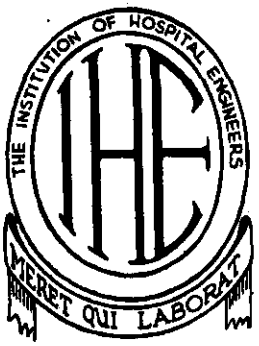

THE HOSPITAL ENGINEER

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THE INSTITUTION OF HOSPITAL ENGINEERS
FOUNDED 1943.

President :
THE LORD CALVERLEY OF BRADFORD, D.L., J.P.

No. 17 October, 1950

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Hon. Editor—R. G. ROGERS, "ELMFIELD," STONE, AYLESBURY, BUCKS.

Hon. General Secretary—H. S. CLARKE, 14 THE VILLAS, ST. MARY'S HOSPITAL, STANNINGTON, MORPETH, NORTHUMBERLAND.

CONFIDENTIAL BULLETIN FOR THE USE OF MEMBERS.

EDITORIAL.

" Complete co-operation is vital to success."—ED.

A special meeting of the Council was held at 8.25 p.m. on Thursday, 31st August, 1950, at the " Prince of Wales " Hotel, Harrogate, to consider the revised " Rules of Incorporation and Articles of Association."

Those present were : Mr. J. Tomlinson, Vice-Chairman (in the chair), Mr. R. E. Rogers, Vice-President, Messrs. G. Jones, J. Forsyth, R. G. Rogers, H. A. Adams, H. E. Clutterbuck, L. Hunt, M. Gray, R. S. Smith, J. Green, E. Heald, A. J. Templeman, R. H. Chesney, H. Partington, F. H. Mills, A. E. Pullen, J. W. Brodie, A. M. Bain, A. MacGregor, H. Wright, H. S. Clarke.

This meeting had been called for 2.30 p.m., but owing to the late arrival of Messrs. R. G. Rogers and J. Forsyth (members of the Committee of Rules and Incorporation) and H. Wright, due to a breakdown of their motor conveyance, it was not possible to commence before the above time.

In the absence of Mr. J. H. Hargreaves (Chairman), Mr. J. Tomlinson (Vice-Chairman) occupied the Chair.

The Council reviewed the work already accomplished on " The Company's Act, 1948, and Articles of Association, Rules and Incorporation," and having considered the amendments and alterations submitted from the branches, and debating all the sections one by one, taking legal advice where necessary, and guidance from similar Institutions, unanimously decided that, the completed documents governing the above, with the alterations, additions and amendments, as agreed at previous meetings, and finally decided this day, be approved for submission to the Annual General Meeting to be held on Saturday, 2nd September, 1950.

The meeting closed at 11.45 p.m.

COUNCIL MEETING.

A meeting of the Council was held on Friday, 1st September, 1950, at the " Prince of Wales " Hotel, Harrogate.

Those present were : Mr. J. Tomlinson (Vice-Chairman), Mr. R. E. Rogers (Vice-President), Messrs. G. Jones, J. Forsyth, H. A. Adams, H. E. Clutterbuck, L. Hunt, M. Gray, R. H. Smith, A. M. Bain, E. Heald, A. McGregor, J. W. Brodie, J. Green, F. H. Mills, A. E. Pullen, A. J. Templeman, H. Partington, R. H. Chesney, C. Oliver, J. D. Lewis, H. Wright, R. G. Rogers, A. Shawcross, J. C. Chynoweth, H. S. Clarke (Hon. General Secretary).

The meeting was opened at 10.30 a.m., and in the absence of Mr. J. H. Hargreaves (Chairman), Mr. J. Tomlinson (Vice-Chairman) occupied the chair.

The Hon. Secretary informed the meeting that he had received a letter from Mr. J. H. Hargreaves regretting his absence from the meeting, also that some concern was being suffered by him owing to the ill-health of his son, and suggested that a wire conveying the good wishes of Council be sent to him. The wire was immediately despatched.

The Minutes of the last meeting held at Newcastle-upon-Tyne on 3rd June, 1950, were taken as read and signed by the Chairman.

Apologies of absence were received from Mr. W. G. Owen, of Wales, and Mr. W. F. Graham, Staffordshire, and sympathy was expressed at the great loss Mr. Graham had suffered by the death of his wife. The Hon. Secretary reported that he had written to Mr. Graham and offered him the condolences of Council. Mr. Pullen, of Warwickshire, attended in place of Mr. Yates.

The deaths of Mr. J. W. Young and Mr. D. Pratt, both of Glasgow Branch, were reported ; the members stood as a token of sympathy to their passing.

A letter of apology was read from Sir Hector McNeill (Vice-President) regretting his inability to be present at the Annual General Meeting owing to the sudden severe illness of Lady McNeill. The Hon. Secretary was instructed to convey to Sir Hector our sincere wishes for a speedy recovery to good health of her Ladyship, and regretting his absence from our meeting.

Owing to pressure of business, Mr. Feldon, of London, sent his apologies, thanking the members for the invitation to our Annual General Meeting.

The resignation of Mr. H. L. Eglin was received and accepted, and expressions of thanks for the good work done by him were freely voiced.

Mr. R. E. Rogers reported on correspondence received from Mr. Hearndon, of Carlisle.

Arising out of the appeal of Mr. E. Robinson, of Croydon, the Hon. Secretary read the correspondence relevant to the case.

Council unanimously resolved that it be recorded in the Minutes the thanks to all who assisted in the happy outcome of this unfortunate case, with special mention of Mr. H. Wright, Mr. J. Panton and Mr. R. E. Rogers, whose work was worthy of the highest praise.

Applications for membership were approved as follows :—

Members	4
Associated Members	3
Graduate Members	2

Three applications were referred back to Branch.

Mr. Panton was transferred to Member. Mr. H. Blaylock was transferred to Associate Member.

Arising out of a report from the Examination Sub-Committee, it was resolved that the Hon. Secretary purchase a rubber stamp for future application forms. Branches are asked to be careful in the filling up of application forms and to see that they are correctly proposed and seconded and signed, and that all certificates are seen and the information recorded, and that their branches' recommendations are added for Council's guidance and approval.

Mr. G. Jones (Hon. Treasurer) read the audited accounts for the year 1949, and gave a statement of accounts up to date. After questions and answers, the accounts were accepted.

Mr. C. Oliver, Hon. Secretary and Treasurer of the " Benevolent Fund, read the audited accounts for the year 1949 and gave a statement of accounts to date. Attention was drawn to the subscriptions outstanding, and members are asked to remit their payments to Mr. Oliver without delay.

The Hon. Secretary in his report drew attention to the subscriptions outstanding for the current year, and members were asked to remit at the earliest possible date.

Mr. Tomlinson reported on the work of the Examination Sub-Committee, and informed the meeting of the inability of Mr. Barnetson, of Bristol, winner of the " Sandford " Premium, to be present at the Annual General Meeting to receive his prize. Mr. Annand, of Reading, who was awarded a special prize by Council, was also unable to be present.

The " Sandford " Premium Paper this year was to be an " Electrical " subject, particulars of which will be issued as early as possible.

The dates of the next examinations to be held in London are the 24th, 25th, 26th and 27th October, 1950.

The question of eligibility for membership of two members was raised by Mr. Gray, Northern Ireland, who asked for Council's guidance on the subject, and it was resolved that the members of the Northern Ireland branch should consider the matter in the light of the information given by Council, and recommend their decision to Council.

The Hon. Secretary read correspondence received from The British Standards Institution with special reference to a committee which is being formed to study Sterilizers for Hospital Wards. Messrs. G. Jones, R. H. Chesney and C. Oliver were nominated to serve on this committee in addition to Mr. J. Forsyth, who had already consented.

Arising from yesterday's meeting reference, "The Company's Act, 1948, Articles of Association, Rules and Incorporation," it was resolved that by a unanimous vote, the whole of the documents be agreed upon, and presented to the Annual General Meeting by Messrs. R. G. Rogers and J. Forsyth.

Mr. Brodie reminded the meeting that the sub-committee had been requested to take up the question of "Standing Orders."

Mr. R. E. Rogers (Vice-President), representative on Whitley Council, reported on matters being dealt with by the Whitley Council. The next functional Council Meeting date, 22nd September. Matters under discussion and raised by members included Teaching Hospitals, Clerk of Works and Building Foremen, Local Authority Hospitals, Staff Consultative Committees.

Messrs. R. H. Smith and A. Bain, of Glasgow, and Mr. MacGregor, of Edinburgh, spoke at great length and explained the position with regard to the implementation of P.T.B.3 in Scotland and the difficulties our Scottish members are having in the acceptance of their status and salaries.

Mr. Rogers informed the meeting of the endeavours he is making in the matter and that representations have been made direct to the Scottish Board of Health, and that all complaints should be forwarded to him for that purpose. It was agreed that to take up each individual case for presentation would lead to great loss of time, and the only satisfactory solution was to take the whole matter before the Scottish Board of Health.

The question of overtime was raised by Mr. Templeman, and Mr. Green raised the question of poaching of members for representation on Whitley Council.

Mr. Chesney called attention to H.M.C. Circular on the formation of Appeals Committees, and other circulars were asked about, including Rents of Houses. The Chairman pointed out that all circulars are freely distributed to all hospitals and members could, on application to their Hospital Secretaries, have access to them.

Mr. M. Gray reported on the implementation of the awards in Northern Ireland, and felt that, although movement was being made, much more could be done to speed up the work of conciliation.

Mr. R. G. Rogers, Editor of *The Hospital Engineer*, informed Council of his pending retirement, and that he would be pleased to have Council appoint a successor to his post. Mr. Chynoweth spoke on the matter. No appointment was made.

On a resolution from the Midland Branch, it was unanimously agreed that Mr. G. Jones (Hon. Treasurer) be appointed a Vice-President of the Institution.

On a notice of motion standing from the last meeting of Council, proposed by Mr. R. G. Rogers, G. W. Cummings, Esq., J.P., be appointed a Vice-President of the Institution.

General matters were discussed under A.O.B.

It was agreed that the next meeting of Council be held at Bristol on Saturday, 2nd December, 1950.

The meeting concluded at 7 p.m.

PROCEEDINGS AT THE OFFICIAL LUNCHEON OF "THE INSTITUTION OF HOSPITAL ENGINEERS."

HELD AT

The Prince of Wales Hotel, Harrogate

on SATURDAY, 2ND SEPTEMBER, at 12.30.

After proposing the Loyal Toast, the Vice-Chairman, MR. TOMLINSON, said : The few words that I now want to say will be very brief. We are gathered here at our 6th Annual General Meeting in Harrogate, and it is with very great pleasure I introduce to you His Worship the Mayor of Harrogate, Alderman C. E. Whiteley.

THE MAYOR, ALDERMAN C. E. WHITELEY : My words also are going to be rather brief. In the course of the week I have to welcome various kinds of people to Harrogate, but I do welcome you this morning with particular pleasure because I feel that, in the first place, you are on the same work as Harrogate, relieving physical suffering. As hospital engineers you are doing your job of work, and I think Harrogate is always trying to do that. Harrogate was built for the relief of physical suffering. And so it is for that reason that I particularly welcome you here today, and furthermore, I welcome you because, personally, I am an engineer, so that I know the troubles and worries to a great extent of your calling when you are asked to improvise and to stop leaks and to restore the electric current and all the other little jobs that fall to the lot of an engineer.

And furthermore, I was also in hospital work during the first world war. I served in France and Belgium in the British Red Cross, and also in hospital and ambulance services, and was frequently in charge of cars to repair the needs of hospitals. So that you see, Ladies and Gentlemen, that I have a pretty intimate connection with your calling as hospital engineers, and therefore, for these three reasons, I do welcome you to your conference in Harrogate. We like people to come to Harrogate ; while for many, many years Harrogate was there for people to regain their health, nowadays Harrogate is here to attract people in order that they may retain their health. In other words, we are turning over to the holiday side and the health side more than we did before.

Whilst the cure will always be there, we are going to the holiday side very much more, and welcome every conference that comes along, and welcome its meeting here. We have unrivalled opportunities in the hotels and other buildings in the town for you to hold your conference, and we welcome you very greatly and we trust that you will have a most successful meeting here in Harrogate today. With that I will finish and we will be able to get on.

MR. TOMLINSON : It is with very great regret that I have to announce the absence of our Chairman. You have no doubt noticed that he is not present. The reason for Mr. Hargreaves's absence is a matter of the health of his son, and I am sure we are all very sorry, and we do hope that the fears he has will be unfounded and his son will soon be quite fit.

We are also exceedingly sorry that Sir Hector and Lady MacNeil are not with us. They recently returned from France after a holiday, and they returned in order to attend this luncheon here today. Unfortunately, Lady MacNeil has been taken seriously ill, and that is the reason for their absence.

Our old friend Mr. L. T. Feldon is also prevented from being with us, and Mr. Owen and Mr. Daglish, of London, and I should like to say how sorry we are.

Without further ado, since we have a lot to get through, I am going to call upon our President, Lord Calverley of Bradford, to present his address.

LORD CALVERLEY : I can assure you I am not going to give an address. All I have to do is to express our thanks to His Worship the Mayor, and also to his gracious wife, the Mayoress of Harrogate, for coming along this afternoon. They are always having to give civic welcomes here in Harrogate, and they must get fed up with them.

Alderman Bambridge is here in order to take an interest in what you are trying to do, because he has a job of great responsibility in

being Chairman of what some people call the Leeds Region. It is in fact the Yorkshire Hospital region, with the exception of Middlesbrough, which is outside the pale.

Mr. Bambridge has a great job today. In Harrogate you will find that there are very few hospital engineers who can manufacture a grievance against the Regional Boards. Mr. Bambridge realises the status of our engineers. He realises what you are trying to do.

I want to thank you for coming along and hope you have a good lunch. I want also to thank you, your Ladyship. I am glad to be able to welcome you.

MR. TOMLINSON : It gives me great pleasure to call on Alderman Bambridge, C.B.E., J.P., Chairman of the Regional Hospital Board, to address us.

ALDERMAN BAMBRIDGE, rising to propose the toast, " The Institution of Hospital Engineers," said : If I had been consulted about this before the arrangements were made, I think I could have found quite a number of members of the Leeds Board who would have been more competent to give this address than I am. Once, for a short period, I was Chairman of the Management Committee of a hospital, one of the smallest in the region, and when the old Chairman went to South Africa he asked me if I would take over the Chairmanship while he was absent, and unfortunately, as many of you will know, he died shortly afterwards. As a result of the short period that I had had as Deputy Chairman, I was then asked to take on the position.

In this region we had approximately 300 hospitals of varying degrees, some small, some medium and some comparatively large. But I think it would be fair to say that, except for very few of these hospitals, due to factors which perhaps cannot be helped, these hospitals had increasing difficulties in meeting the costs of hospital administration, due to the changes made by the war.

When you get these restricting factors, and then suddenly get a complete change, a revolutionary change in the administration of hospitals, it has released a volume of enthusiasm for improving hospital services in this country, then you will see that there was bound to be very considerable demands upon the finances available.

There have been on occasion many criticisms raised against the methods of setting up the new administration. I confess that logically I am bound to agree that a good many of the criticisms are justified.

When we are considering these objections, it may be wise to consider what the problems were. We had to weld together, and

within two years it has been shown that it could be done, and has in fact been done, the two different systems of administration—the voluntary hospital system and the hospitals run by public authorities. I have had considerable experience of local authorities, and I am bound to say that this method which has been set up during the past two years, in fact, has succeeded in getting the most effective co-operative spirit that one could possibly hope for in that short period of time. More attention is being paid to the general welfare of hospital services, and this new set-up, as I say, has released a very considerable volume of enthusiasm for improving hospitals, so much so that we are rather tending to overspend the kitty, not perhaps always in the right direction, but nevertheless, having regard to the fact that the world was in very considerable economic difficulties, a halt had to be called to the expenditure on hospitals. If one may read the international situation aright, one may visualise still further restrictions upon the expenditure on this most essential service.

You may say this has nothing to do with hospital administration so far as hospital engineers are concerned. On the other hand, it seems to me that it may very well be that the hospital engineering side may be asked to contribute more than the services rendered by other branches of the service.

I should hesitate to say it, but it may be that we are spending a little more on the minor provisions rather than on the physical well being of our hospitals in the charge of hospital engineers. It may be that if a hospital should be run efficiently and with a due regard to economic administration, it seems to me that we should get the considered advice of people who are competent to give us that advice. We should have advice from people who know the job really well, to have the benefit of the best possible advice on how to run the complicated engineering services of a modern hospital system. It is to such organizations as yours that it seems to me we have got to look.

Lord Calverley said he did not think you had any complaints against the Leeds Region. I do not think there are really any serious complaints about the way the Leeds Region reaches its official decisions in any section of the service. We believe we should never cavil at any national agreements which are arranged through the ordinary process of the organization of the service. I was amazed to hear that all regional boards do not take that point of view. I am one of those people who believe that hospital engineers wish the kind of economy on widespread expenditure which ultimately reduces the running charges for hospital services, and at the same time gives a more efficient service.

I noticed in the particulars your secretary let me have, what a very youthful organization this is—seven years old. I think this arrangement is a very effective part of the machinery of the hospital administration in this country. The very fact that you are set up for the purpose of attaining a higher standard of efficiency in the branch of the service for which you are responsible is, I think, entirely to be commended, and is in the long run bound to give very considerable advantages in the social world.

It was said of a certain speaker that he asked the Chairman how long he had to speak. The Chairman replied, " If you haven't struck oil in three minutes, give up boring " !

MR. TOMLINSON : I am very sorry to announce at this juncture that the Mayor has to leave. We have been delighted to have him and the Mayoress, and in view of the other engagements they have, we must excuse them.

MR. FORSYTH, who replied to the toast in the absence of Sir Hector McNeil, LL.D., F.E.I.S., said : In the first place, those of you who know Sir Hector MacNeil will realise that in a Scot deputising for a Scot, the only thing we have in common is that of stature.

When it was announced that this Conference was to be held in Harrogate and we read the literature sent on to us by Mr. Thwaites, we saw the awe-inspiring word " Spa," and I can assure you no one was more relieved than I, when arriving, to see the Fair on the green. I realised we had at least come to some place we could feel at home.

In reply to the very nice things you have said about our part in the Health Service, I would like to point out that Hospital Engineers look upon themselves as a very important cog in hospital administration. A cog of such importance, in fact, that we know if anything went wrong with one little bit of that cog, the best laid plans of the Hospital Administrator would just go haywire. Therefore, Sir, I would ask you, in your position as Chairman of the Leeds Regional Board, to instruct your Group Secretaries and Administrative Assistants to co-operate wholeheartedly with the Hospital Engineer, and if that co-operation is achieved, it would be one of the finest achievements of the Health Service.

I am very fortunate to be employed in such a Group, and I assure you, Sir, that where there is co-operation, it does pay very full dividends. And if you, Sir, within your administration, just point out to the people concerned that the engineering service, whilst being a very important part of the hospital service—a service in which Secretaries and Administrators and Engineers are all allied—will run more smoothly if there is the full trust of the

Secretary in his Engineer, and given that trust, the full co-operation of the Engineer is assured. No Institution looked forward to the advent of the New Health Service with better intentions than the Institution of Hospital Engineers. We welcomed the new set-up from many points of view. We knew that the Engineer had a very important part to play in the new service and we looked forward to gaining increased status. But in a great many cases our efforts are still frustrated, and it will be a happy day when we get full co-operation of all Secretaries and Hospital Administrators, and I can assure you, Sir, that in return for that co-operation they will get the best that any hospital engineer can command.

I do not wish to take up much more time, but, Ladies and Gentlemen, we do owe a debt of gratitude to such a man as the Chairman of such a large region as Leeds, who can find time to come and do this on a Saturday afternoon. If we could instil the same spirit throughout the country, this institution will ultimately have done what it set out to do, that is to raise the status of the Hospital Engineer in the eyes of the employing authority, and I would counsel all to give all the help and co-operation that is within your power, to all hospital secretaries and administrators, and I am quite sure that by that means the status of this Institution and ourselves, as individuals, will be raised.

I thank you, Sir, on behalf of the Institution for the nice things you have said about it, and you Ladies and Gentlemen for the spirit in which you have honoured the toast.

MR. CLARKE, rising to propose "Our Guests," said: As Secretary of the Institution, it gives me great pleasure to propose this morning a toast to our guests, and I can hardly imagine a toast at any dinner which is more important, which is more pleasure to propose, than that of your guests. This morning we have the Mayor and Mayoress, and I am sure we all agree with what the President said in his remarks.

Alderman Bambridge is our principal guest, and we are delighted to see him. We know that you have a very important job as Chairman of the Leeds Rigional Board. The Leeds region is one of the biggest, if not the second biggest, in the country, and I am quite sure that what Leeds does today, the country will do tomorrow.

We have very much appreciated your kind words with regard to engineers, and I am quite sure you will find not only now, but in years to come, that the engineers of your region will be most faithful servants to your Board. Whatever you do to encourage your members to give greater services, to give you better and more economic services at your hospital, I am quite assured you will find no better servants than the Hospital Engineer.

The wife of an engineer has a most difficult job, as my wife knows only too well, and I do not know what we would do without them. I am beginning to realise that it must be a task indeed. It is fine that they should have come along here to support us.

To the Press we extended a most hearty invitation here today. we are proud to welcome this most important body here. We do not always agree with you, but I am quite sure you always try to give an honest report, and in this country we have every cause to admire the Press.

Members of the B.B.C., we are glad to receive you, and you know that you have taken an interest in our little proceedings, and that you are going to give a countrywide report of our meeting here today.

Ladies and Gentlemen, I have great pleasure in proposing a toast to our guests.

MR. TOMLINSON : I call upon Mr. Sandford to reply to the toast.

MR. SANDFORD : With the solitary exception of this occasion, it has not infrequently been my experience that an excellent meal has been more or less spoilt by post prandial speech-making. I therefore do not wish to say more than I ought properly to say on this occasion. I believe it is the practice not very far away from here to " 'ear all and say nowt." I must say here and now that, although I have not had the pleasure of consulting my fellow guests as to what I ought to say, I am going to take it as read and say that if I may speak personally, it was a matter of very great regret that neither my wife nor I could accept the kind invitation to Glasgow, and although I have been able to get here this year, my wife has asked me to express her regret that she is unable to come with me. She would greatly have appreciated your kind hospitality.

If I may say so, this function has been one worthy of either of the three major engineering institutions. I am sure my fellow guests have appreciated every moment of your hospitality and kindness. This Institution was set up seven years ago and has grown up out of very small beginnings, but is an institution whose potency is increasing and which is being recognised as professional institution of considerable merit.

This is largely due to the initiative of your Chairman and certain colleagues who are gathered about us. To them much credit is due.

I do not think I can say more at this juncture than to thank you on behalf of my fellow-guests, whose consent I have assumed, for your very kind hospitality and entertainment today.

MR. TOMLINSON : I had in mind to say a lot this afternoon, but it is now time for starting the Annual General Meeting. I wanted to say things which concern the service and engineers as a whole. I would like to say, in fairness to Alderman Bambridge, Chairman of the Board of which I am one of the servants, I think that the Leeds Regional hospital board is a model to the country. I am not saying this because Alderman Bambridge is present this afternoon. Most of you know that I have never had difficulty in obtaining from the regional board authority to carry out any schemes necessary and essential in your group hospitals. I have told you how the board has always agreed and in fact sponsored work that was of essential importance to the group of hospitals. That is an important thing.

You all may have ideas as to what we would like to do for each particular hospital, but we should just ask ourselves " Are they really essential ? " We must ask ourselves if the work we want to do is really necessary and we must look at a job and ask ourselves—is it of essential importance so far as the welfare of patients is concerned.

Alderman Bambridge referred in his remarks to the restrictive aspect of the work of hospitals. I say here and now, thank God it is removed. Never could it have been more opportune. I am not going to start condemning anybody or any particular hospital. We as engineers know that there has been an enormous amount of inequality in hospitals throughout the country. There are some hospitals in the country which are models of what the others should be. These hospitals are in the minority. We would all, therefore, like to spend money like water in improving the hospital for the advantage of the patient.

I read quite recently a letter to *The Times* from Dr. T. M. Ling, The Medical Superintendent of Roffey Park Rehabilitation Centre, who said that the competitive spirit in hospitals should be developed. What does he mean ? Hospitals should be regularly visited by inspecting teams consisting of perhaps a lay chairman, a hospital administrator and a matron, who would assess marks, not only for running costs but also but the quality of work, for example, with regard to keeping labour turnover.

The only thing I can say is that if they start assessing marks in hospitals at the present time, they will have a hard time to fill the first division.

We know the country is divided into regions and within the regions there are groups. The grade of the engineering service has been recognized and approved by the Ministry of Health. For that I think we should all be grateful, not for personal advantage, but because we as engineers know that it is necessary. There is no

present servant or officer in a hospital who is able to put his finger on extravagances more easily than the engineer, not only from an engineering angle but right through the gamut of hospital administration. The engineer walks around from day to day and sees what is going on.

The Ministry have suggested certain qualifications to ascertain suitability for engineering appointments within hospitals. If it could be taken that the new Whitley Council salary scales and conditions of service were fully acceptable the outlook for these branches of the hospital service would be reassuring, but the adequacy of the Whitley Council is by no means universally accepted, and in fact strong criticisms have been voiced.

It is not for me to make comparisons within the hospital service, which I would like to, and could do. I have had 27 years' experience of hospital engineering. I could shock the Press of this country, and, of course, the public, by voicing some of the views I hold with regard to what goes on in some hospitals, and I know what I am saying. Now that the hospital service has become a national responsibility, we believe there will be great improvement. Never was there field for greater improvement. This will only come about by the hospital managements recognising and fostering the team spirit which is necessary. It must be recognised that only the engineer can do an engineering job, and people who are not engineers have no right to poke their fingers, and their noses, into engineering jobs. In some hospitals this is being done.

I would never for one moment say that I can sew a button on as well as my wife can. I know very well that when it comes to the administration of engineering services I can do a lot better than anyone else in the hospital. I get no interference. I only wish that in every other hospital this same situation prevailed. It does not, I know. Where it does not prevail, that hospital is not satisfactorily run, as where the engineer is in charge of the engineering services, and is responsible to his committee, as he should be.

I have taken more time than I intended. I shall have much more to say at the meeting.

Before closing, I wish to tender the Council's thanks to the Social Sub-Committee, who are deserving of great praise and credit, and also to Mr. Brodie and Mr. Thwaites, who have found a way to cope with every difficulty.

OFFICIAL LUNCHEON

Press Reports.

Extract from "News from the North," 2nd September, 1950.

Methods of improving engineering and electrical equipment in hospitals were discussed at Harrogate today, where 150 members of the Institute of Hospital Engineers from many parts of the British Isles are holding their Annual General Meeting. Lord Calverley of Bradford is the President. Mr. John Tomlinson, of Leeds, Vice-Chairman of the Institute, speaking from the engineering point of view, said, "Some hospitals are a model, but I'm sorry to say that these are in the minority."

"*The Yorkshire Post*," *4th September*, 1950.

A MODEL BOARD.

The Leeds Regional Hospital Board was a model to the rest of the country, Mr. John Tomlinson, of Leeds, Vice-Chairman of the Institution of Hospital Engineers, said at the Institution's annual conference luncheon, at the Prince of Wales Hotel, Harrogate, on Saturday.

Alderman H. J. Bambridge, Chairman of the Leeds Regional Hospital Board, proposing the toast of the Institution, said the National Health Service had released a great volume of enthusiasm for the ungrading and improvement of hospital services, and had also obtained a most effective co-operative spirit.

Please mention this Journal when replying to advertisements.

REPORT ON THE ANNUAL GENERAL MEETING OF THE INSTITUTION OF HOSPITAL ENGINEERS

held at Harrogate on the 2nd September, 1950.

MR. TOMLINSON (VICE-CHAIRMAN): In opening this 1950 Annual General Meeting, in the first place I am very sorry to announce to you that our Chairman, Mr. Hargreaves, is unable to be present on account of the health of his son.

In addition, we have apologies for absence from Sir Hector MacNeil, Mr. Daglish and Mr. Owen.

You are all waiting to hear the opening address of the President, Lord Calverley of Bradford, and it gives me great pleasure to ask Lord Calverley to give his address.

LORD CALVERLEY: I want to say at the outset that I have no address as such. It would be wrong for me to preach a sermon.

I am glad and proud to welcome you to my own county of Yorkshire, and I well remember the generous welcome you enjoyed in Glasgow last year, and in Birmingham.

Last year we had the pleasure of listening to a Lord Provost, and Sir Hector MacNeil was able to grace the proceedings as a guest and to be elected as Vice-President, to join with that great friend of the Institution, Mr. Sandford.

Today Alderman Bambridge has, I know, been glad to come and join you, not simply to have a meal with you, but to express his appreciation of the work the Institution is doing in what I call the Yorkshire Region. The Ministry of Health in its wisdom called it the Leeds Region, but there is a certain amount of rivalry between the county boroughs and local institutions, and a lively generous co-operation. Alderman Bambridge, who comes from Otley, is serving the county well as the successor to the late Enrico Fattorini, and doing the job given to him by Mr. Bevan to reorganize and to try to co-ordinate the institutions, that is the municipal institutions, whether teaching hospitals or institutions run by the all too inadequate but generous subscriptions of the public.

Today I can congratulate the Institution of Hospital Engineers on taking a part second to none in the reorganization of the co-ordination of what might have been conflicting elements—the job is not finished—in order to bring them into what I should call the harmonious whole.

As you remember, immediately after the adjournment of your Council meeting in Glasgow, some of your officers were delegated with the chief task of going to St. Andrew's House in Edinburgh to discuss the financial status of some of the engineers. But there is a feeling of frustration which can overcome men filled with enthusiasm and with a desire to qualify as hospital engineers in a proper way. They are sometimes frustrated by petty-fogging difficulties and at others even by members of the various local hospital boards.

We cannot congratulate you at this meeting that Scotland is doing its duty so far as hospital engineers are concerned, and it will be a pleasure and privilege next time I see the new Secretary of State for Scotland, Sir Hector MacNeil, to ask him if he will give some personal attention to the difficulties of Scotland.

I am not going to traverse the 14 different, and at times, differing regions. I am going to say that some of these regions are trying to face up to their difficulties in giving the head to the willing racehorse, the hospital engineer, who wants to see that work on the engineering side in the hospitals is more fully recognised.

Progress has been made. I do not know whether you read all the White Papers which are issued from Whitehall. If I wanted to be cruel to the Hospital Engineers I would sentence you to read every one of them. I do not do it myself. But the Ministry of Health has laid down a plan for the recognition of Hospital Engineers, and I hope that this Annual Meeting, and all those who are attached to your various groups in every part of the United Kingdom will not rest until you have seen that the broad outlines of the White Paper are recognised and implemented. I think that is the first job, and a job which ultimately entrusts you with a mandate.

We are fortunate in Yorkshire in having as Chairman Alderman Bambridge, and I hope that some of you coming from other regions can congratulate yourselves that you have a chairman who is with you heart and soul for the more efficient reorganization of the Hospital Engineers in this country. That is my immediate task so long as I am your President.

We are faced, you are faced, with this growing curve in an upward direction of infantile paralysis. I believe the figures this weekend will draw attention to one fact, and that is the thanks that are due to Lord Nuffield and others for the money placed at the disposal of the Nuffield Trust, so that we are no longer obliged to send cablegrams to America for the iron lungs, and if some bit of mechanism of these iron lungs gets out of order we no longer have to go to the U.S.A. to put them right, when the life of a patient depends on it.

In many of our hospitals these iron lungs can be kept going night and day, and even increased in efficiency by men who are members of the Institution of Hospital Engineers.

I was in a hospital in Yorkshire where they have 1,700 beds. We used to say that we might keep a seven-month old child alive, and an eight-month-old child, but there I saw a six-and-a-half-month-old child being kept alive by a beautiful piece of apparatus designed by you and such as you, with the active co-operation of a medical officer who knew his job. Think of what that means. What a grand thing it is for a hospital engineer to say, " I helped to produce that incubator in order that a child should not die."

In Birmingham we were going through the teething stage. Last year you had at least grown to the grumbling stage, especially when you were in Scotland. We still have growing pains. It is our duty as brother Councillors, as brother members of this Institution, to make positive suggestions to those who give their time to seeing how we can help the public of Great Britain in making our Institutions more efficient.

A Brigadier in the Army said, " I wish we had more men in R.E.M.E." When I visited the R.E.M.E. institutions in the last war, and when I visited the downstairs department of a great hospital and saw the work of the hospital engineers in making what appeared to be the smallest piece of scrap into an efficient piece of vital apparatus for the conduct of that hospital, I felt that I would like to raise my hat to those institutions and what they are trying to do.

You have all the impatience of youth wanting to go forward. As far as I am concerned, I do not wish to be looked upon simply as a not-too-ornamental president or figurehead, but I want to see, and I should like to live to see the day when hospital engineers and their work will be recognised, not only in a White Paper, but in the spirit which is behind the White Paper.

My concluding remark is that I am speaking to the wrong audience, to be converted. It is up to the beginners and apprentices to realise that they must qualify if they wish to bring and to build up the status of the Institution of Hospital Engineers. We must go ahead and say to the Ministry of Health, " We are ready to help, will you allow us to help ? " I wish you Godspeed.

MR. TOMLINSON : I am not going to comment on our President's address. It needs no words of mine to improve on what he has said to you. I think we appreciate every point he has made, and how important and justified they are.

Report on the last Annual General Meeting.

The acceptance of the Report of the last Annual General Meeting was proposed by Mr. Heald and seconded by Mr. MacGregor. No matters arising from this report were brought forward for discussion.

MR. JONES, who gave both the Treasurer's and Auditor's reports, said : Before proceeding with the balance-sheet, I would like to take the opportunity to pay tribute to my colleagues of the Council. The more I associate with them convinces me more every day that this is a truly democratic Institution. I am proud to belong to the Institution.

. . . There are 800 members in the Institution, 300 of whom are members of the Benevolent Fund, and only 116 of them have paid their subscriptions. I am hoping that none of us will fall on bad times, but it is nice to know we have a fund to which we can subscribe and justifiably make claim on it.

. . . Due to the hard work of Mr. R. G. Rogers, the *Newsletter* is beginning to pay returns to justify its existence.

The adoption of the Treasurer's Report was proposed by Mr. Black and seconded by Mr. Strachan.

MR. STRACHAN : Since there are 800 members of the Institution, it seems to me that there is something wrong if we can only get a subscription of 30/- per member.

It is rather staggering that Council expenses amount to 50 per cent. of the receipts from fees. If this carries on for a number of years, I am afraid our balance in hand is not going to be very great.

MR. JONES : There is no question that this is deplorable. We are approaching the authorities now with a view to becoming an incorporated institution. We will have to show a balance. I think this is satisfactory, but only just. Other institutions have this trouble, but as Mr. Clarke says, we do pick up after the Annual General Meeting each year. It is a deplorable thing that people should backslide in this matter of payment. They expect to enjoy the privileges, but they do not face up to their obligations as they should.

MR. TOMLINSON : The next item on the agenda is the Report of the Council. This year it falls to my lot to do this. I am sorry it is my job because our Chairman is much more able at this job than I am.

However, I refer to the activities of the Council during the past year. I do not propose dealing at length with any of the items to which I shall refer, because they are each dealt with by other mem-

bers of the Council in subsequent reports. For instance, the Whitley Council proceedings will be dealt with by Mr. R. E. Rogers, and our Vice-President will also be dealing with the Sandford Premium and other items pertaining to examinations and education.

I therefore would like to make this point. The Council has already had during the past year four ordinary Council meetings. In addition, they have held one special Council meeting, to deal solely with the question of incorporation. This has been a matter which has exercised the minds of every member for some time past, and this past year has been one of intensive activity regarding incorporation. There has been a colossal amount of work to do, because one cannot go seeking incorporation without every detail of the powers of the Institution being on a right and proper basis.

The first thing, in addition to the Articles of Incorporation, is all the pros and cons regarding the rules and regulations upon which our Institution exists, and so the whole structure of the rules and regulations of this Institution had to be taken apart and carefully analysed, sent to branches for comment, back to the Council, back to branches, and back again to the Council. Mr. R. G. Rogers, who has been detailed for this very particular job, will deal more fully with this at a later stage in the proceedings.

I would now refer to the P.T.B. circular 3. I am very pleased to see that a number of the members of this Institution have felt it incumbent upon them to write to the Council and say thank you for the effort they have made on their behalf. I know that this does not apply to every one of you. Some of you have had disappointments. This your Council regrets most sincerely, but it does not mean that they are going to stay so. We shall use every endeavour to put all those little injustices right. I can give you that assurance.

With regard to Whitley Council procedure, I shall leave that to a more able man than I, Mr. R. E. Rogers.

I would, in passing, like to refer to the very troublesome problem of Scotland. I can assure you that the position as it exists at the moment is no fault of this Institution. Your secretary of the Whitley Council has received some vital information this morning in conversation with Mr. Bland and he will impart it to you at a later moment, but it is most regretable that all sections of this Great Britain of ours do not see that it is right and proper to abide by a kindly and courteous directive of the Ministry.

The Ministry could be adamant about all this but they are not. The Ministry, I think wisely so, leave the final decision to the people concerned with the particular hospital region. They say,

" We advise you to do this, but in your wisdom you may have reasons for not doing so. Whether these reasons are satisfactory is a different matter, and where they are proved to be erroneous, they must be put right."

Examinations and Education. Your Council has pursued both of these items throughout the year. There is still a lot to be done. The educational side of this Institution is one that must be pursued. I cannot emphasise that too strongly. There must be improvement in the standard of engineering generally in health services. There is always room for improvement and where the engineering services are concerned it is our job to make that improvement. It is not your job to say to your Secretary, " Don't you think I ought to do this." It is your job to say, " We must do this." You should also receive a satisfactory reason from your management if they say no, why it may not be done.

As you know, we held an examination in April last, and the Examination Committee which was sitting as late as 12 last night, have arranged for the next examination to take place in mid-October. We may have here today some graduate members, some registered students of the Institution. I do appeal to all of you to try the examination, even if you fail. An attempt is something achieved. I do strongly emphasise the advisability of every graduate and every student taking the Institution examination.

The last point concerns the Sandford Premium. We are glad to have Mr. Sandford with us. He is a gentleman who has given his time and thought to the welfare of this Institution, so much so that more than a year ago he offered a premium for a paper. He left it to your Council to decide how that paper should be arranged. Your Council decided that it should be a mechanical paper and an electrical paper in alternate years. This coming year it will be an electrical paper. Mr. Sandford will have some comments to make on this.

One of the greatest tributes we can pay to this donor is that we should make an attempt to win the Sandford Premium. No greater honour at the present time can be bestowed on any member of this Institution than to be given a Sandford Premium, because it shows an attempt made and something achieved in the educational sphere of the Institution. It is open to everybody. When Mr. Sandford makes his announcement concerning this forthcoming year's attempt, I do appeal to everybody to submit a paper under the particular title that he will tell you.

I do not think I have a great deal more to say. There is on the Agenda, under Item 8, " Question Time." If I spoke for another

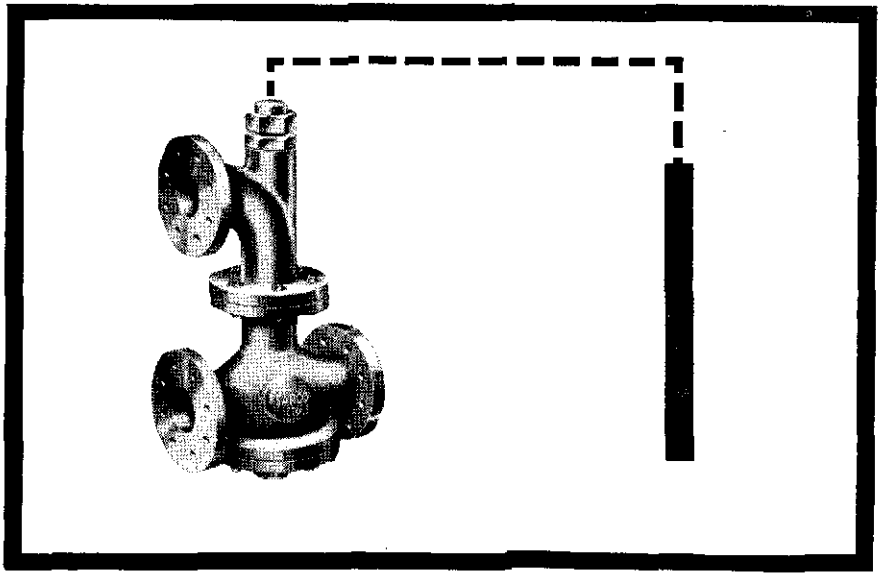
hour I should not cover all the queries you might raise, and therefore you will have an opportunity at this point of asking questions and being answered without hurry. You have the opportunity of giving vent to any feelings and opinions you may have. Please take advantage of it.

I hope we shall be able to say we have 75% of the members present at an Annual General Meeting before long. It is of vital importance. Through the medium of the Institution you will get what you wish—recognition and status.

Before I sit down, I will ask Mr. Sandford to say a few words to you immediately following my report. I know Mr. Sandford has much to say to you on the question of education and examination, and therefore without further ado I will ask Mr. Sandford to address you.

MR. SANDFORD : It is with great diffidence and trepidation that I get up here this afternoon in response to your call, Sir, because, as I said to the Southampton Branch and on two occasions to the London Branch, speech-making is not one of my pursuits. I speak today in fear and trembling because I am in the presence of one who has contributed much to and endured much in the flood of oratory that flows in what I believe is called Another Place.

You have asked me to say something about the educational side of engineering, which is a subject on which many people could speak for much longer than I can with far greater authority. It is difficult to know what comes first. My training in engineering did not embrace apprenticeship. My father decreed no course for me—he sent me to work in a foundry. I never went through a recognized apprenticeship. In many ways I wish I had. I believe there is much to be said for the training of hospital engineers if more apprentices could be obtained. I believe I was instrumental in getting the first boy ever apprenticed to a hospital authority in this country. I managed to persuade some clients of mine to accept a quite promising boy as a five-year apprentice. I eventually got them to do it, and they went so far as to provide quite a considerable sum for the teaching of this boy by a private tutor in technical subjects, in addition to the practical work that he was learning at the hospital. That worked out very successfully. He had all the help he could passibly have and turned out very well. He got deferment from national service in order to complete his apprenticeship. I am glad to say that the hospital authority, when his deferment came to an end, decided to keep a post for him when he came back from his service. I have been able since then to persuade another authority to do the same thing.



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I might suggest that some of you might be in the same position, having boys on the staff who deserve it. I suggest you do the same thing. They can do proper training and it will give them a very good start. It would help them in becoming students of this Institution and I think would go far to produce continuity in this Institution as a recognised body in the professional upbringing and status of hospital engineers, who are in a totally different category from any other engineers in the world.

In hospital work we have to contend with every branch of engineering that can be thought of, except perhaps building a bridge.

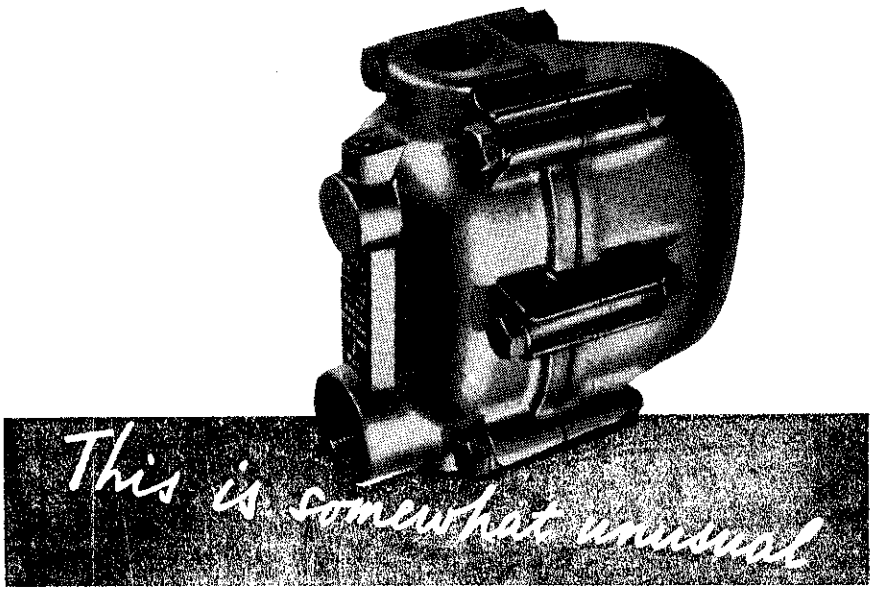
That is one of the suggestions that I would throw out as a help towards the progress of hospital engineers.

Many of you are also qualified. This Institution has laid down a level of examination which is well worthy of it, and in certain respects it is equal to some of the papers set by other institutions with associated membership. I hope that that standard will without question be maintained, because when I was first invited to become a Vice-President of this Institution, I had what may be termed a certain vision that ultimately it might become, although less in members, a body that is recognized in standing throughout the country and abroad, equal at least to the mechanical and electrical people. I think it should have, because it is a specialized body. You cannot attain that standard unless you maintain a high level of entry. But here is an Institution starting on the right lines, and I hope that the Council will see that under no circumstances is that high standard ever departed from. We do not want purely academical people. We must have people with practical experience, but they must have a technical background to help them before they can attain professional status, and attainment of the high level is of vital interest in every respect to the individual member of this Institution.

Mr. Chairman, you have referred to a small premium which is offered annually for competition, and I am very glad to announce the results of last year's paper.

The winner, on the findings of the examiner appointed by the Council, after perusal of the papers submitted, was Mr. Barnetson, of Bristol. Unfortunately he is not here. Mr. Annand, of Battle Hospital, Reading, submitted a highly meritorious paper, and I think it extremely good that the Council should have awarded him, on its own initiative, a prize of two guineas in respect of the paper he submitted. It was of a very high standard and well deserved.

The selection of the paper was at the discretion of the Council, and they thought it would be wise to have a mechanical paper one year and an electrical paper alternately each year. The Council



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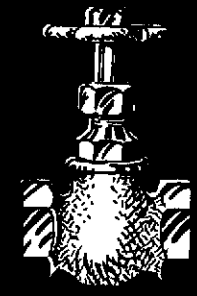

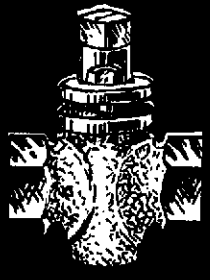

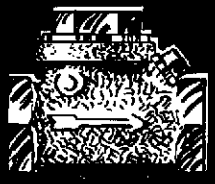

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has therefore proposed that for the 1950–1951 paper the subject should be " The Electrical Installation of a Hospital," and for the purpose of preparing that paper candidates will be provided with a set of plans for a hospital and will be asked to indicate on them the complete wiring scheme for the various departments, and with the plan submitted, which will indicate the scale of draughtsmanship, there will no doubt be a description of the manner in which the work is to be done. This offers a very wide field and one which I think is not too highly specialized, but should be easily within the capacity of the hospital engineer. I think the Council is right in not calling for papers which are too highly specialized.

May I make one or two other suggestions which I think may be for the benefit of the Institution, but not necessarily connected with the educational side. I hate to interfere, as you know, with the Council, but I have had it said to me when asking engineers in hospitals whether they are members of this Institution and they reply in the negative—they say, " Where is the Institution, where do I write ? " I give them the name of the Secretary, but when they ask if we have no offices, I have to say no. I do suggest that the time is coming when this Institution, even at some cost, would do itself an immense amount of good by establishing a recognized office, perhaps in London, which is the centre of most of these activities, whereby it may become more widely known and firmly established and more readily accessible.

I feel that the expenditure would be more than justified. It is quite conceivable that there may even be some retired member of this Institution who might have time to devote to running it with the aid of one clerk until the thing got on its feet, and then perhaps you might appoint someone as permanent secretary. But it is a matter which should have the serious attention of the Council as the next step in the progress of this body. A wonderful start has been made and it is due to the enthusiasm of Mr. Rogers and Mr. Forsyth and a number of others that it has so progressed. I want to see it go further. After incorporation, as it grows in strength, let us, if we can, try and get a charter on the lines of the other mechanical and electrical institutions. It would establish you as the most highly recognized body of hospital engineers throughout the world.

MR. TOMLINSON : I am sure we are all delighted to have heard what Mr. Sandford has said. He always comes out with something fresh which is of the utmost value and importance to this Institution, and I do assure you, Sir, that very sincere thought will be given to the points you have made this afternoon. We value them most highly.

Tea Interval.

MR. TOMLINSON : The next item on the Agenda is the consideration of any matters arising from the Council meeting yesterday. During all the deliberations the Council have had in mind all the services rendered to the Institution by various members and by gentlemen who are outside this Institution but who have rendered considerable services. It has been the practice of the Institution to invest a vice-presidency on certain gentlemen outside the Institution for services rendered to the Institution.

I have therefore to announce to you that the Council wishes me to put to you a resolution from yesterday's meeting : that Mr. G. Jones, the Treasurer of this Institution be elected a Vice-President of the Institution. It is therefore with the greatest of pleasure I make this announcement.

Furthermore, we have one other Vice-President and that is Mr. A. G. Cummings. Your Council all know him, and I would like to refer to the days when we were negotiating with the Mental Hospitals Association for the agreement which did so much for this Institution. Whilst many of you thought that it was not as substantial as it might be, it was a step we were able to take in the interests of the Institution which was a very substantial one when it came to submitting to the Ministry of Health the resolutions of negotiated agreements on which we might base our recommendations for salary scales. Mr. Cummings is an engineer and he is still a member of a Hospitals Board. We owe a lot to him, because he helped to get our suggestions agreed to by the remainder of his board, and for that reason we ask Mr. Cummings to become a Vice-President of this Institution.

The chief item we have to put today is the question of incorporation. M. R. G. Rogers and his very worthy committee have spent an enormous amount of time on this job. All the secretaries and members of branches have done likewise, and I am pleased to say we have reached finality in this matter.

MR. R. G. ROGERS : You all know that a lot of time has been spent on the question of incorporation, and the sub-committee have been on several occasions to see Mr. Neil Maclean with a view to reaching finality about the method in which this shall be dealt with. A draft document was drawn up and sent to all branches to be read over, recommendations made, submitted to the secretary, and then to me. We have had, furthermore, two special Council meetings to deal with these Articles of Incorporation.

The final draft was drawn up yesterday and a good deal of time has been spent going through this and all the resolutions submitted

by the branches, and unanimous approval was gained of the rules of incorporation and articles of association in the draft form in which they now stand. This will now have to be submitted in accordance with the Companies Act of 1948, and in a lot of this we have no option in the matter. The Articles of Association are a little different. These can be drafted to suit our particular needs when they will have to be submitted to the Board of Trade after being approved by our Legal Adviser.

MR. TOMLINSON : Every member of the branches gave unanimous acceptance to the rules as they are, and we have prepared them for submission to the Board of Trade in final draft form. There is very little that we can discuss. They are in final form and your Council has given unanimous approval to them.

MR. STRACHAN : I understand that the rules of incorporation have been passed as printed here.

MR. TOMLINSON : Recommendations have been sent from every branch. These recommendations have been hashed and rehashed in Council and your representatives of every branch have approved the final form. The point is now that if we send them back it will be another year before we get them approved.

MR. STRACHAN : There is a divergence of opinion amongst the branches on several items of these Articles of Incorporation, and I should like to know how the differences of opinion have been reconciled, and if they are going forward to the Board of Trade without the members of the Annual General Meeting having a say that they will accept these rules.

MR. R. G. ROGERS : What rule in particular would you like to take up ?

MR. STRACHAN : The one on apprentices in particular, on which there was a resolution sent from the London Branch which conflicted with the amended resolution sent down by the Council.

MR. R. G. ROGERS : That was dealt with and the London Branch resolution was put to the Council last evening, and I will read the final draft concerning the item to which you refer. (Rule read.)

MR. STRACHAN : That is the one, but it does not cover associate members and graduates. The associate member still, under the rules as laid down here, must have served an apprenticeship. Anyone who has not, cannot become an associate member, and it was the strong feeling at the London Branch that that was wrong. We have members within the hospital services who have acquired a liking for engineering in the services—as the President said, " I wish we had

more men in R.E.M.E." They have come out with the liking though they have not served apprenticeships. We are, by passing these Articles of Incorporation, debarring these men from membership of an Institution, unless by some subterfuge they manage to become Chief Engineer at a hospital, but as an assistant or a graduate member, they cannot become members of our Institution.

MR. R. G. ROGERS : At the Council meeting last night all these points were put on behalf of the London Branch, and the Branch resolution was put to the Council with the same emphasis as you now put it. They felt that that point was covered.

MR. STRACHAN : I am still not assured that that applies to associate members, and I have been given to understand that it only applies to members, but not to associates or graduates.

MR. R. G. ROGERS : I will read the Associate Member Clause. (Clause read.)

MR. TOMLINSON : May I make it quite clear to Mr. Strachan that that point was covered. The clause was phrased with that point of view, in order that where a particular applicant's qualifications warranted it, we could take him into the Institution under that particular section of the clause.

MR. STRACHAN : I must bow to the rules, but I am still not very happy. It still leaves it to the discretion of the Council, and I feel that it is important that incorporation should be settled once and for all by the Institution. I do not know if I am trespassing on what I ought to divulge, but I was privileged in London to attend a functional council on behalf of one of the members who could not attend, and was amazed at the competitive spirit. The Institution of Hospital Engineers is very small fry in the functional Council by virtue of its membership of 800. We are now denying people entry and at the same time these competitor unions are seeking to bring people in so that they are backed by sheer force of numbers. If they are going to try to get electricians, etc., into their unions, then they will do it. We are trying to turn down every man who is a hospital graduate, and I am not happy about it.

MR. R. E. ROGERS : This is an old problem in a new guise, whom to have and whom not. We cannot have everybody, even if they have served an apprenticeship. As regards the other unions, if they wish to take in boiler-house men and electricians, let them do so ; it is nothing to do with us. They will not become members of the Council because they do not come under the circular P.T.B.3.

MR. W. BULLIVANT (Oxford) : Do I understand that hospital people can become members of this Institution without serving an

apprenticeship? It was the corner-stone of this Institution, that every man must have served a proper apprenticeship. Are we giving all that up now?

MR. R. G. ROGERS: In general principle, no, but many points have been made that good men with technical qualifications are debarred from becoming members of this Institution solely because they have not served an apprenticeship. While we are sorry for these men, our fundamental rule states they must have served an engineering apprenticeship. In order to cover exceptional cases, at the discretion of a two-thirds majority of the Council, a person holding technical qualifications, and who has been 12 months in the service of a hospital, may be considered by the Council for acceptance as a member.

MR. W. BULLIVANT (Oxford): My personal opinion is that a plebiscite of every member should be taken.

MR. R. E. ROGERS: At the discretion of the Council. It still lies with them to analyse any individual case and see if it warrants coming in at any grade. Because a man has technical qualifications does not necessarily mean he is good enough.

MR. SANDFORD: May I offer an observation on this matter? It was only today that there was a question of incorporation or rules under discussion. I think perhaps it would not be improper to say that in the rules of the Mechanical Engineers and so forth regarding membership and associate membership, there is in each of these cases a discretionary clause which allows the Council in exceptional cases to admit an applicant to the grade to which in their opinion he is appropriate. I think, therefore, although I know nothing of the details, that the ruling your Council has suggested is correct, on the precedent of these other Institutions.

MR. RILEY (Wales): I was going to bring the same point myself. I suggest that they consider creating a grade "Associate" to cover all these people who have no technical qualifications to warrant associate membership. I think we should take a leaf out of the Institution of Mechanical Engineers and create a new grade of Associates.

MR. STRACHAN: I feel much as Mr. Riley does. It should be the wish of the majority of the members. The compromise, though all very well, is not good enough. I feel I cannot offer anthing to a young boy who comes into my establishment. If I say provided he works for four years, goes to evening classes, passes examinations, that he will be accepted into the Institution—it may be that in spite of my promises the Council will turn him down, and I am not happy about it.

MR. R. G. ROGERS : The Council has the power to turn *anybody* down, irrespective of qualifications.

MR. STRACHAN : I do not agree. If we pass these Articles of Incorporation now, the Council can do nothing to upset them, and if the candidate meets with all the requirements, the Council cannot turn him down, or it is liable for legal action.

MR. TOMLINSON : This is most definitely incorrect. The Council have the power to refuse anyone admission to the Institution, as have the other institutions.

MR. STRACHAN : The resolution put forward in London was in no sense a frivolity. The Institution of Marine Engineers is a much more powerful body than this by virtue of the members available, and they, in their wisdom, have incorporated a ruling by which they are allowing people to become members of their Institution who have not served apprenticeships.

MR. TOMLINSON : I think that with a case such as Mr. Strachan has cited I am justified in assuring you that, by virtue of his achievements, the Institution will accept him. I do not think there is the slightest doubt about it. The point is, the Institution is not going to rule everybody with a hammer. It is reasonable in its decisions. Some decisions it has had to make have given the Institution much heart-burning. But by virtue of regulations, they have had to do it. The rule has been slightly altered and, I think, to conform with the request of the London Branch. The power is open, under certain circumstances, to accept the type of member you speak of. You need not have the slightest fear about not getting them into the Institution. I think you can accept that.

MR. CHESNEY (Newcastle) : I have every sympathy with Mr. Strachan, but I think he should look at the Institution as a whole and with the proper tolerance of one member out of 800. A resolution from the London Branch came up in the same strain in Glasgow. I spoke against it, as I had done on previous occasions. The apprenticeship was the corner-stone of the Institution. Nevertheless, in the Council there are other people there who have their views. We are proud of our apprenticeship. You have to strike a happy medium somewhere, but we must try to cover all the needs of the country and each country in which we have members. This is a professional institution and it must stay that way. I would suggest that the London Branch accept the ruling with as good a grace as the other Branches have. It is the decision of the majority, and our Council stands together, and we should stand by the Council's decision.

MR. STRACHAN : There has never been any suggestion on my part that I should resign on this issue. If I encourage youngsters in my department, I promise that if they do certain things, they will be admitted to the Institution and ultimately become Chief Engineer. I appreciate the Chairman's remarks that the Council would not look unkindly on the application. But in five or ten years the present members of the Council may no longer be members. The Council may be composed of more than two-thirds whose opinion differs from that of the present Council, and who will not tolerate someone who has not served an apprenticeship. I do not give false promises to any of my men. I am working for competent men in my department.

MR. TOMLINSON : I fully agree with what you say, and I assure you the Council has not forgotten the point you have made, and has set it out specifically. The two representatives of the London Branch have voted for this adjustment in the rule.

As to the boy you are speaking of, I would recommend that this boy registers as a student with the Institution now. He could have a period of study doing the first part of the examination and become a graduate member. By that means the door is nearly wide open. I do assure you we have gone into this matter most carefully. In fairness to the whole of our members we have had to lay down some regulations. There must be some restriction on whom we should have in. The Council will have this matter in mind when an application such as this comes before it. I would ask you now to let us leave this in order to get on to the other items.

Are there any other questions ?

MR. R. G. ROGERS : I formally move the acceptance of the Rules of Incorporation.

MR. FORSYTH : It gives me great pleasure to second the motion, and to pay tribute to Mr. R. G. Rogers as Chairman of the Committee.

MR. TOMLINSON : I was going to refer to this sub-committee. I would like to include Mr. Forsyth and Mr. R. G. Rogers in the thanks of this Institution to them for the terrific amount of work put into the question of Incorporation. They have spared no time or patience in getting the job to the point it has now reached. We have taken legal advice through the whole proceedings. The best thanks of the Institution should be accorded to Mr. R. G. Rogers, Mr. R. E. Rogers and Mr. Forsyth for the work they have put in on this committee.

MR. BULLIVANT : Though I voted against it, I should like to add my grateful thanks to those of the Chairman.

MR. STRACHAN : I would like to second that.

MR. TOMLINSON : The next resolution is one from the London Branch that recognised machinery be formulated for calling emergency meetings of the Council for dealing with specific matters of the Institution. We have machinery for that particular purpose. The Council has met on two additional occasions with regard to this matter of incorporation.

MR. STRACHAN : May I ask why this was not made use of in the case of Robinson ?

MR. TOMLINSON : I would like to say that there has been action taken in this case under the month. Of that I am aware, because I knew of the matter, but I do not think any amount of discussion now will alter it. We do not want to alter the satisfactory outcome.

MR. BRODIE : I take it we are dealing with the resolution of the London Branch. I can see no reference in this resolution to the Robinson case. I think we have wasted valuable time at this meeting.

They are asking that emergency measures be introduced within the Institution for dealing with any matters that any particular branch may consider emergencies, and I am in favour of that. What we should do is to refer them to the machinery that we have within the new rules of incorporation. The machinery is there for this particular business. I suggest we satisfy the London Branch by taking the particular clauses and putting them into operation herewith.

MR. TOMLINSON : I did make that quite clear when I opened my remarks. Does that satisfy all the members ?

The next business is to receive the report from Mr. R. E. Rogers.

MR. R. E. ROGERS : The outcome of the Whitley Council is fairly well known to all of you who have seen the P.T.B.3. Whitley Council meetings have been held fairly frequently.

First of all, any disappointment which you might have over P.T.B.3 is not the fault of the Institution. If anyone is not satisfied, I can only say to you, please nominate someone else, and you will realise the difficult situation we are faced with. I must add that P.T.B.3 came at the time of the devaluation of the pound, and we all believed we would not get a brass farthing from the management side. If we got anything at all from P.T.B.3 it was through our efforts.

We did try very hard to get better conditions, but you cannot get every improvement at once. Much good has come out of this.

But that does not mean to say that we shall let it stand where it is. We shall continue to press for payment for additional hours of work, additional staff, etc., etc., and if possible a general reviewing of the whole salary scale.

Some have asked why every grade except two or three is not any higher than it was before. The top scale of £800–£900 per annum we could not exceed. We did try but we failed. The reason is that £900 is the maximum payable to an assistant regional engineer, and the Ministry will not pay more. Salary scales of Clerks of Works, Engineers in teaching hospitals and Engineers in hospitals which have not yet been taken over. On the 22nd September the first meeting is being held of a small sub-committee to deal with salaries of Clerks of Works. In Scotland not as much progress has been made as we would have desired. Clerks of Works are claiming salaries which we have negotiated for Engineers-in-Charge. I 'phoned the Department of Health in Edinburgh, and a position has been reached where all correspondence referred to me will be sent on to Mr. MacMillan at the Scottish Department of Health, and he and Mr. Bland will look after it.

In general in Scotland, P.T.B.3 was being implemented. I have decided personally that it would be far better to tackle this as a problem collectively rather than take every individual case at a Council meeting. Ben Smith said it would take months to do through the Whitley Council, but we should send it to the Department of Health for Scotland. When the papers come back from London they will be sent to St. Andrew's House and Mr. Bland and Mr. MacMillan will examine them.

In regard to engineers in hospitals not yet taken over, the Ministry told us that they have difficulty in identifying the people to whom we are referring. At the next Whitley Council meeting but one, this matter will come up again. It is rather a slow machinery such as are all Ministry meetings, but you must leave it to your representatives to see that this matter of the local hospitals does receive its proper attention.

The draft document relating to engineers in teaching hospitals is in the hands of the Ministry, who are discussing it with the Treasury. We have not yet heard from the Ministry.

That sums up the activities of the Whitley Council. If there are any questions regarding the application of P.T.B., I would suggest you refer hem to your local branch.

MR. TOMLINSON : I call upon the Honorary General Secretary to give his report.

MR. CLARKE : We have put in a lot of work on the committees, including matters arising from the British Standards Institution.

We have two committees now sitting, and we have appointed yesterday three representatives to sit on a committee with the special work of sterilizers for smaller hospitals.

A year ago today I asked all branch secretaries to let me have a copy of their branch minutes so that I could keep the Council informed with regard to your work. Only one branch secretary out of thirteen sends me his minutes regularly. It is not good enough. You must inform the General Secretary, and he will inform the Council.

In January of this year I asked that each branch secretary supply me with a list of members in his branch, with particular reference to change of hospital, change of names and status. We have lost touch with many members due to branch secretaries not notifying the General Secretary.

MR. TOMLINSON : Before we go on to Question Time we had better settle the date of the next annual meeting. It is usually held on the first Saturday in September. Do you wish to change the date? I take it that the existing arrangement is to be retained.

Venue : Last year we held the meeting in Glasgow, this year Harrogate—where next?

(Weston-super-Mare gained 18 votes, Llandrindod Wells gained 11 votes. The final choice was Bournemouth.)

A VOICE : Has the South Wales Branch been forgotten?

MR. TOMLINSON : No.

MR. BARR : In the negotiations with regard to P.T.B., may I ask that we keep in mind not only the clerks of works, but also the engineer who has clerk of works duties to carry out. Is it the intention that there will be no allowance for this work?

MR. TOMLINSON : There was no addition for clerks of works. The particular problem arose in isolated cases and was arranged with their own hospital authorities. They altered the salary to suit. Under P.T.B. you will find that where a man is acting as engineer and clerk of works, the salary under the new scale is arranged to suit the difference you have mentioned.

MR. BARR : It is hardly fair to the clerk of works that he gets no allowance. He should get the same scale.

MR. TOMLINSON : I would accept it if it meant no more, and I would advise every one of you to take on a clerk of works job if it is offered. Do not question the point about salary.

MR. KIRBY (Bradford) : With this group arrangement you get one hospital of a group perhaps taking on the group laundry. There is no mention of anything for that extra work entailed. A group laundry is hard work. Is no provision made for this?

MR. R. G. ROGERS : This is being discussed in other groups.

MR. CLARKE : There is a feeling round the country that the cost of all hospital laundries are going to be considered.

MR. ROBINSON (Leeds) : I hear that progress is being made in teaching hospitals. Could you give me any information, if we are to follow the normal routine of the last issue of P.T.B.? Is the ruling and salary scale likely to be altered?

MR. TOMLINSON : At the moment I cannot tell you. We must wait until the Ministry has issued its findings. When we know what the Ministry has in mind, we shall be able to tell you.

MR. RICHARDSON : What about certificates?

MR. TOMLINSON : A number have been sent out. A further batch will go out today.

MR. R. E. ROGERS : With regard to Staff Consultative Committees, you all know that these committees were to be set up. There are five groups of employees. Some engineers have been put in the grade with artisans. I have taken this up with the staff side secretary, and he agrees with me that under P.T.B. he should automatically come into the group of professional people on the Staff Consultative Committee, not in another grade.

MR. KIRBY : as regards this, we are accepted as professional people without question. Group engineers should be on the management side.

MR. R. E. ROGERS : In general, yes.

MR. TOMLINSON : I am afraid our time is now up. Thank you all for attending today. You know where we are going next year, and will you make a special point of being there and taking along two or three other people from your branch, and let us have a bumper meeting. I want to see at least 50 per cent. of the members of this Institution present and the Annual General Meeting. Please urge your friends to attend next year's meeting.

I think we owe special thanks to all the officers of the Institution, and to the members of the Council for all the hard work they have put in in the past year. We have also to thank all other ex-officio members, the Vice-Presidents, Mr. Thwaites, the branch secretaries, who are all doing such a good job. By your wholehearted efforts and team spirit we shall get there.

I declare the meeting closed.

MR. FORSYTH proposed a vote of thanks to Mr. Tomlinson for his work as Chairman of the meeting, and this was carried with acclamation.

TREATMENT OF BOILER FEEDWATER.

Lecture given by G. T. PEAT, B.SC., A.R.I.C., M.INST.F., *to the London Branch of the Institution of Hospital Engineers, July 15th,* 1950.

Despite the fact that most water supplies require some kind of treatment before being used for steam generation or process work, water is still one of the purest chemical compounds found in nature.

We are inclined to consider in commerce that a purity of 99.9% is very pure indeed, but such would represent a very poor quality water. For example, London water is 99.96% and Glasgow supply 99.998% pure water. However, these small amounts of impurities become very significant, particularly in boilers which have a large evaporation, and it is remarkable the trouble which can be caused by even traces of certain impurities in supplies both in regard to scale formation and corrosion of the metal.

In order to trace these impurities from their source and study what effects they may have in certain circumstances let us commence with rain.

Hardness of Water.

As the rain falls through the atmosphere it takes up oxygen and carbon dioxide, the latter gas uniting with the water to form a very dilute solution of carbonic acid.

Limestone, chalk and dolomite are very slightly soluble in water, but are soluble in carbonic acid, so that when rain containing carbon dioxide flows over these rocks they are dissolved. It follows then that as the rocks have entered in solution due to the presence of carbon dioxide in the water, that if this gas is driven off by boiling they will once more come out of solution.

This does happen, and the type of hardness which comes out of solution on boiling is termed " temporary hardness."

It should be mentioned here that the term " hardness " of water was first used by textile manufacturers and launderers to give an indication of the amount of soap which should be used before a lather can be obtained. It so happened that the hardness corresponded fairly closed with the scale-forming properties of the water, but engineers should realise that this need not necessarily be so. Magnesium sulphate (Epsom Salts), for example, is a hardness salt, but is very soluble in water and would not under normal conditions form scale in a boiler.

The hardness of water is due almost entirely to calcium and magnesium salts, the temporary hardness (which is removed by boiling) being due to the presence of the bicarbonates of these metals. All the other salts of calcium magnesium, such as the sulphates, chlorides, etc., are not affected by boiling, but would concentrate in a boiler with the eventual formation of scale. These latter salts are termed " permanent hardness salts."

It will be seen from the foregoing remarks that a water high in temporary hardness will give trouble in those parts of the plant where the feedwater is pre-heated, *i.e.* Economisers, internal feedpipe of the boiler, etc., and if the water shows a high permanent hardness, then one can expect heavy scale deposits in the boiler itself where the water is concentrated.

When the bicarbonate of calcium is decomposed by heat to form the normal carbonate—

$$Ca(HCO_3) \xrightarrow{\text{Heat}} \underset{\text{(Chalk)}}{CaCO_3} + CO_2 = H_2O$$

the chalk comes out of solution in two distinct forms according to the temperature. If the water is at a temperature below 300°F., then the calcium carbonate comes out of solution in the form of calcite, which is a crystal of the cubic form and tends to build up like bricks in a wall to form dense, hard scale. At temperatures above 300°F. the chalk comes out of solution in the form of aragonite, which is a long needle-like crystal and does not form scale, but sludge.

It will thus be seen why a water high in temporary hardness forms scale in Economisers, but if passed directly into the boiler will form a heavy sludge.

The question may be asked, " Why is it that most boiler scales contain a very high percentage of chalk although aragonite does not build up as scale? " The reason is that the aragonite crystals are bound together in a matrix of calcium sulphate, silicate, etc., and are not themselves adhering to the boiler metal.

Scale and Overheating of Boiler Metal.

Scale on a boiler can be responsible for a considerable loss of fuel owing to the resistance which it offers to the passage of heat. In a boiler the temperature of the water is constant according to the pressure at which the boiler is working. Thus in order to maintain the correct working pressure the temperature of the boiler metal must increase as the thickness of the scale increases. As the maximum temperature allowable for boiler metal is 900°F., it will be seen that as the pressure increases the thickness of the scale per-

missible on the metal becomes less and less, until, with boilers working at very high pressures, even scale of paper thickness can cause an immediate breakdown of the metal.

The resistance of oil to the passage of heat is one thousand times that of steel and between ten and thirty times that of scale, according to the composition of the latter. Thus traces of oil in a boiler can be extremely dangerous, and care should be taken at all times to eliminate any possibility of oil contamination of the feedwater.

Treatment.

For the treatment of scale-forming feedwater either a softening plant or internal conditioning can be used. Whichever method is adopted depends on the water to be treated, the conditions under which it has to be used, and the amount of money available. For example, it might be possible to obtain good results with internal conditioning on a feedwater being used in a Lancashire boiler steaming at 60 lbs. to the square inch, whereas it would be impossible when used in a water-tube boiler steaming at 200 lbs. per square inch. However, as a general ruling, I would say that with waters having a hardness of over 150 parts per million, it is advisable to get rid of the scale-forming salts outside the boiler by means of a softening plant. It often happens, however, that, although the hardness of the feedwater is so high that a considerable amount of sludge is bound to be produced by internal treatment, the cost of softening equipment may be out of proportion to the small water requirements and people may not have the money to spend on softeners, although they appreciate the technical advantages.

There is an important point which must not be overlooked. When treated water leaves the softener it may not be, and in the majority of cases is not, in the best condition for use as boiler feed, an external adjunct treatment being necessary.

If the water being softened is liable to rapid fluctuations of hardness, as, for example, some river and canal waters, then the hardness of the softened water may also fluctuate considerably, and in such cases it is customary to use internal treatment in the boiler to deal with the resultant hardness.

Base Exchange Softener.

The type of softeners usually encountered for the treatment of boiler feedwater are Base Exchange and Lime Soda Plants. The former plant is so named owing to the fact that the bases of the hardness salts, *i.e.* magnesium and calcium are exchanged for the

non-scaling base—sodium. This type of plant is excellent for the softening of the majority of process waters, whether for potable or for laundry purposes, because the water can be softened to zero hardness. However, if the temporary hardness of the water exceeds 80 parts per million, then it is not advisable to soften boiler feedwater by the Base Exchange method, the reason being that the bicarbonates of calcium and magnesium are converted to bicarbonate of sodium, which on entering the boiler is converted to sodium carbonate and tends to build up high alkalinities in the boiler water. Care must also be taken to ensure that if there is not already sufficient sulphate present in the original raw water to balance the caustic sulphate ratio of the boiler water, then sodium sulphate (Glauber's Salts) must be added in order to guard against caustic embrittlement of the metal. This will again be referred to later.

After a certain volume of water had passed through the Base Exchange Softening Plant, the Zeolite or Base Exchange material must be regenerated by back flushing with a strong brine solution, the reactions being represented by the following equations :—

SOFTENING

Na_2Z	+	$MgSO_4$	=	MgZ	+	Na_2SO_4
Sodium 'Zeolite'		Magnesium Sulphate		Magnesium 'Zeolite'		Sodium Sulphate

REGENERATING.

MgZ	+	$2NaCl$ (Brine)	=	Na_2Z	+	$MgCl_2$ Magnesium Chloride

Lime/Soda Softener.

With waters of hardness exceeding 150 parts per million undoubtedly the best type of plant to use in order to soften the water for boiler feed is the Lime/Soda type. As the name implies, the reagents used are lime and soda ash. The lime precipitates all the temporary hardness and magnesium salts present in the water, and the soda ash precipitates all the calcium salts. The reactions taking place can be represented by the following equations :—

REMOVAL OF TEMPORARY HARDNESS.

$Ca(HCO_3)_2$ Calcium Bicarbonate	+	$Ca(OH)_2$ Lime	=	$CaCO_3$ Chalk (insoluble)	+	H_2O Water
$Mg(HCO_3)_2$ Magnesium Bicarbonate	+	$Ca(OH)_2$ Lime	=	$MgCO_3$ Magnesium Carbonate	+	H_2O Water

Magnesium carbonate is slightly soluble, and this reacts with further lime forming the insoluble magnesium hydroxide.

$MgCO_3$	+	$Ca(OH)_2$	=	$Mg(OH)_2$ Magnesium Hydroxide (insoluble)	+ $CaCO_3$ Chalk (insoluble)

REMOVAL OF PERMANENT HARDNESS.

$CaSO_4$ Calcium Sulphate	+	Na_2CO_3 Sodium Carbonate (Soda Ash)	=	Na_2SO_4 Sodium Sulphate	+ $CaCO_3$ Chalk
$CaCl_2$ Calcium Chloride	+	Na_2CO_3 Soda Ash	=	2 NaCl Sodium Chloride	+ $CaCO_3$ Chalk

The amount of lime and soda to be used to soften any particular water is easily calculated from the analysis of the water. It is necessary to know the total hardness of the water, the total alkalinity (which is equivalent to the temporary hardness) and the magnesium hardness, these figures being expressed in parts per million of calcium carbonate.

The amount of soda ash required in pounds per thousand gallons of water is obtained by multiplying the permanent hardness of the water (total hardness less temporary hardness) by 0.0106. In order to allow for a slight excess treatment a further one-third of a pound per thousand gallons should also be added.

The amount of lime required is obtained by adding the figure for the magnesium hardness to that obtained for the temporary hardness and multiplying by 0.0074. This gives the weight of lime per thousand gallons of water to be softened, and once again in order to allow for the necessary excess of treatment a further quarter of a pound of lime should be added per thousand gallons.

These figures are calculated on 100% pure reagent, and it may be remembered that commercial lime might contain anything from 60% to 95% pure calcium hydroxide. It is thus advisable always to purchase the best quality lime available. Once the original amounts of lime and soda necessary for correct softening have been calculated, it is a simple matter thereafter to control the softening plant by reference to the chart which has been drawn up by the speaker, a copy of which is available if desired.

Treatment for Oil.

As previously explained, oil in a boiler can be extremely serious and where condensate provides a large proportion of the boiler feed, it is important to ensure that no dangerous amount of oil is present, either as an emulsion or in suspension. In the former state, *i.e.* emulsion, oil promotes foaming, while suspended oil through adhering to the plates leads to overheating. A fraction of 1% of oil in sludge can cause serious overheating.

Suspended oil can be eliminated in an oil separator of the baffle plate type. Vapourised oil, however, will not be removed by such mechanical means, chemical treatment and filtration being necessary.

The best method for the elimination of traces of oil in the feed is by the use of sodium aluminate and aluminium sulphate (alumino-ferric).

The chemicals are dissolved in separate tanks and are fed into the feedwater to be treated, the rate of flow of both chemicals being arranged so that the water shows a slight alkaline reaction. The chemicals react, forming sodium sulphate and a gelatinous precipitate of aluminium hydroxide. The oil present in the water is entrained with the precipitate of aluminium hydroxide and is removed by means of wood-wool filters. Under proper control this process will remove oil when present in as small a quantity as 1.5 parts per million.

Internal Feedwater Conditioning.

Various chemicals can be used for what is termed " Conditioning of Feedwater," and the formula of treatment depends not only on the hardness of the water, but the conditions under which the water will be used. The chemicals most commonly used are soda ash, caustic soda, various phosphates, sodium sulphite and tannins.

If the water has a high temporary hardness and it is necessary to prevent scale formation in pre-heaters, feedlines or cooling systems, then sodium hexametaphosphate is used, which has the property of preventing the breakdown of the temporary hardness by heat.

In the case of boiler water the hexametaphosphate would play a dual role inasmuch as it would present temporary hardness from coming out of solution in those parts of the plant where heat is first encountered, but on reaching the boiler it would be decomposed to form the ortho-phosphate, which would then react with the scale-forming salts in the boiler water and precipitate them as the insoluble phosphate sludge, thus preventing scale formation in the boiler.

In order to carry out efficiently the reactions just mentioned, the sodium hexametaphosphate would not be used by itself, but would be stabilised by selected tannins. Again, for the full precipitation of all the scale-forming salts in the boiler, it would probably be necessary to feed directly to the boiler other chemicals such as soda ash, etc.

As previously stated, even when softened water is used as boiler feed, it is very often necessary to use adjunct treatment, which would consist in all probability of selected phosphates, tannins, and sodium sulphite.

Sodium sulphite is added when it is necessary to remove corrosive properties from the water. The sulphite absorbs oxygen in the feed with the formation of sodium sulphate, and as oxygen is usually necessary to sustain corrosion, its elimination should arrest any corrosion taking place. The formula of treatment required for any particular feedwater, the amount to be used, and the direction of control is a specialised study, and it is dangerous practice for anyone without full chemical training to attempt to condition feedwater. Very often more trouble is caused by the misuse of chemicals in boiler water than would have been caused if no treatment whatever had been used.

Corrosion.

There are various theories of corrosion but most of these can be reduced to electro-chemical action. To enter into a full explanation here would necessitate a considerable amount of time, so that I will just deal with different types of corrosion that may be encountered and explain how they can be arrested.

Galvanic Action.

If metals which have a potential difference are connected together, the less noble of the metals will tend to pass into solution and thus become anodic. As the ions of the base metal pass into solution, there will be a flow of cations towards the noble metal, when then becomes the cathode. Electrons will flow through the connected metals from the anode to the cathode, thus completing the electrical circuit, and anodic corrosion of the base metal will continue unchecked.

Corrosive activity by galvanic action due to the use of dissimilar metals is sometimes encountered in steam plants, hot water systems, etc., and great care should be taken in the selection of metals when a plant is being fabricated.

The easiest way of arresting this type of corrosion is to insert an insulating joint between the two metals, thus breaking the flow of electrons.

Pitting.

In the same way that dissimilar metals can form a galvanic cell—one metal becoming anodic and the other cathodic—so impurities or certain inclusions in a steel plate can set up galvanic action. Should the inclusion be more insoluble than the surrounding metal, it will become cathodic and the metal anodic, and in the presence of an electrolyte and a small amount of oxygen, anodic corrosion will proceed unchecked.

Where pitting of the metal is encountered, it can be arrested by removing all the oxygen from the water by means of sodium sulphite or a deaeration plant. It is also necessary to make sure that the water is alkaline. Feedwater should be maintained with a pH of 8.5 and boiler water should have a pH value of over 10.5.

Graphitic Wastage.

This type of corrosion takes place in cast iron and is often encountered in Economisers, valves, centrifugal pumps, etc. Once again galvanic action is the cause. Minute galvanic cells are set up in the metal between the insoluble graphite and the surrounding iron carbide, the latter becoming anodic and entering into solution, leaving the graphite *in situ*. It is invariably found that the water which causes graphitic wastage is :—

(*a*) Soft.
(*b*) Fairly highly aerated.
(*c*) Has a low pH value.

The method adopted to arrest the corrosion is to deaerate the water, either mechanically or chemically, with sodium sulphite, and also raise the pH value to over 8.5.

It would appear that the method adopted for raising the pH value of the water is very important. In the treatment of feedwater passing through Economisers for the prevention of graphitic wastage I have used caustic soda to elevate the pH value, with poor results.

When lime water was used, however, the results were satisfactory. In one particular case the use of lime water gave striking results, the graphite coming away from the metal just like scale, leaving a polished metal surface.

Caustic Embrittlement.

This type of corrosion takes the form of intergranular cracking, these cracks at times joining up to form major fractures between rivet holes in boiler plates. Although a considerable amount of knowledge has been obtained in regard to embrittlement in recent

years, it has still not been decided with absolute certainty how this corrosion proceeds. The following facts appear, however, to have been established, *i.e.* caustic embrittlement does not take place unless :

(1) caustic soda is present in the boiler water ;

(2) metal has been submitted to stress ;

(3) the amount of sulphate present in the water does not conform to the sulphate/caustic ratio.

It would appear from work which has been done by Schroeder and C. M. Longfield that caustic cracking, similar to other types of corrosion is electro-chemical in action, a difference of potential being set up in the crack, where the caustic soda is concentrated, to the boiler metal where the caustic soda is diluted. The metal in the crack becomes anodic and passes into solution as sodium ferroate (Na_2FeO_2).

The accepted method of preventing caustic cracking is to maintain in the boiler water a pre-determined concentration of sulphate, according to the amount of caustic present.

The British Standards Institution advise that at all times the ratio of sodium sulphate in the boiler water (calculated as such) to caustic soda (as such) should have a minimum value of 2.5. Should the ratio fall below this figure, then sodium sulphate should be added to the feedwater.

The solubility of sodium sulphate is depressed as the concentration of caustic soda increases, so that the theory underlying the sulphate/caustic ratio for the prevention of embrittlement is that, provided the correct ratio is maintained in the boiler water, should at any time concentration of water take place in a crack, sodium sulphate will be thrown out of solution on to the metal and will thus shield the vulnerable atoms of the crystal boundaries from attack by caustic soda.

pH Value.

As the term " pH value " has been used once or twice in this paper, it would be as well to give a few words of explanation. pH is defined as the logarithm of the reciprocal of the hydrogen ion content. The strength of acidity of a solution is determined by the strength of hydrogen ions (H.) present, and the alkalinity by the strength of hydroxyl ions (OH–) present. The formula of water H_2O is more accurately represented by H.OH. showing a balance between the hydrogen and hydroxyl ions—thus pure water is neutral in reaction.

The amount of hydrogen ion and hydroxide ion in water is very small compared to the mass of non-ionised water, and can be measured electrically, 1.8 Mg. per ton of water. In other words, the concentration of hydrogen ion in water expressed as grammes per litre is 0.0000001.

It follows that as water is neutral the amount of hydroxyl ion must also be 0.0000001 grammes per litre, or expressed in logarithms 1 times 10 to the power minus 7,

as H. & OH- = constant

(1 & 10–7) & (1 & 10–7) = 1 & 10–14

The product of the hydrogen ion and the hydroxyl ion in any dilute aqueous solution, whether acid or alkali, is = 1 x 10 to the power minus 14.

Thus the pH range, being the reciprocal of the logarithm, was taken as from 1 to 14, 1 to 7 being acid, due to excess of the hydrogen ion over the hydroxyl ion, and 7 to 14 being alkaline due to the excess of the hydroxyl ion over the hydrogen ion.

A solution having a pH value of 3 is ten times more acid than one having a pH value of 4. Again a solution with a pH of 9 is ten times more alkaline than a solution with a pH of 8.

pH is a measure of the strength of alkalinity or acidity and not a measure of the quantity of acid or alkali present. To illustrate this further you can easily appreciate that acetic acid is not such a strong acid as nitric acid. If you put a piece of iron in 80% pure nitric acid you will find that the rate of attack is much quicker than when the metal is immersed in 80% pure acetic acid. The percentage purity of the acids is the same, but the difference in the strength of the acids is due entirely to the higher concentration of hydrogen ion in the nitric acid.

One can compared the amount of acid and the pH value to amperes and volts of electricity, or units of heat and temperature rise.

To obtain the same pH value as a few drops of strong acid would impart to water, a much larger quantity of a weak acid must be added.

Condensate Pipeline Corrosion.

A further source of trouble, very often encountered in hospitals and institutions where heating is done by means of steam, is corrosion of the condensate return pipelines. This is invariably due to excessive carbon dioxide passing over with the steam from the boiler. As a rule most trouble is experienced with feedwaters which are high in temporary hardness, or feedwaters which have been Base Exchange softened. In such cases if the condensate is tested for pH value by means of B.D.H. Universal Indicator (British Drug Houses) it will be found that it is in all probability very acidic and may be as low as just over pH 5.5.

The best method of dealing with this problem is to soften the water by a Lime Soda Softener, but if this is not possible, then limewater should be added to the feedwater in order to remove as far as possible the reactive carbon dioxide present.

$$\underset{\text{Lime}}{Ca(OH)_2} + \underset{\substack{\text{Carbon}\\\text{Dioxide}}}{CO_2} = \underset{\text{Chalk}}{CaCO_3} + \underset{\text{Water}}{H_2O}$$

Sufficient limewater should be added so that at all times the feedwater has a pH value of 8.5 to 9.

As lime is a scale-forming salt, feedwater treatment is also used to ensure that no scale will be formed, should an excess of lime go forward to the boiler.

Priming and Foaming.

Priming and foaming in boilers can often lead to considerable trouble, particularly when steam is used for engines. Priming in a boiler is invariably due to mechanical causes, as for example a restricted steam space owing to the water level in the boiler being too high, or a very heavy draw-off of steam.

The boiling point of water is dependent on the pressure—the higher the pressure the higher the boiling point. It will thus be seen that if a large steam valve is suddenly opened with the result that there is a quick draw-off of steam, there will be a momentary lowering of the pressure in the boiler, with the result that for a short while the water will actually be superheated and there will be a rush of steam bubbles to the surface, causing what is termed a " prime."

Foaming, on the other hand, is not due to mechanical agencies, but is entirely chemical and is caused by impurities in the boiler water. These impurities might take the form of emulsified oil, very high alkalinities, or excessive sludge.

The remedy for priming and foaming is therefore obvious. Do not work with high water levels, and eliminate as far as possible sudden heavy demands of steam. Keep the density of the boiler water as low as possible consistent with economic working, and do not allow the alkalinity of the boiler water to exceed the recommended figures. The density and alkalinity figures advised vary considerably for different types of boilers and the pressure at which these are worked, so that it will be advisable, particularly if feedwater treatment is being used, to obtain the recommendations for your particular boiler.

OFFICIAL APPOINTMENTS.

AYLESBURY AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE.

GROUP ENGINEER AND CLERK OF WORKS.

Applications are invited for the appointment of Group Engineer and Clerk of Works (8 Hospitals—1,540 beds). Applicants should possess the Higher National Diploma in Mechanical Engineering or its equivalent.

A thorough knowledge of institutional boiler plants, engineering and electrical services is necessary, together with some experience of building construction and maintenance works. Applicants should be able to prepare specifications for plant and minor structural adaptations, etc.

Duties include direct responsibility for the engineering services at one of the Hospitals (750 beds) in the Group, and for the supervision and co-ordination of those services in the other Hospitals, together with responsibility for the maintenance of building fabric.

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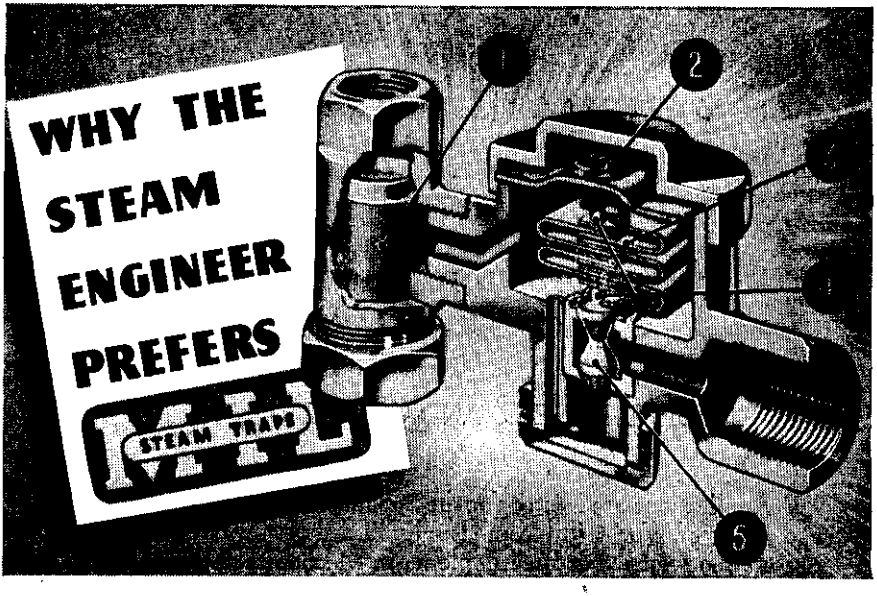
Applications, giving full details of experience, qualifications, etc., together with three names for reference, should be submitted to the Secretary, Aylesbury and District Hospital Management Committee, 9 Bicester Road, Aylesbury, to reach him by 1st December, 1950.



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The Institution of Hospital Engineers

Chairman—J. HARGREAVES Esq. Farnborough, Kent
Hon. Sec.—H. S. CLARKE, Esq. Northumberland

Dear Sir,

The next London Branch Meeting of the Institution will be held at Westminster Hospital, Medical School, Horseferry Road, London, S.W.1, on Saturday, Dec. 16th, 1950, at 2.30 p.m.

Chairman R. G. ROGERS, Esq.

AGENDA

1. Minutes of the last Meeting.
2. Matters arising from the Minutes.
3. To receive Nominations for Membership.
4. To appoint Branch Officers and Members for Council
5. To receive Report of Council Meeting held at Bristol, on Saturday, the 2nd December, 1950
6. Correspondence.
7. Any other Business

Please contact two other Members this time and help us to prepare for 1951.

H. WRIGHT,
Hon. Branch Secretary,

Whipps Cross Hospital,
Leytonstone, E.11