON,
Honorary Secretary.

December 10th, 1926.

Copies of the above were sent to the members of the Deputation Committee, our President, Past Presidents and others specially interested.

Annual Dinner.

Friday, October 29, at 6.30 p.m.

CHAIRMAN: THE PRESIDENT.

A reception was held by the President at 6.30, when he welcomed the members and guests at the Hotel Cecil, and afterwards led the way to the dining-room.

The *Loyal Toasts* were submitted by the President and heartily supported.

Lord INVERFORTH, proposing the toast of the *Naval, Military and Air Forces of the Empire,* said the Institute afforded an excellent medium for the interchange of views and ideas on things mechanical pertaining to the fighting services. The British nation, with its multifarious interests in every part of the world, must necessarily have at her disposal adequate forces to enable her to discharge her great administrative responsibilities, and the success and prosperity of her commerce was entirely dependent upon the maintenance of open trade routes. The people of the Empire as a whole were averse to war, but they had to recognise that the method of arbitration as a means of settling international disputes had yet to justify itself. Personally, he was afraid that it would be a long time before they were able to get away from the old maxim that the surest way to preserve peace was to be prepared for war. He also felt that prosperity for the nation could only be achieved so long as she remained immune from outside interference. It was up to the people, therefore, to observe yet another time-honoured maxim, "Mind your own business." Lord Inverforth concluded by referring to the great development of the internal combustion engine, and declared that still greater advances in connection with its adaptation to marine work would be seen ere long. The shipowner, he said, would never again be content to place himself at the mercy of the coal miners.

Engineer Vice-Admiral Sir ROBERT DIXON, responding to the toast on behalf of the Navy, said that with the reduction of the Fleet, the policy of maintaining and increasing its efficiency had become of paramount importance. In this connection it was to engineers, and particularly to marine engineers, that they looked for help in solving many difficult problems. In the next war no doubt they would have many more difficult problems to face, a great proportion of them due, no doubt, to that young but very enterprising sister service—the Air Force.

He had no doubt that should circumstances require it the Navy and the Mercantile Marine would work together and collaborate as heartily and efficiently as in the past.

Lieut-General Sir TRAVERS CLARKE, replying for the Army, said he felt it was appropriate for a soldier to speak at an engineer's banquet, because the gun was the parent of the internal combustion engine, and still remained the most efficient apparatus for converting heat into work. Moreover no mechanical engine in the world could raise steam at anything like the speed of a Maxim gun.

Sir BURTON CHADWICK, M.P., proposed the toast of the *Mercantile Marine*. It will be of interest to you, sir, and to this great community of men of the sea, that the merchant seaman is getting a little more of the public notice than has been his wont hitherto. For instance, there has been quite a little correspondence in "The Times" the last few days in regard to the participation of the Merchant Service in the Armistice Day ceremonies. Some days ago attention was called to the omission of the mention of the "Merchant Service" in announcements that were made about these ceremonies: That was followed by a letter in "The Times" from the Home Secretary, and I see there is another letter to-day. That particular incident seems to have arisen out of a misunderstanding, but for my part, as a seaman, it is gratifying to me to know that public attention is being more drawn to what I have always felt to be a very great injustice to the men of the Merchant Service, namely, the indifference of the general public as to the nature and the value and the vital importance of this service to our country.

No one is to blame, because being a commercial service, it is very difficult to get any central authority which can speak for the Mercantile Marine. Every company, every ship is a unit in itself. It has its own interests, its own responsibilities, and being a moving quantity, and the men themselves being seldom long in any one place for a given time, there has not been the same opportunity that is given to other services and professions, and so the Mercantile Marine, on the seamen's side, has not had the opportunity of taking its part on the social side of our national and Imperial life. On the shipowners' side it is quite different. They have their important bodies, such as the Chamber of Shipping and other associations; they have their annual dinner and celebrations; and they are able to take their appropriate part.

Again, the marine engineers have been more fortunate and wiser in their generation, because you have this great Institute of Marine Engineers, which is able to take its part in the public life of the country, as you are doing by this important annual dinner. But recently, to fill this long-felt want, a hundred of the leading British merchant service officers have come together and they have formed a company to be known as "The Company of Master Mariners," and that company is designed to fill this serious gap on behalf of the merchant service officer. It has been received with the utmost cordiality by his Majesty, by the Prince of Wales, by the great institutions, such as Lloyd's and Trinity House, by the shipowners and by the men of the service, and here I am especially charged, as deputy-master of that company, to offer to the Institute of Marine Engineers our cordial thanks for the help that they gave us some years ago in allowing us the use of their boardroom in the institute for our early meetings, for although the first meetings of the founders of the "Company of Master Mariners" were held in Liverpool, the first meetings in London were held at the Institute of Marine Engineers, and I am perfectly sure it will be gratifying to your institute to know that you have afforded assistance in the building of a great structure by your brother officers.

It was a pleasure to hear a Colonial Premier describe the Merchant Service as the "greatest industry in the British Empire." As an old seaman himself, he was highly gratified to notice that the Service was attracting a greater share of public attention than it had ever done in the past. After all, the Navy, the Army, and the Air Force alike could do practically nothing without the continual co-operation of the Mercantile Marine. He had recently seen a good deal of the conditions in the Service and he could not help comparing the lot of the lad who went to sea nowadays with his own experiences. He well recalled that he signed on for his first voyage at a wage of thirty shillings a month, and even after he had taken his "master's ticket" he was obliged to work for some time for four pounds a month. As a youth, he had stood and watched the cabin steward put a dish of potatoes into the ship's hen-coop and he was not ashamed to confess, that as soon as that steward's back was turned he dived into the coop and ate the food himself. Such incidents, of course, no longer happened aboard ship. One could not, for instance, conceive of the ship's cook springing at the word of command from his galley to the fore sheet as he had to do in the old days. Indeed he

supposed that if it was ever desired to give such an order in these times it would be necessary first to send wireless messages to the Transport Workers' Union and the Labour Bureau of the League of Nations at Geneva in order to obtain the necessary permission.

Sir GEORGE HIGGINS, C.B.E., in reply, said Sir Burton Chadwick and I have much in common, but we differ in outlook. He, as the Parliamentary Secretary to the Board of Trade, looks at the Mercantile Marine from the point of view of the State; he has also the advantage of the intimate knowledge of a master mariner. As deputy-chairman of Lloyd's Register, and looking at the question in the broad interests of the Mercantile Marine, it is my concern to see that the ships of the Mercantile Marine are fit to go anywhere, and to do everything they may be called upon to do.

Sir Burton has this advantage over me—that the better I do my work, the better and easier it is for him. You all know what "A1 at Lloyd's" means, and I am certainly doing my best to maintain that high and world-famous tradition. I anticipate you expect me to say a few words on the present shipping position. Owing to the lamentable stoppage in the British coalfields, those employed in the shipping trade are living under artificial conditions—conditions, unfortunately, that are very detrimental to the country. Instead of exporting coal from this country to ports abroad (last year this export amounted to 54,000,000 tons), the procedure is reversed, and we are engaged in carrying coal and other kinds of fuel to this country.

If anyone a few years ago had said that shipowners could have made a fair living out of bringing coals to Newcastle, we would have been regarded probably with pity, contempt or incredulity! It is true that while this state of affairs lasts a certain class of shipowners is benefiting by the comparatively high rates of freight obtainable, but the profit derived from this business is not so great as some people imagine. The enormous rise in the price of bunkers; the congestion experienced at loading and discharging ports, and the delays on passages owing to the inferiority of bunkers must all be taken into account. On the other hand, the increased cost of coal must be causing very heavy loss to some of the great liner companies who still have coal-burning vessels engaged in their trades. To these the extra operating costs must be enormous. One can only hope that a settlement of the dispute in the coalfields will

be speedily arrived at and that the aftermath of this misfortune may be the end of misunderstandings and mistrust amongst those engaged in the production of the country's greatest exportable commodity.

I must, for a moment, remark—being very closely in touch with the facts—on the increasing tendency of the world to use oil instead of coal. There are at present something over 1,850,000 tons of shipping being built, of which nearly 50 per cent. is to be driven by oil engines, while there are no less than a quarter of a million tons of tankers being built. I may, perhaps, put it in another way—we know there are something like 525 sets of engines being built, and of these only 254, or less than half, depend on steam, and if we omit vessels which are driven by steam turbines (on the assumption that they will have oil-fired boilers), there are only about 40 per cent. of engines which are dependent on steam. This is the first time I have been privileged to address you at one of your functions, and I am fortunate in having the opportunity of stating these important facts. They have given me much cause for reflection, and, I do not doubt, will occasion consideration by yourselves. The engineering profession is by nature one which produces inventors, and, now more than ever, owing to the problem which this change of motive power must present, is the opportunity for the exercise of those abilities which aim at the cheapening of power costs, with due consideration to maintaining efficiency.

Lloyd's Register has many opportunities of acquaintance with inventors and inventions. We are keen to encourage them, and I think I may claim that we have endeavoured so to encourage and to help forward all new developments, although of course, in view of our responsibilities, we are rarely in a position to give the inventor all he wants and may claim.

In thanking Sir Burton Chadwick for the kindly terms in which he has proposed this toast, I should like to testify to the cordial relations which exist between his department and the society which it is my privilege to represent to-night. This feeling is, I know, also shared by shipowners throughout the country, and I am happy to be able to record it.

The toast of the *Chairman*, which was received with great enthusiasm, was given by Sir Joseph Cook, P.C., G.C.M.G., who referred to the great attainments of Lord Kylsant and the widespread interests with which he was associated in connection with the shipping industry, both in the building and in

the voyaging of ships to different parts of the world. In Mr. Archibald Hurd's recent book Lord Kylsant was included in what is now known as the "big five" shipping magnates of this country. Lord Kylsant was big in more ways than this. He was in addition to being a big shipper, a big citizen and a big gentleman.

Sir Joseph added that it had been a pleasure to him to attend the dinners of the Institute year by year, and it was an additional pleasure to propose the toast of the President on this occasion.

The Chairman expressed his thanks for the reception accorded to the toast and for the cordiality which had been a feature of the evening.

The proceedings closed with the usual hand shake and Auld Lang Syne.

———o———

Notes.

War Memorial to the Mercantile Marine.—A Bill has been introduced into Parliament, somewhat late in the day, for the erection of a Memorial to those who lost their lives during the war while serving in the Mercantile Marine. It is proposed to place the Memorial, with the names of the lost inscribed upon it, in the garden above the Tower, adjoining Trinity House.

The Mercantile Marine was represented at the celebrations this year at the Cenotaph, Westminster, and formed a fitting prelude to the proposed erection of a Memorial on Tower Hill. There were many under whose names may be inscribed the line, "Aqua involvens, navemque virosque."

From "The Metal Industry," September 10th:—

For many weeks the metal industries have been living from hand to mouth, so far as fuel has been concerned. There has been a little, a very little, good British coal available. There has been rather more foreign coal, of sorts, coming into the country, and industry has put up with it as best it could. Gas has been substituted, in many operations, but gas, in these circumstances, resembles closely Marie Antionette's cakes, seeing that to make gas, coal is needed. The price of gas has now risen to nearly the point where its cost, in industry, becomes prohibitive. It is not surprising that the metal indus-

tries have had increasing recourse to oil fuel. It is cleanly and efficient, and either costs no more, or only a little more than coal. Finally, there is pulverised fuel. This does not necessarily involve the pulverisation of good and costly coal. Coal of very inferior description can be efficiently burned in the right sort of burner, under the right sort of conditions. An article which appeared in these columns last week showed that this is no empty claim. The increased use of low-grade fuel in a pulverised fuel system can make an important economical contribution to the solution of the fuel problem that awaits us.

The problem is an important one, and the question often arises whether the water flow cannot be utilised to a greater extent than it has been for the production of power in the land.

The appointment of a Committee, arising from the Royal Coal Commission Report to consider and advise upon the subject of the economic use of fuels and energy for industrial service is excellent and ought to be of value to the country.—J.A.

From "The Foundry Trades Journal" of September 6th:—

Essential Supplies.—The coal stoppage has thrown on to the foundry industry of Great Britain a burden which the industrial conditions of the last five years have ill fitted it to support. Yet through all, it adapts itself in a really splendid manner to the ever-altering circumstances. Since the inception of the coal dispute its normal sources of raw materials have been gradually drying up, yet in spite of everything, one large foundry owner stated to us last Saturday that not an hour had been lost since May 1st, while another prominent foundry owner tells of a record output for both July and August. They both own foundries which are technically well equipped. Coke to them is an aggregation of fixed carbon, volatile matter, ash and sulphur, whilst pig-iron is a complex alloy, the constitution of which has to be determined before use. Thus equipped they have been able to utilise Westphalian coke, or Dutch pig-iron, or other foreign material without noticing any appreciable effect on quality. Obviously, selling prices have had to be adjusted, but admirable restraint has been exercised by the majority. It is less than a fortnight since one large steel foundry notified its customers of an increase in price. We are constantly being asked whether we would advise extensive future Continental buying owing to a possible general resumption. Whilst refraining from pro-

phesying, it can be stated with a good deal of certainty that the demand for coke and pig-iron is likely to be heavy for a considerable period, until stocks have become normal. Some of the foreign material, especially certain consignments of coke, have been of poor quality. Those founders who have been unable to use it with complete satisfaction will return to their normal supplies as soon as possible. This will tend to stiffen the price of the home-produced material as compared with pre-strike prices and to depress the price of imported material. Thus we doubt if forward buying would be advantageous, though it will be necessary in many cases to continue utilising these sources for some time to come—at a minimum two months. If not so serious, it would be positively humorous to chronicle the expressions of opinion various foundrymen have vouchsafed to us on the subject of, say, German coke. They are either loud in their praise or positively blatant in their condemnation of what they erroneously conceive to be an average sample.

Whilst everybody hopes that this will be the last of national coal strikes for at least a decade, it would be of advantage to the British foundry industry if the individual members would ascertain the source and circulate the result, so that in an emergency quick access could be made to the best market. It would be information of a very valuable type, and worthy of filing in that complete foundry organisation for which we are constantly striving, and the counterpart of which already exists in Germany.

"The Scots Observer" of November 20th, has the following editorial note:—

Now that the most disastrous industrial stoppage in our history is approaching an end, we would impress upon both sides the necessity for taking to heart its obvious lessons and acting upon these as soon as may be. If these things are not done, the settlement which is likely to be arrived at within the next few days will bring only a temporary armistice and not a real peace. It is absolutely necessary, in the first place, to cast out bitterness and avoid recriminations. Post-mortems in such cases are worse than futile. Let the dead past bury its dead. Our concern is with the future. Let the miners get rid of the notion of defeat; let them admit frankly that they have not yielded to the owners, but to economic circumstances, which are stronger than any federation or association or

Government. Let the owners, for their part, remember that there can be no real peace or progress without a sympathetic recognition of the natural desire of the miners for effective organisation and for a greater share in the conduct of the industry. Coal-mining, even under the best underground conditions, is a hard and dangerous occupation. Those who are engaged in it are entitled to the highest wage the industry can afford. At the back of nearly all the trouble in coal-mining has lain the fact that the miner was—more or less—regarded as a living piece of coal-getting machinery. It is the business of coal owners and also of the miners, to alter this, and to establish a relation of real partnership. The "human touch" must not remain a mere sentimental abstraction, it must itself act concretely in the actual working of the pits and in frank and friendly dealings between the owners' and the miners' organisations. Coal-mining, as the public has had cause to learn since the publication of the Coal Report, is one of the most intricate and difficult of all industries, if only because of the wide differences, geological and commercial, between, and even within, the various districts and areas.

"The Compressed Air Magazine," New York, contains much interesting matter of general as well as of specific interest. The articles deal with the services performed by compressed air, and various paragraphs are occupied with industrial progress notes. Copies may be seen in the Reading Room. In one issue it is stated that a safe in one of the American Banks was charged by the cashier with a case of ammonia between the outer and the inner doors, and on burglars attempting to break into the inner sanctum after breaking through the outer door, the gas poured forth from the case and compelled them to decamp, with a minus sign for their records. A new service for ammonia.

In conjunction with the Institution of Mechanical Engineers and others, the Institute subscribed to purchase the model of the *Simla*, which is now placed in the Kelvingrove Museum in Glasgow. The following description of the historic model is given for the information of members:—

MODEL OF ENGINES OF SS. *SIMLA*.

Scale one-fourth of full size.

The vessel, engines and this model were built by Tod and McGregor, Glasgow, in 1854. The SS. *Simla* was one of the

first P. & O. vessels fitted with a screw propeller. The model was exhibited in the Paris Exhibition in 1855, and in London in 1868; at Paris it gained special mention and was awarded the Médaille d'Honneur.

The engines, of which this is an exact model to a scale of one-fourth, were of the Steeple type patented by David Napier in 1842, and showed one of the adaptations whereby the slow shaft speed in common use for paddle boats was increased by gearing to suit screw propulsion. The gearing, in the ratio of 2·75 to 1, consisted of a mortice wheel (wooden teeth) and a cast iron pinion, the latter being keyed to the propeller shaft. The nominal h.p. was 640 and the boiler pressure 17 lb. per square inch.

The engines consisted of two cylinders 90 ins. diam. by 78 ins. stroke, each with 4 piston rods and a return connecting-rod driving cranks at right angles. The main slide valves were worked from a weigh shaft by loose eccentrics on the crank shaft. Connected with the main eccentric straps were diagonal rods which operated rocker shafts working four gun-metal bilge pumps with clack valves. These pumps were arranged to throw out of gear in pairs as the upper portions of the diagonal rods were capable of either being locked to, or disengaged from sheaves attached to the lower portions. The expansion valves were driven in a similar manner to the main valves and had separate weigh-shafts. Disengaging gear, resembling that on the diagonal rods driving the bilge pumps, allowed these expansion valves to be thrown out of action at will. The reversing gear was of the balanced ship sheave type and reversal was effected for each engine separately by a hand wheel and geared quadrant.

The hot-well and jet condenser were formed in the bed plate of the engine, and the latter was cleared by two diagonal air-pumps. They were driven from the main crank-shaft by connecting rods working in trunks. A crosshead attached to the starboard air-pump drove two plunger feed pumps.

In "The Nautical Gazette," New York, of October 2nd, there is an article entitled "Solution of the American Merchant Marine Shipping Problem," by F. B. Palen, of Newport

News, Shipping and Dry Docks Co., from which the following paragraph is quoted: "All great wars of modern times have been won by the nation controlling the sea, and these wars have clearly shown that a merchant marine is an essential part of a nation's navy strength. The past has shown that our merchant marine is part of our national defence and that an adequate merchant marine cannot be commandeered or seized, but must be built at great expense of time and money. If our experience in the world war did not convince the United States of these facts, regardless of all "bunk" involved therein, there is no use of farther argument."

Shipping, Engineering and Machinery Exhibition, to be held at Olympia, September 8th to 24th, 1927.

At a meeting of the supporters and Hon. Committee of Experts held on November 17th, the new President, the Duke of Northumberland, proposed by Sir Chas. Parsons, at a previous meeting, occupied the chair.

In the course of the proceedings, the President made wise comments when he said their efforts to stimulate production seemed to be encouraged by the news of the large orders which had been received, amounting to from 11 to 12 million pounds. It was a very encouraging symptom of what we might look for as soon as the coal strike was over, and that was a steady, if not a rapid, revival of trade in this country. He felt, however, that the situation was still very serious, for we might fall into the delusion that we could just sit still and that things would come right on their own, that the trade unionists would reform themselves, and everything would come right in the end. He felt that that was a dangerous delusion. If industry was to revive in this country the British workman had to work as hard as his foreign competitor, and he must be freed from those revolutionary influences which were at work and be given his freedom. The British workman was not a fool; he recognised the kind of men who were leading him, and had a most fathomless contempt for them, and if only the Government would give him a lead, the response the Government would get would be most astonishing.

The following is quoted from a Paper by Lawrence B. Chapman, Associate Professor of Ship Operation and Marine Engineering, Massachusetts Institute of Technology. The paper

was printed in "The Marine Journal," New York, October 23rd:—

> PREFACE.—*The cost of stevedoring the ship's cargo is the largest single item in the annual operating disbursements of a large proportion of the world's cargo ships. It is rather surprising therefore when so much thought is being given to the economics of ship operation that the reduction of operating costs that the problems of cargo handling and pier design and equipment do not receive more attention to-day. The small amount of cargo moving at the present time should not be an excuse for the indifference so generally accorded to terminal facilities, stevedoring and the rapid turn-around of ships. The more I study the economics of cargo ship operation, the more I am convinced that cargo handling and pier layouts are the most vital problems awaiting attention in ship operation to-day, and the place where the greatest saving in operating costs can be made.*

Cargo handling, as we well know, exerts a dual influence on the expenses and profits of ship operations. The *rate* at which the cargo is handled controls the time of turn-around and consequently determines the number of voyages in a year and the total amount of cargo that can be carried per annum. The *cost* of handling the cargo enters directly into the operating disbursements and therefore has an important influence on the profits of each voyage. The rate and cost of stevedoring are pretty much dependent on one another, for any methods that can be adopted that will give a more rapid speed of cargo handling will generally reduce the cost per ton handled. The result is a double gain as already indicated—more cargo carried per year and less outlay for stevedoring per voyage.

RAPID TURN-AROUND OFTEN OFFSETS OVERTIME STEVEDORING CHARGES.—There are times, of course, when there may be a distinct annual gain by shortening the ship's time in port even at the expense of an increased cost per ton of cargo handled. Such a case would arise when the cargo was worked 22 hours a day and overtime paid to the stevedores. The extra cost of stevedoring per voyage will often be more than offset by the increased profits from the larger number of trips made per year.

A thorough discussion of the subject of cargo handling should take up both ocean going and coastwise ships, winches and hatch arrangements, pier design and pier equipment, the design and operation of the ship's cargo handling gear, port fuel consumption and the longshoreman. Obviously only a few of these points can be touched on in this short article. The scope of this article will not allow a discussion of cargo transfer through side ports or of port fuel consumption, which would bring in a comparison of steam and electric winches.

The relative influence that the stevedoring costs will have on the profits will vary with the size of the ship and the length

of the trade route. For short voyages and for small vessels, the stevedoring costs are relatively much larger than for long voyages and for large ships. Consequently the smaller ships on the short trade routes should receive the more serious attention. The following table, made up from some comparative studies by the writer on 10.5 knot ships, shows the relation of stevedoring costs to the total operating expenses for ships of different sizes and for voyages of various lengths. The stevedoring costs are for labour only and do not include port fuel. If the cost of fuel for winch operations were included, the cargo handling costs would be increased, especially on short voyages where the cost of port fuel is often considerably more for steamships than the cost of the fuel used at sea.

Often the Vital Factor.—It is evident from this table that the cost of working the cargo is a very large item in the annual operating disbursements and for most voyages it is the vital factor in operating expenses. With the rates prevailing today and the facilities available, it overshadows capital charges, wages and fuel costs. It is only on voyages around 10,000 miles and over that capital charges and fuel for steamships exceed the cost of stevedoring. (It will be observed from column 4 that the fuel cost for the motorship on the 10,000-mile voyage is less than the stevedoring costs.)

On short voyages a ship is in port working cargo a larger percentage of the year and at sea a smaller percentage than on long voyages; consequently the stevedoring expenses become relatively more important as indicated in the table.

When sufficient cargo is available to make rapid dispatch advisable, an increase in the hourly rate of handling cargo will always show a decided increase in the annual profits, provided the cost per ton of cargo handled is not increased. In a particular case where the rate of working cargo was increased from 750 to 1,500 tons per day, the calculated loss of 3% per annum changed to a profit of 4·5%. The cost per ton handled in this case was kept the same for both ships, although faster handling speed would naturally reduce the cost per ton.

	1	2	3	4	5	6
Length of Voyage ...	500	5,000	15,000	15,000	15,000	500
Gross deadweight ...	10,000	10,000	10,000	10,000	15,000	4,000
			Per cent			
Stevedoring costs ...	51	35	18	22	19	55
Capital charges ...	15	22	30	37	32	8
Fuel costs (sea and port)	6	17	28	15	26	7
Type of machinery ...	Steam	Steam	Steam	Diesel	Steam	Steam

NOTES.—Data in the above table are for new ships fully loaded on each voyage. Cost of stevedoring taken at $1.00 per ton. Rate of stevedoring assumed 1,500 tons per day for all ships. Capital charge includes depreciation, maintenance and insurance, but not interest.

When a number of boats are operating on a line between two ports, with a more rapid turn-around it would often be possible to reduce the number of boats required on the run and still maintain the same schedule of sailings. The gain from such an arrangement is obvious.

PREVAILING RATES TOO LOW.—The writer has made numerous observations on the rates of working cargo. These rates vary in general between 10 and 38 tons per hatch per hour for general cargo. The highest rate ever observed by the writer was for a ship unloading sugar where the rate carefully timed for 10 minutes was 72 tons per hatch per hour. The average rate prevailing in American ports to-day is probably not over 20 tons per hatch per hour and is far too low for efficient ship operation. As will be pointed out later, much higher rates can readily be attained with a reduction in the rate per ton if a little more systematic study is given to the problems of cargo handling and pier layout.

For small ships working four hatches simultaneously, and for ships of around 8,000 tons deadweight working five hatches, a fairly reasonable turn-around can be secured with a rate of from 30 to 35 tons per hatch per hour. For larger ships of 10,000 tons and over, rapid turn-around without overtime is more difficult to attain because of the longer distance to move the cargo between hold and pier and because of the difficulty of providing a sufficient number of hatches. A great many of the large deadweight ships in existence to-day are not provided with enough hatches and winch and boom systems to insure rapid dispatch. The cost of large cargo ships is so high and the capital charges per day in port are so excessive, that rapid cargo handling and quick turn-arounds are necessary to insure profits, even if the cost per ton handled has to be increased. The foregoing, of course, only applies when there is plenty of cargo available. When the amount of cargo moving is small, a condition will eventually be reached when the ship of large deadweight must cease operation entirely and what trade there is will go to the smaller ships.

LARGER SHIPS SERIOUSLY HANDICAPPED.—As ships increase in size, the deadweight capacity varies practically as the cube of the length, while the deck area for removing cargo increases only as the first power of the length. It is the number of hatches (varying with the length of the ship) and not deck area that influences the hourly rate of handling cargo. Obviously the large ship is seriously handicapped in hatches and consequently careful attention must be given to the problem of

cargo handling in the design. The number of hatches fitted on large ships is too often far inadequate. Cargo ships of 10,000 to 15,000 tons deadweight should be provided with 10 to 12 winch-boom systems in place of the conventional four or five hatch arrangements frequently fitted. This change alone without any increase in the speed per hatch will double the amount of cargo transferred per hour.

In order to provide sufficient deck length for 10 or 12 systems that can be worked simultaneously it is necessary to keep the length of the bridge house as small as possible. The use of the two deck bridge house in the Luckenbach ships gives an excellent deck layout for fast cargo handling.

Winch location should also receive more attention in the design. Winches should be located so that the winch operator can have a clear view into the hold. This will obviate the slow and inefficient signalling between the deck man and winch operator and in many cases the deck man can be dispensed with. The two winches or winch controls for each system should be close together so that one man can operate the two winches when conditions will allow.

Pier Layouts Can Be Improved.—In addition to the improvements in ship design mentioned above, it is imperative that terminal facilities and pier layouts be greatly improved if any worth while gains are to be realized. Very few piers to-day could function smoothly handling cargoes from a large number of hatches at the high rates proposed.

Transit sheds with ample floor area for sorting, tiering and moving cargo and a wide marginal way between the transit shed and the ship are absolutely essential. The arrangement of the interior of the transit shed should be such that the stevedores can have a free and continuous movement to and from the ship. High rates of cargo handling per hatch mean a faster movement of cargo across the pier. Trucks and teams should never be allowed on the floor of the transit shed as is too often the custom to-day.

The best arrangement is to have local cargo received and delivered from the shore end of the transit shed. A simple and inexpensive overhead monorail travelling hoist can be used for moving cargo to and from the waiting trucks. If this system is properly operated in conjunction with hand or trailer trucks, only a centre line track is necessary. This arrangement will leave the deck of the pier absolutely clear of the longitudinal movement of cargo; and the transverse movement to and from the ship will not be interrupted.

Electric trucks and trailers should find a much wider use. While the hand truck has its proper place especially for short hauls, it is used far too frequently at the present time. Tiering machines should also be provided. While small consignments and miscellaneous cargo cannot, of course, be tiered to any height, large consignments and uniform package cargo can be.

Pier Cranes.—Pier cranes are useful in handling heavy pieces of cargo; but with the average cargo faster time can generally be made with the ship's tackle. One crane per pier is sufficient to take care of heavy pieces of cargo. This crane can be moved along the pier from hatch to hatch as required, and heavy pieces moved directly from ship to car or vice versa. Pier cranes are often very useful in loading and unloading barges and lighters when the ship is not at the pier. Small cranes such as are fitted at the State Barge Canal Terminal in New York are better suited for this work, however, than the larger and heavier pier cranes.

Both the single hook (continuous movement) burtoning and the double hook (interrupted movement) burtoning systems are in use to-day at American ports. Both of these systems are good when properly operated, although from my observations the reservoir principle possible with the two hook system is seldom appreciated. Both of these methods as operated to-day, I have found, are capable of great improvements which will reduce costs and speed up cargo handling.

Co-ordination Will Give Results.—If a careful study is made of methods now in use, it will generally show that more co-ordination and co-operation and better planning at the ship, better pier layout and equipment, attention to hatch and winch layouts in ship design will allow far faster rates than prevailing to-day. This will both shorten the time in port and reduce the cost per ton handled. It may be that with faster speeds additional men will be needed in the hold for stowing and breaking out cargo. At all other places I am confident from my observations that the present size of gang can handle cargo at very much faster speeds. The use of power trucks, conveyors, tiering machines and other mechanical equipment will reduce the labour and fatigue of the longshoreman.

Space has only allowed a general outline of methods and suggestions. There are, of course, many details and special conditions at each pier that must receive careful attention if rapid and low cost of cargo handling is to be attained.

Boiler Explosions Acts, Report No. 2766.—This has reference to an explosion from a boiler on board the SS. *Foamville*, on November 29th, 1925, at about 12.30 p.m., while in Mount's Bay, Cornwall, during a voyage from Antwerp to Drogheda. The boiler was built of steel, 12 ft. 9 ins. diam. by 10 ft. 3 ins., with 3 plain furnaces 39 ins. diam., each having a separate combustion chamber, steam pressure 130 lbs. Owing to inclement weather on the way from Antwerp the vessel sheltered in Mount's Bay. Next day the weather improved and it was decided to continue the voyage, but about half an hour after starting, an escape of steam and water from the centre furnace was noticed with a drop in steam pressure. The auxiliary feed was put on and the vessel turned back, and on reaching Penzance the fires were drawn and the boiler examined. The leakage was traced to the back landing edge of the centre furnace and it was found that it emanated from a hole about $1\frac{1}{4}$ ins. by $\frac{1}{4}$ in. It was temporarily repaired by welding and the voyage proceeded with to Drogheda, then to Liverpool, where the lower back portion of the furnace was removed and a new plate fitted. The defect was attributed to a possible crack in the furnace plate welding which developed during years of work and gradually opened out into the hole.

The examination was made and the report written by Mr. A. Fairley, Board of Trade Surveyor, Liverpool. The observations made by the Engineer-in-Chief were that the explosion was not of a serious nature and was caused by a defect in the longitudinal weld of the furnace. A considerable amount of skill is necessary to make a satisfactory weld with plates 11/16ths inch thick, and in many cases, although to all outward appearances, the weld may appear to be sound, latent defects make themselves evident after some years of working.

———o———

Books Added to the Library.

By the courtesy of the British Engineering Standards Association.—"British Standard Tables of Pipe Flanges for Land Use."

By the courtesy of H.M. Board of Trade.—"Instructions as to the survey of Life Saving Appliances," 1926.

By the courtesy of Lloyd's Register of Shipping.—"Report of the Society's Operations, 1925-1926."

By the courtesy of the Proprietors of the "Tables Annuelles de Constantes et Donnees Numeriques"—"Art de l'Ingenieur

et Metallurgie."—This engineering publication, which is in French, is offered to our members at a 25% reduction of price, viz.: Fr. 94·50 instead of Fr. 126 for a bound copy, and Fr. 78·75 instead of Fr. 105 for a paper backed copy.

By the courtesy of the Publishers: "The Motorship Year Book" of the "Motorship."—This excellent volume gives a very comprehensive survey of the whole field of internal combustion engine activities, and in addition to valuable tables of building figures, contains many very good plates of motor vessels of all types, from the large ocean going ship to small tugs and ferry boats. There are, in addition, chapters on Progress in Engine Design, Direct and Indirect Drive, Types of Marine Oil Engine, Types of Cooling Systems, Supercharging Engine Room Auxiliaries, Deck Auxiliaries, etc. All very well illustrated. This book is indispensable to all concerned with the management of motor vessels.

By the courtesy of the Publishers: The Merchant Marine Publishing Co., 115, Broadway, New York. *Bain's Marine Annual, 1926.—An American annual containing a wealth of useful information on shipping matters, with a comprehensive historical survey of the progress of shipping from its earliest years and many pages of useful shipping data and general information. Well illustrated throughout and of great interest to all connected with the shipping industry.

PURCHASED.—"Ship Form, Resistance, and Screw Propulsion," by G. S. Baker, O.B.E., 2nd Edition. "British Standard Glossary of terms used in Electrical Engineering," published by The British Engineering Standards Association.

By the courtesy of the Author. "The Naviators," by E. F. Spanner.—This is a companion volume to "The Broken Trident," and the author has taken the same theme for his story. The question of air power is, quite rightly, receiving a good deal of consideration by thoughtful people, but the ordinary citizen no doubt feels that the decision as to the relative values of the various forms of fighting units is one for the experts, and they are not by any means unanimous, but it is very interesting for the layman to hear the views of the protagonists of the opposing theories. In his former book the author developed many interesting tactical theories and the reader had an opportunity of realising how the experts played the great game of circumventing each other, and how highly

* A Dumbartonian.—J.A.

trained men brought the fruits of their scientific minds to bear on the various problems of war and produced answers to the various and apparently unanswerable moves of their opponents, and this skilful exposition constituted a large part of the value of the former book.

In the present volume the author handles his theme more cavalierly, he does not devote the same attention to detail, except in one or two points, and he appears to be more concerned with the general idea of the story, in the development of which he has introduced some of the features which form the usual material of the ordinary novelist. We think that he made a much stronger case in his first book, but he has nevertheless succeeded in writing a very interesting story, which, whether it convinces the reader of the soundness of the author's views or not, will undoubtedly hold his interest by its novelty. Increased power of characterisation will come with further trial and we hope that Mr. Spanner will give us another good story soon with a still more searching exposition of the possibilities of tactical development, for the reader of to-day is much better informed on mechanical and scientific subjects than his father was as a general rule. Meanwhile, we heartily commend this volume to our members' notice.

By the courtesy of the Publishers. (1) "Lloyd's Calendar, 1927."—A very authoritative and most valuable year book containing a very wide range of information on all subjects relating to shipping with many matters of historical interest, charts, tables, flag and signal codes, tables of ephemeras, chapters on shipping law and merchant practise, etc. Altogether a prize to those who wish to be well informed, especially in the less known and familiar aspects of our greatest national industry.

(2) "Heat Engines," Vol. I. Bennet's College Reference Library.—The indefatigable authors of this remarkable series of technical books continue to attack the problem of presenting knowledge in its most easily assimilated form to those who are seeking it. The present volume is worthy of its place in this list and follows faithfully the tradition hitherto maintained.

The subject is treated, as it should be, from the theoretical point of view, but in a comparatively elementary and popular manner, so that the beginner can follow the course of instruction with advantage. The preliminary chapters of definition and explanation which are excellent, are followed by a well designed exposition of the theories of the heat engine, and

the method of presenting propositions, followed by worked examples is admirable. We have no hesitation in recommending this work to all students, many of whom will have learned, by experience of the previous volumes, the value of this series.

(3) "A Note upon the obligation of the Ironfounder to Diesel Engine Users," by Horace J. Young, F.I.C. The Diesel Engine Users' Association, 19, Cadogan Gardens, S.W.3. 5/-. —The question of the adoption of up-to-date and scientific methods in iron foundries, in lieu of the intuitive and conservative practice generally followed is here shown by the author to be one of considerable difficulty. This is not to be wondered at, for we know that the men in charge of most foundries have acquired a considerable degree of skill by largely empirical methods and inherited instruction, and they are, not unnaturally, unwilling to abandon their laboriously acquired technique for the, to them, untried possibilities of new ideas. We hope, however, that this attitude will be modified soon, as it has been in the later stages of the ferrous industries, e.g., hardening and tempering and steel making, where marked progress had been made by the adoption of more certain and scientific methods. The result cannot be other than beneficial to all concerned.

By Purchase.—"Stability and Seaworthiness of Ships," by Professor T. A. Abell, O.B.E.

By the courtesy of the Council.—"The Transactions of The North-East Coast Institution of Engineers and Shipbuilders, 1925-6." Vol. xlii.

———o———

Election of Members.

List of those elected at Council Meeting of 6th December, 1926, at 5 p.m. :—

Members.

Alfred Harold Barnes, 15, Hulse Road, Southampton.

John Adam Burgess, Engineers' Dept., Canadian Government. Merchant Marine, Ltd., 230, St. James Street, Montreal, Canada.

John Carlisle, 28, Windsor Road, Monkseaton.

William Masson Cordiner, 9, Wellington Place, Aberdeen.

John Frederick Roberts Crighton, 7, Willem de Zwygerlaan, Schiedam, Holland.

Alexander Cross, 37, Gunnersbury Avenue, Ealing Common, W.5.

Alfred Harrison, 6, Dulverton Avenue, South Shields.

Alfred James Lewis, Technical High School, Pukekohe, Auckland, New Zealand.

Henry George Monro, 8, Arlescourt Road, West Derby, Liverpool.

Herbert Moy, Eng.-Lieut., R.N., Longdene, St. Ronans Avenue, Southsea.

George Frederick Parry, 34, Richmond Park Road, East Sheen, S.W.14.

John Henry Willens, 144, Ferme Park Road, Crouch End, N.8.

John Mackenzie Wood, Grosvenor House, Lesbury Road, Heaton, Newcastle-on-Tyne.

Associate Members.

Cecil Francis Ivanson Batt, Ferndale, Walton Road, Clacton-on Sea.

William Albert Cobb, 49, Felbrigge Road, Seven Kings, Essex.

Norman H. R. Lester, 17, Crompton Road, Handsworth, Birmingham.

Patrick McCarthy, Shandon Villa, Popes Road, Cork.

William Henry Sharp, "St. Malo," Station Road, Thorpe Bay.

Associates.

Carl Albin Hallgren, Engineer, SS. *Port Hunter*, *c/o* Commonwealth and Dominion Line, Ltd., 9, Fenchurch Avenue, E.C.3.

Frank Rigden Harrop, Technical College, Darlington.

William Smith McCloskey, Lieut., Southern Command Engineer Adjutant, Collins Barracks, Cork, Ireland.

Transferred from Associate-Member to Member.

Arthur Bayliss, 83, Onslow Road, Sheffield.

John Ambrose Matthews, 249, Hither Green Lane, Lewisham, S.E.13.

Transferred from Associate to Associate-Member.

John Duffus, *c/o* Messrs. Anglo-Persian Oil Co., Waidan-i-Naftun, via Ahwaz, South Persia.

George Gall, 166, Cranbrook Road, Ilford, Essex.