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

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Hon. Editor—R. G. ROGERS, "ELMFIELD," STONE, AYLESBURY, BUCKS.
Asst. Editor : J. Chynoweth, Martin's Farm, Graylingwell, Chichester, Sussex.
CONFIDENTIAL BULLETIN FOR THE USE OF MEMBERS.

EDITORIAL.

A Meeting of the Council was held on Saturday, 7th May, 1949, at the Royal South Hants and Southampton Hospital, Southampton.

Members present were : Mr. J. H. Hargreaves (Chairman), Mr. J. Tomlinson (Vice-Chairman), Messrs. R. E. Rogers, G. Jones, J. Forsyth, R. G. Rogers, A. MacGregor, L. Hunt, C. Oliver, A. Bain, R. Smith, F. H. Mills, H. Adams, H. Partington, E. Heald, J. D. Lewis, H. E. Clutterbuck, H. Eglin, A. J. Templeman, W. Bullivant, J. Chynoweth, G. Kelly, H. S. Clarke.

The Council were very warmly welcomed by Mr. Lewis (Deputy Chairman of the Southampton Group Hospital Management Committee), Miss Morris (Matron) and Mr. Ives (Deputy Secretary).

The minutes of the last meeting held at York on 5th February, 1949, were taken as read and signed by the Chairman.

Arising out of the minutes, Mr. H. Eglin raised the question of the Building Trades operative being appointed by a Yorkshire Hospital Management Committee as Hospital Engineer. Mr. R. E. Rogers gave a considered ruling that, where the position was existing, the Management Committee have the authority to appoint.

The Hon. Secretary submitted sample monograms with cost, as instructed, and after discussion it was agreed that the monogram as used by the London Branch be adopted, and a die be purchased for use with future stationery.

Mr. Tomlinson explained the position with regard to membership certificates and reported on the subject of examination of candidates.

The " Sandford " Premium will be reported fully in the next issue of the " Journal."

Apologies of absence were received from Messrs. W. G. Owen (Wales), G. R. Thwaites (Yorkshire), R. Chesney (North East) and H. Armstrong (Stafford).

The Hon. Secretary reported the death of Mr. J. S. Ewing, of Edinburgh, the members standing to order as a mark of respect and sympathy.

The retirements of Mr. F. S. Arkle, of Coulsdon, and Mr. W. McAlpine, of Northern Ireland, were reported and were granted Life Membership.

Mr. F. C. Duncan, of Northern Ireland, has left Hospital service and resigned.

The Chairman having reported on the slowness of applications received for the Annual General Meeting, to be held at Glasgow on 3rd September, 1949, Mr. Smith asked that all Council members

should immediately confirm their arrangements, and that they bring to the notice of their branches the necessity of early and prompt bookings, and encourage members to support this, their annual meeting.

Mr. Partington reported on his enquiries as to the publication of an " Annual Diary," and submitted quotations as to the probable cost. It was resolved that further investigation be taken by the Publication Secretary, Mr. R. G. Rogers, who would welcome suggestions and, most important, promises of advertisements to defray the cost.

The question of " Qualification of Membership " was debated at some considerable length, and it was unanimously resolved that the existing Rules governing membership be adhered to.

Confidence in the examination sub-committee's actions were expressed.

Applications for membership were considered and approved as follows :—

Members	5
Associate Members	5
Graduates	2
Students	1

Applications for transfer to higher grade of membership were considered and approved as follows : From Associate Member to Member, 4 ; from Graduate to Associate Member, 4.

The annual audited accounts for 1948 were presented by the Treasurer, Mr. G. Jones, and a vote of congratulation on his excellent work was unanimously carried.

The Hon. Secretary raised the question of arrears and it was agreed that Branch Secretaries should enquire into outstanding arrears and apply the rules where necessary. Arrears notices have been sent out to these members.

Mr. C. Oliver submitted the audited accounts of the Benevolent Fund and thanks were unanimously accorded for his excellent work.

Messrs. C. Oliver, R. Smith and H. C. Adams were unanimously re-elected as members of the " Benevolent Fund " Committee.

Mr. C. Oliver submitted a " Trust Deed," *re* Benevolent Fund, and it was resolved that further legal advice be obtained before acceptance is confirmed.

Mr. R. E. Rogers reported on Whitley Council's proceedings. (Reports of proceedings will be forwarded to Branch Secretaries at the earliest possible date after confirmation has been received.)

Mr. R. G. Rogers reported on alteration of Rules and his work in preparation of Incorporation. Legal advice is to be taken on questions pertaining thereto.

Messrs. J. Forsyth, H. S. Clarke and J. Chynoweth were appointed as substitute representatives on Whitley Council as and when necessity arises.

Arising out of Resolutions from Branches, the meeting was informed by Mr. R. E. Rogers that only reports drawn up by the joint Chairman and Secretaries of Whitley Council will be issued to Branches.

The resolution from the Midland Branch was received.

The resolutions from the Lancashire and Yorkshire Branches had already been covered in the report of Whitley Council proceedings.

The resolution from the Northern Ireland Branch was received and Mr. Tomlinson agreed to persue the subject as a matter of urgency.

Mr. R. G. Rogers read a letter received from Mr. Winstanley *re* the designation of appointments at Napsbury and Shenley Hospitals, and it was agreed that the Hon. Secretary take up the matter with Mr. Winstanley.

It was unanimously agreed that the President and Vice-Presidents be invited to the Annual General Meeting at Glasgow on 3rd September, 1949.

The meeting accorded a hearty vote of thanks to the Management Committee on the excellent arrangements and hospitality extended to them.

The date of the next meeting was fixed for Friday, 2nd September, at 2.30 p.m.

The members of the Southern Branch were thanked most warmly for the most excellent arrangements which had been made for the Council's visit to Southampton. Council were entertained to dinner by the Southern Branch in a most excellent manner, and after dinner entertainment was provided by artists of outstanding ability. A visit to Messrs. Thornycroft's shipyard was also arranged by the Southern Branch, and this also was extremely interesting and edifying. Council wish to thank the members of the Southern Branch for arranging this visit, and Messrs. Thornycroft's for granting the Institution such facilities and arranging for guides to conduct the parties through the various shops and yards.

BRANCH NEWS

LONDON BRANCH

The London Branch Social sub-committee organized a series of events for Saturday, 19th March, 1949, which proved to be one of the most interesting and enjoyable days in the history of the Branch.

The programme commenced at 9.45 a.m., when about 56 members assembled at Charing Cross Station. From here we were conveyed by coaches to The Miller General Hospital at Greenwich, where we were welcomed by the Secretary, I. G. Scott, Esq., M.C., and the Group Engineer, Mr. Simm, who took us on a tour of the Hospital. We were shown through all the departments and watched demonstrations on X-Ray and Electro-Cardiograph equipment, and the Bacterol sterilising plant.

The party then proceeded by coach to Victoria Street, S.W.1, for lunch.

The members expressed their deep appreciation to Mr. Scott and Mr. Simm, of The Miller General Hospital for their kindness in making such excellent arrangements for their visit, and to A. F. Dance, Esq., M.A. (Oxon), and D. F. Hext, Esq., for the excellent arrangements for travelling, lunch and the demonstration of the Bacterol method of sterilisation.

After lunch, feeling much refreshed, we made our way to the Westminster Hospital to attend the monthly meeting of the London Branch.

Here a very interesting film show had been arranged. The subject was lubrication, and the film, entitled "The Inside Story," which was exhibited by the Vacuum Oil Company, was very comprehensive and edifying. A general discussion on lubrication problems followed the film show and many questions were put by members to Mr. T. W. Markall and Mr. Gemmell, of the Vacuum Oil Company, who were thanked by the Chairman, on behalf of the members, for providing such an excellent show. Tea was taken at 4.30 p.m. After the tea interval the ordinary branch business was proceeded with, and it was during the course of this business that Mr. Tomlinson (Chairman of the Branch) announced that he had been appointed Group Engineer to the Leeds No. 1 Hospitals Group and that he would shortly be leaving the London Branch to take up his new duties.

The members heard the news with very mixed feelings, for, while wishing to congratulate him and wish him every success in his new appointment, a keen sense of disappointment was evident, and expressed, at the fact that he would be leaving the Branch.

Having recovered from this shock, we moved on to the "Westminster Arms," where the stage was set for the grand finale of the day, for here was "laid on" the second annual dinner of the London Branch, complete with first-class entertainment. Here the members wined, dined, laughed and joked with the distinguished guests and friends of the Institution, and with one another, until the late hours of the evening.

Proposing the toast of "The Institution of Hospital Engineers," MR. H. A. SANFORD, Vice-President of the Institution, said :—

Mr. Chairman and Gentlemen,

When you, Sir, invited me to propose this toast I accepted with pleasure but with some trepidation. If you will bear with me I will do my best. I feel it a privilege to address a relatively small, if I may say so, but very select group of the vast number of engineers scattered all over the face of the globe. There are, of course, electrical engineers, mechanical engineers and civil engineers; there are structural, water and gas engineers, and there are some who, I believe, are from time to time called "insulting engineers."

I wonder if we ever pause to think what as engineers we really are? Suppose somebody said, "What is an engineer?" If I was asked to answer that question I should be tempted to say: "An engineer is one who co-ordinates, organises and harnesses the materials and forces of nature for the use of mankind"—whether to his benefit or to his adversity is another matter!

If that is a fair definition of an engineer, I cannot think of any cause to which we can with our specialised knowledge devote our professional lives than that of helping the physicians and surgeons in their work of relieving pain and suffering. I think that that is what we as hospital engineers are for.

Now to come to the Institution. At the moment it is small! It was originated a few years ago and in a relatively short time has achieved a very high standard. It may be many years before we can hope, if ever that is possible, to get to the position of the three major institutions who have Royal Charters. But I do hope over a long time that is a target to be aimed at, and I hope that whatever happens the standard of membership required for this Institution will never drop below the present. The standard of examinations for members is high, and I hestitate to think what would happen if I were now asked to answer some of the questions in that examination! I hope further that in any event the Institution will never concern itself with politics and that it will never be regarded as a body to which appeal should be made with reference to remuneration and terms and conditions of service. I do not think a professional institution should be called upon to do so. I hope that whoever has a say in the affairs

of the Institution will always bear these two considerations in mind.

Furthermore, Mr. Chairman, I hope that, although as I understand the potential membership in this country is limited to about 800 (I speak without exact knowledge), I do not see why, as the Institution grows, we should not have foreign branches with whom we can correspond. I think that this is a matter which might receive in due course attention with a view to development. The Institution is being recognised in certain Government Departments as an authoritative organisation, and if it is recognised fully and grows in every respect we may look forward to the day when we can call ourselves Chartered Hospital Engineers. It is with very great pleasure therefore that I ask you to stand and drink to the health and the prosperity of the Institution of Hospital Engineers.

J. FORSYTH, Esq., replying to the toast, said :—

Mr. Chairman, Mr. Sandford, Gentlemen,

I can assure you this a very great privilege and honour to me to be asked to rise to reply to this toast to the Institution, so ably proposed by our worthy Vice-President, Mr. Sandford.

I think, Gentlemen, one of my finest achievements for this Institution was the day I persuaded Mr. Sandford to allow me to put his name forward as the first Vice-President of this Institution. As a young Institution we are naturally very proud of our past achievements, and we are well aware of the part that the Institution must play in the future of the National Health Services, and, in this respect, we *do* look forward to the day when the Ministry will realise that membership of this Institution, either by exempting qualifications or through the medium of our own examination, is their sure guarantee that the Engineering Services of the hospitals are in safe and confident hands.

We have not built up our membership, Mr. Sandford, of slightly over 800, indiscriminately. Very many applicants have been rejected because your Council, Gentlemen, felt that to admit such applicants would only defeat our initial aim, which was, as you all know, to raise the status of the Hospital Engineer in the eyes of the employing authority. That is still our firmest endeavour, and, as a Member of the Council, I am sure I speak for the three very distinguished members from the London Branch, members whose voices are always very much respected, I am sure I also speak for them when I say that none but the worthy shall pass that well-guarded entrance door. Rival organisations are springing up all around us, and here I would issue a warning. Generally, on investigation, we have found that the members of these organisations are rejects from our own. An engineer, Gentlemen, is justly proud of his profession, and none more so than the Hospital Engineer. We look forward to the day

when we can possibly take our place with the other well-known Chartered Professional Institutions.

I know that such an eminent consulting engineer as our Vice-President would not be associated with us for one minute if we relaxed our vigilance so that Bill Jones the Handyman was admitted to our ranks. We must maintain what we have achieved through the past six years, and, if we keep our membership strong, I am quite sure both the Hospitals and the Institution will derive the greatest benefit.

I thank you, Mr. Sandford, for the very able manner in which your proposed this toast, and for the very nice things you have said, and I thank you—Gentlemen—for the way in which you have honoured it.

J. J. TOMLINSON, Esq., Chairman of the London Branch, proposing the toast, " Our Guests," said :—

At Annual Dinners such as the one we are now celebrating, it is the usual and proper thing to have guests, but apart from it being the right and proper thing to do, there is something far deeper and more sincere behind the invitation extended by us to the Gentlemen who have honoured us with their presence here this evening, and that is they are our friends.

We welcome them most heartily and sincerely, it is very nice to have them with us, and I hope and trust they are having a good time. Engineers have always been noted for being a forthright crowd of good fellows and I wish our guests to know that we have more than a small measure of respect for them ; furthermore, we value their friendship very much indeed.

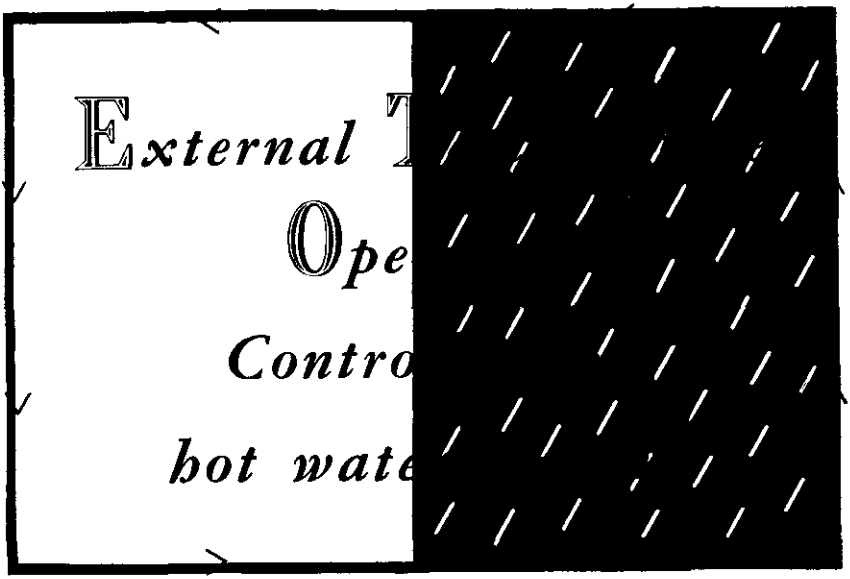
This will probably be the shortest of the toasts this evening, as I am quite certain you are desirous of hearing from our guests, it is nevertheless most sincere. I am quite certain that you hear more than sufficient from me at our regular meetings. Therefore, Gentlemen, I ask you to rise and drink the toast " Our Guests."

S. MAYNE, Esq., replying, said :—

President, Friends,

I would like to say thank you very much for inviting us here. I can say on behalf of each one of the guests that this dinner has the advantage of being even better than last year's.

I was asked at last year's dinner to follow on my friend, Mr. Feldon, the noted misogynist, who got up and made his usual moan of the terrible state of everything ! I said that what was being started was not a period of black misery. I think that I was not so far out ! It is true that the National Health Service has not been in operation for a year, but, from the point of view of Hospital Engineers, how much has happened ?



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I think there is a fairly general feeling that very little has happened. I think you would be quite right to feel that. One can understand a feeling of a certain amount of disappointment—because even engineers are apt to be fairly human!

I think one has got to have a bit of perspective and a sense of proportion. I think the greatest thing is to have things started off in the right direction. In the first place, one has got Regional Engineers. That is a very good thing, and a very good start. It is true that when one is dealing with the Hospital Engineer proper the requirements are not quite so tight. The beginning has been made.

The Hospital Service has been going a very long time, and all sorts of things have happened in it. You cannot put all that right at once. It will take a good deal of time. One of the most important jobs is the maintenance of the standards of the Institution. Not the least difficulty is the fact that when the average person talks about an engineer they think about anybody but the engineer—and therefore you have got a very strong job in getting a proper conception of an engineer.

Now your Institution is a very young Institution, and I think it is not a bad idea to reflect a little about the time it has taken to develop. Do not let us be discouraged.

I have recently ceased being a Civil Servant. There are many misconceptions about the Civil Service, and about Civil Servants, and one of the greatest misconceptions is the high standing that the Professional Civil Servant has in the Service. It is a fact that over the general history of the Civil Servant, the professional man has had to play a very second-rate part. He has had to build himself up to an increasing position of importance. He is now beginning to get there. In the few years the status of the Professional Civil Servant has improved quite enormously. There is still quite a way to go.

There was recently a report from the "Chorley" Committee, which recommended an overhaul of the Professional group. This, it was hoped, would have far-reaching results.

This is the fruits of very nearly thirty years' work by the Institution of which I am now the General Secretary. Things are moving. They move because the Institution has been pressing hard for recognition of the Professional Civil Servant. My advice to you is this: Do not be disheartened because things are taking time to get along. You are making good progress. If you are sufficiently vigorous and sufficiently keen on pressing the importance of your own profession, you will arrive there, and more quickly than we did inside the Civil Service.

We are getting a better general recognition of the part professional men are playing ; take, for instance, the remarks made by Sir Henry Tizard in his address to the British Association. His emphasis was not on the importance of people researching and discovering things, but the importance of the engineer in the application of things of which people already know.

I think that one of the things is to see that the engineer gets his proper status. I wonder, Mr. President, if I might dare to cross swords with your principal guests about the importance of remuneration. You are already concerned because you sit on the Whitley Council. Unless you get the right remuneration for your people, you will not receive the right status. It is one of the things that measures status. So long as the engineer is paid two-thirds of what the Secretary earns, so long will he rank as only two-thirds as good a man. Secretaries are very excellent men. As an administrator myself, I think we have not to maintain the superiority of the administrator, but recognise that the professional men and the administrator are two parts of the one machine. They are essential to each other.

A balanced conception of human relationships is not easy to come by. You must be ready to see the merits of the other person. But it is important that as an Institution you should obtain proper recognition for the standing and importance of Hospital Engineers. As a good Ministry of Health man, I remember old John Burns ; he always used to say, " It doesn't matter what they say about you, so long as they keep talking about you." That is advice worth remembering.

Thank you, Gentlemen, very much indeed on behalf of all the guests for a first-rate evening. We are delighted, I know, to be here, and we wish you luck on the very important job you have on hand.

CHAIRMAN :—

Gentlemen,

I have now much pleasure in asking Mr. Feldon to propose the toast of the London Branch of the Institution of Hospital Engineers. Mr. Feldon, whom you all know very well, has kindly undertaken this duty at very short notice, in the absence of Mr. R. E. Rogers ; Mr. Feldon.

MR. FELDON, proposing the toast " The London Branch," said :—

Mr. Chairman, Mr. Vice-President and Gentlemen,

It is a little difficult to rise at this time of the evening when people are departing, to propose at a moment's notice such an important toast as " The London Branch."

I was brought up in the Corporation of the City of London where, when one was entrusted with a task of this kind, an official came to you with a mass of information about the subject of the toast well in advance, and your task became a fairly simple one, but, alas, that is not the case this evening. Mr. Chairman, to be honest, I know very little about the London Branch as a Branch, but what I do know, from my experience last year, is that it is composed of an extremely nice lot of fellows.

Now, what shall I say? May I first of all join with my friend Mayne in expressing some doubt as to the advisability of your confining your activities to that of a small learned profession, or whether you would be better advised to look after your interests from a more materialistic point of view.

To be quite frank—now that Mayne has left the Ministry, perhaps I can say what I would not have voiced had the contrary been the case—I do not feel that the award so far as the salaries of Hospital Engineers are concerned could be regarded as in any way approaching generosity, and I feel that, unless you find some other body to represent your interests on the Whitley Council, you will have to go on fighting, and not restrict your work to purely professional matters. You will have noted that Secretaries to Management Committees have been, in my opinion, well looked after. You must do the same so far as your own members are concerned.

Let us be fair. In the earlier days of our negotiations—when you were a struggling body—we had to deal with a number of odd people who were not, I feel sure, your idea of the type of man who should occupy the important office of Hospital Engineer. Mayne hit upon an important point when he referred to the scales of salaries of the two offices as indicative of the view that the Group Engineer was about two-thirds as important as a Group Secretary. How very much I agreed with him that there should be no question as to who is the higher and who is the lower man. Team work is the keynote.

Mr. Chairman, it is my very good fortune to have next to me tonight our Group Engineer, Mr. Clayton, to whom I referred when I spoke to you last year. I have worked with Mr. Clayton for nearly thirty years. He will tell you that we work together without any question as to who is to say " do this " or " do that." I value his advice most highly, we are friendly colleagues and, above all, we work as a team.

My friend Mayne pictured me as being last year a figure of abysmal gloom and he has endeavoured in his breezy and cheerful—but, I think, quite unsuccessful—way to paint you a picture which can only be described as extremely rosy. Maybe I painted a black picture last year but, Mr, Chairman, when the new Health Service

came in last year many of you felt at long last you were going to be permitted to do the things you had aspired to in the past.

We thought—and with some reason—that in the days we had left behind, Local Authorities had been apt to meanness so far as the mental health service was concerned. We so desired to improve our mental hospitals and we thought the day when these legitimate aspirations would be achieved had dawned. We did not wish for vast sums of money, but we knew that many major works were of importance and urgency, and we—I repeat—thought, at last we can get on with it.

But what is the position now? Yes, Mr. Mayne, I am still gloom! gloom!! gloom!!! We are told that our estimates must be cut. How can we cut them? We cannot cut wages, provisions or similar ordinary day-to-day running expenses, so we fall back on works and gone again are the hopes we have cherished that at last we would be in a position to modernise our mental hospitals and institutions.

All I can say is "Keep at it." If we cannot get these things in 1949/50, then keep pressing your Management Committee with your schemes for bringing our hospitals up-to-date in the hope that someone will be strong enough to say these things must be done.

Gentlemen, you have been very kind to me. When you invited me last year I was Secretary of the Mental Hospitals Association, and it might have been felt that I was asked to come because you had a lively appreciation of possible advantages which might result. Tonight I am of no use to you whatsoever, and I find much to be grateful for in the thought that you have asked me to be with you because you regard me as a friend. That, Mr. Chairman, I appreciate very much. I can only say that I will always have your interests at heart, and I venture to think that your Chairman, Mr. Hargreaves, and Mr. Rogers will tell you that has always been my aim in the past.

I told you I did not know much about the Branch, but what I do know is you are a jolly good set of blokes, and in that spirit I ask you to get up and drink to yourselves.

Mr. Chairman, Mr. Vice-President and Gentlemen, the toast is "The London Branch."

A. M. JONES, Esq. :—

Mr. Chairman, Vice-President, Mr. Feldon,

I have the same complaint as both Mr. Feldon and Mr. Mayne. I was not notified of this speech and I do not know what to say. Now, last year I had to respond to this toast and I prepared a very able speech. I cannot remember the speech I prepared; unfortunately I was unable to be here, owing to being snowed up.

I will start with a story. Here is a story. I thought : " I'll tell them that the happiest days of my life were spent in the arms of another man's wife "—my mother !

The man who was going to tell this story said the best days of my life were spent in the arms of another man's wife, and " damned if I can remember her name."

Well, now, Sir, you have said some very nice things about the London Branch. We hold our meetings in the Westminster Hospital, and held our inaugural meeting about five years ago. We were then about 11 or 12 people, and I think they are all still members, very active members, of this Branch. Since then we have swollen up to about 170–180. We had a rather larger than usual meeting today. We only have a large meeting when salaries are on the Agenda ! But confidentially, it was the dinner which attracted the members ! I am very glad to see so many members from the London Branch here, together with their friends.

Now, I do not want to say any more, but I thank you very much, Sir, for the very nice things you have said about the London Branch. I hope we shall be able to have a larger room next year, perhaps in the West End, though I must say we have dined and wined here exceedingly well.

This is not on the programme, but I do feel that before we continue with the entertainment at this juncture I should make a gesture to the services of our Chairman of the London Branch, and I will be very brief.

We all know with regret that he is departing from us, and I do think this is the one opportunity we do have for drinking his health. I should also like to thank Mr. Woolsey and his Committee, and I would call on you to drink the health of Mr. Tomlinson, Chairman of the London Branch.

CHAIRMAN :—

In reply to this toast, Gentlemen, I must thank Mr. Jones for the very kind things he has said regarding my departure for a new post in the North. I must also say that I am looking forward to the time when I shall take up my new duties in Leeds, but I am very sorry indeed to be leaving London, where I have made so many good friends. When I first came to Town, I did not think that I should ever like it, but meeting the members of the London Branch of the Institution of Hospital Engineers has been a very bright spot in my London life.

I came to Town in 1939 and, as you all know, the years immediately following there were most exciting and at the same time very

trying and now brighter days are, I hope, ahead of us in more than one aspect of our profession, I am leaving you to take over a bigger job in the North. I do wish to thank you most sincerely for your kindly congratulations, for your good wishes for my future welfare and for the manner in which you have received this toast, and in closing may I say, whatever I have done within the London Branch has given me the keennest pleasure ; again thank you very much.

MR. WOOLSEY :—

Mr. Chairman, on behalf of the Social Committee, I thank you all for supporting us tonight. I thank you and hope you have had a good day. It has been a great pleasure to me to organise this affair, and I hope it will be a forerunner of many.

EDITOR.

ARTIFICIAL RADIOACTIVITY

The belief that the atom was the ultimate, indivisible, particle of matter first became inconsistent with known scientific facts when radioactivity was discovered by Becquerel in 1896. Later Rutherford and Bohr described the atom as a miniature solar system in which a nucleus, like the sun, containing almost all the weight of the atom, was surrounded by fast-moving tiny "planets," the negatively-charged electrons. The nucleus itself was at times supposed to break up spontaneously, emitting small particles at great speed. This emission of particles and energy from the central nucleus of the atom is called "radioactivity." Only a few kinds of atoms are naturally radioactive.

For present purposes we may consider that the atomic nucleus is made up of an aggregate of two kinds of particles. These are :—

1. Protons, which are positively charged ; and
2. Neutrons, which are electrically neutral.

The chemical properties of the element depend on the number of protons present in the nucleus, which number is called the "atomic number." The neutrons add weight to the nucleus and thus affect the physical properties of the element (such as its density, diffussion coefficient, etc.) but do not affect its chemical nature. Thus an atom which has 50 protons in the nucleus will be an atom of the substance called tin, but some tin atoms have 70 neutrons, other 68, others again 66, and so on. Atoms which have the same atomic number, but different atomic weights (*i.e.* different total numbers of protons and neutrons) are called isotopes, and most natural substances exist in several isotopic forms.

Even now, little is certainly known of the nature of the force which holds the nucleus together, but that force must be very strong, for it requires bombardment by a high-energy atomic projectile to disrupt the nucleus. Such a disintegration was first observed by Rutherford in 1919, when the helium atoms, or alpha-particles, which are a result of the natural disintegration of radium, were caused to bombard nitrogen atoms. As a result hydrogen was produced together with a rare isotope of oxygen. This may be written $_7N^{14} + _2He^4 \rightarrow _1H^1 + _8O^{17}$, where the lower figures refer to the atomic number and the upper ones to the atomic weights of the substances involved in the atomic reaction. The first artificial disintegration was achieved in 1933 by Cockroft and Walton when hydrogen atoms were impelled electrically against lithium, and helium was obtained as a result $_7Li_3 + _1H^1 \rightarrow 2_2He^4$. Thus at last was achieved the alchemists' aim of transmuting the elements—if not into gold !

Natural radioactivity, and such artificial actions as have been

mentioned, involve quite small changes in the weight of the atoms. Hahn and Meitner showed that there was another type of disintegration (called fission), in which a heavy atom splits into two portions of roughly equal weight. The weight of the two fragments together is not quite as large as that of the original atom and the balance of mass is transformed into a great amount of energy. Although the energy thus released has naturally attracted most popular attention because of its great (tested) powers of destruction and its possibly greater (but yet untried) powers of performing useful work, the resulting " fission products " are more immediately of interest in medical and industrial use.

Although it is possible for a stable chemical atom to exist in several different isotopic forms, it does happen sometimes that as a result of nuclear reactions isotopes are formed which possess an abnormal number of neutrons ; such isotopes regain stability by spontaneously emitting particles. They thus become radioactive, and although artificially produced, show properties similar to the naturally active elements such as radium.

Comparatively large amounts of artificial radioactive isotopes may be obtained by the action of the so-called atomic pile. Uranium, of atomic weight 235 is fissile, although the commoner isotope uranium 238 is not. In the pile uranium 235 is bombarded by neutrons. Because slow neutrons are more effective than fast ones in producing atomic fission, the neutrons are retarded by passage through carbon. The result of the fission of an uranium atom is to produce new chemical substances, also to release energy and more neutrons. These neutrons are again retarded in carbon. Some of them may be lost, but others are available to produce further fission and further neutrons. Thus a chain reaction is set up. To prevent the chain reaction from reaching explosive violence, cadmium rods, which act as " neutron traps," may be inserted when necessary. On account of the emission of energy in fission and of the radioactivity of the fission products the dangers of injury to the workers by stray radiation are very great, and elaborate precautions are needed to protect staff employed in the production and purification of artificial elements.

As well as the production of fission products, the pile may be used to transform other non-fissile substances, by neutron bombardment, into radioactive forms.

The result of pile reactions is to produce a mixture of very many elements which must be separated by chemical means for use. As several of them may have a very rapid radioactive decay, it is often difficult to accomplish the lengthy chemical processes in time.

The cyclotron, although producing much smaller yields, has

Thermostatic Steam Traps

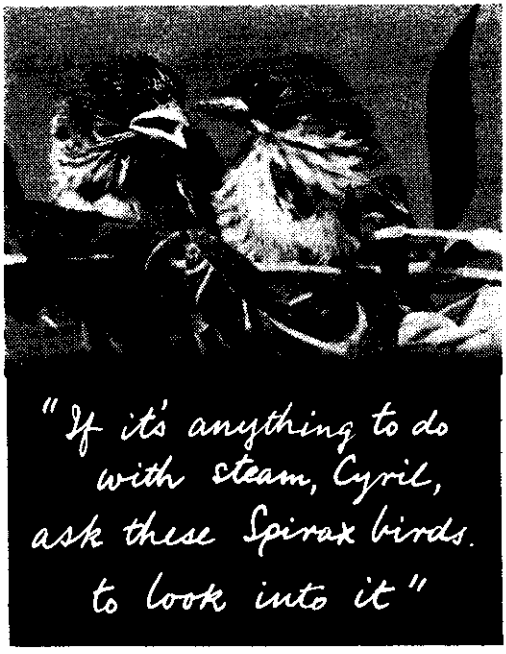
Ball Float Steam Traps

Open-Top Bucket Steam Traps

Thermostatic Air Vents

Sight Glasses

Flash Steam Vessels



Steam Economy, steam utilisation, steam trapping and air venting, condensate return systems and waste heat recovery from steam systems. All Groups and Management Committees are served by Spirax Engineers resident throughout the country.

FOR QUICK REFERENCE. So as to keep you up-to-date may we mention that there are illustrated Technical Pamphlets describing the following:—Steam Traps (1) *Balanced Pressure Thermostatic Type*; (2) *Liquid Expansion Thermostatic Type*; (3) *Ball Float Type*; (4) *Inverted Bucket Type*; (5) *Open-top Bucket Type*; (6) *Vacuum Type*; (7) Trap-Strainer Units; (8) Pipe-Strainers; (9) Thermostatic Air Vents for Steam Systems; (10) Automatic Air Eliminators for Hot-Water Systems; (11) Sight Glasses; (12) Lift Fittings; (13) Flash-Steam Vessels; (14) Steam Circulation Systems; (15) Combined Draining and Air Venting Units for Drying Cylinders; (16) Automatic Pumps and Pumping Traps; (17) Automatic Drain Traps for Compressed Air Systems. Copies of the pamphlets from SPIRAX MANUFACTURING CO. LTD., Cheltenham, Glos.

Liquid Expansion Steam Traps

Inverted Bucket Steam Traps

Trap-Strainer Units

Lift Fittings

Automatic Pumps

Vacuum Traps

SPIRAX MANUFACTURING CO. LTD., CHELTENHAM, Glos.

Phone: Chelt. 5175. Grams: Spirax, Cheltenham. London Office: 28 Victoria St., S.W.1.

SPIRAX STEAM TRAPPING AND AIR VENTING

SPIRAX SAVE STEAM

the advantage that the radioactive isotopes are produced in a pure form, needing no separation. In the cyclotron the bombarding particles are caused by electrical and magnetic forces to travel in circles at ever-increasing speed, before leaving the apparatus and impinging on to the substance in which nuclear change is to be brought about.

Because radioactive elements emit radiations which will produce conductivity in a gas, their presence can be detected by instruments called ionization chambers, and the Geiger-Muller counter will detect the ionization caused even by very small amounts of radio-activity. It thus becomes possible to follow, by means of the counter, the movement of the radioactive element, for example, after injection into the human body.

The uses of artificial radioactive isotopes in medicine are threefold :—

(*a*) Diagnosis.
(*b*) Treatment.
(*c*) Investigation.

Some elements, such as iodine, phosphorus and iron, are almost wholly contained in certain parts of the body, and are not generally distributed. If the body takes up a substance containing iodine, within a short time that iodine will be almost wholly concentrated within the thyroid gland. Since it is known that the body deals with a radioactive isotope in precisely the same way as it deals with the same substance in the normal form, then by introducing something of which a proportion is in a radioactive form, it should be possible to infer what becomes of the normal substance in the body. This is the use of active elements as so-called " tracers." As an example, the investigation of the flow of blood in the small blood vessels by Bale may be mentioned. There are two active forms of iron, having atomic weights of 55 and 59 respectively. The radiations given out are beta rays (*i.e.* electrons) and gamma rays (*i.e.* short-wave radiation of the same nature as X-rays). Bale injected radio-iron, and followed its passage through the capillaries, finding that the red (iron-containing) cells tended to be obstructed, so that in small capillaries the blood was poorer in red cells. Much research on the uptake of iron in anaemia, on the fragility of red blood cells and on the potency of stored blood for transfusions has also been done in this way.

Malignant diesease and many blood diseases are frequently treated with radiations from the natural radioactive substances, so that it would appear possible to obtain good results in these cases by injecting an artificial substance and allowed it to be carried to the diseased region where it would emit radiation. Since iodine is

concentrated in the thyroid, radioactive iodine has been used in an attempt to treat malignant disease there. Unfortunately, this sections of tissue cut from the diseased thyroid after injection and placed on a photographic plate do not produce any appreciable blackening of the plate, indicating that radioactive iodine (and, therefore, presumably, any iodine) is not taken up by the malignant tissue. The healthy tissue does take up the radioactive iodine. It has, however, been stated that radio-iodine is stored in the secondary deposits resulting from malignant disease of the thyroid and hence these deposits may be located by means of the counter (radioactive diagnosis). If radio-iodine has little promise in treatment of the malignant thyroid, however, it is effective in hyperthyroidism.

Radio-phosphorus, which is absorbed into the bones, has been used in the treatment of blood diseases by irradiating the region where blood cells are formed. It has been said to be the best treatment method available for one such disease—polycythaemia vera.

In investigating the action of a poisonous substance, tri-ortho-cresyl-phosphate, the poison was rubbed on the hands and later washed off. Absorption through the skin was shown by the radio-phosphorus detected in the blood.

Continued on page 22.

Continued from page 21.

In engineering research, radio-iron has been introduced into the metal of aero engines. Wear of the engine was measured by the activity of the lubricating oil after running. Radioactive gases have been used to study speed of flow in furnace-ducts, whilst radioactive tracers show the movement of underground waters. Most of the artificial radioactive elements have a short life. They quickly emit their radiations and become stable. This is clearly an advantage, since it is generally not desirable that the person, or the object, studied should remain radioactive after the completion of the treatment or the investigation. There are, however, a few artificial substances which emit their radiations slowly. One of these, cobalt 60, decays by half its amount every 5¼ years. In so doing it emits short-wave radiation of very similar penetrating power to that from the active products of radium. It is proposed to use radio-cobalt as a substitute for radium. Because the cobalt changes more rapidly than natural radium, a much smaller weight would give the same intensity of radiation, and the loss of cobalt through disintegration could be made good by " topping-up " every few months. Since cobalt may be pressed or machined like steel it would be possible to form plates of radioactive material to fit the shape and size of a skin lesion to be treated. This should be simpler and quicker to make and could give a more even dosage than the radium-bearing moulds at present in use.

J. R. CLARKSON, Ph.D.
Physicist.

11/6/48
Royal South Hants and Southampton Hospital.

SUBSCRIPTIONS FOR 1949

There are still a few unpaid subscriptions for 1949. These were due on the 1st January. May I remind those of you who have overlooked this rather important condition of membership that your subscription should be sent without delay to the Honorary General Secretary, Mr. H. S. Clark,

14 The Villas,
St. Mary's Hospital,
Stannington,
Morpeth,
Northumberland.

EDITOR.

THE "PEST HOUSE"

May 17th marked the bicentenary of Dr. Edward Jenner, "father of vaccination."

There is particular interest in the fact that the fine old house in Cheltenham, Alpha House, at which Jenner carried out his pioneering work, is now the main Works Office of Spirax Manufacturing Co. Ltd. and their associates Sarco Thermostats Ltd.

It was at Alpha House that Jenner fought for recognition of his then unpopular theory. Enormous numbers of people, including whole villages, made their way there for free vaccination at Jenner's hands.

As may be imagined, Alpha House was not at all popular with many of the Cheltenham townsfolk and quickly became known as the "Pest House."

On May 17th the memory of Dr. Jenner was honoured at a quiet, impressive ceremony at Alpha House, when the Mayor of Cheltenham unveiled a plaque bearing the simple inscription:

"EDWARD JENNER
1749–1823
DISCOVERER OF VACCINATION
LIVED HERE"

THE MONKEY AND THE ROPE—SOLUTION

Let W = WT. R = Rope, and M = Monkey, and W = M, because equilibrium is maintained.

$\therefore$ R and M = (W and M — W) $1\frac{1}{2}$.

$\therefore$ R and M = $1\frac{1}{2}$ M. $\therefore$ R = $1\frac{1}{2}$ M — M.

$\therefore$ R = $\frac{1}{2}$ M. $\therefore$ Rope = $\frac{1}{2}$ weight of monkey. When monkey was X, monkey's mother was 3X. When monkey is 3 times as old as monkey's mother he will be 9X.

When monkey's mother is half as old she will be $4\frac{1}{2}$X and monkey will be $2\frac{1}{2}$X.

And monkey's mother is twice as old as monkey = 5X. Monkey is 3X.

$\therefore$ by adding 8X = 4 years.

$\therefore$ X = $\frac{1}{2}$ year.

$\therefore$ Monkey's mother is $2\frac{1}{2}$ years and monkey is $1\frac{1}{2}$ years.

Also monkey is as many pounds in weight as his mother is years old, $2\frac{1}{2}$ lbs., and rope is half as heavy as monkey, $1\frac{1}{4}$ lbs. = 2 ozs.

At 2 ozs. per foot, the rope will be 10 feet long.

INSTITUTION OF HOSPITAL ENGINEERS BENEVOLENT FUND

INCOME AND EXPENDITURE ACCOUNT for the year ended 31st December, 1948

To **Sundry Expenses.**	£	s.	d.	By Members' Subscriptions for the year ended 31/12/48	£	s.	d.
Printing, Stationery and Postages	8	17	3		101	9	0
Bank Commission		5	0	**Subscription from Institute of Hospital Engineers.**			
Balance being excess of Income over Expenditure	112	11	7	Deposit Account Interest ... 1 9 10			
				Defence Bond Interest 18 15 0			
					20	4	10
	£121	13	10		£121	13	10

BALANCE SHEET as at 31st December, 1948

INCOME AND EXPENDITURE ACCOUNT

	£ s. d.	£ s. d.
Balance as at 1/1/48	86 7 0½	
Add Balance of account for the year ended 31/12/48	112 11 7	
		198 18 7½
		£198 18 7½

CURRENT ASSETS

	£ s. d.	£ s. d.	£ s. d.
Due from Institution of Hospital Engineers.			
Defence Bond Interest	18 15 0		
Deposit Account Interest	1 9 10		
		20 4 10	
Cash at Barclays Bank Ltd., Didsbury	177 11 6		
Petty Cash in Hand.			
Honorary Secretary ...	1 2 3½		
		178 13 9½	
			198 18 7½
			£198 18 7½

AUDITOR'S REPORT TO THE MEMBERS

I report to the members that I have examined the foregoing Accounts togetherwith the books of the Benevolent Fund and the vouchers relating thereto, and have verified the assets and Cash Balances. I have obtained all the information and explanations I have required and in my opinion the Balance Sheet is properly drawn up so as to exhibit a true and correct statement of the affairs of the Benevolent Fund, according to the best of my information and explanations given to me, and as shown by the books of the Institution.

23, Edward Terrace,
Cardiff, Glam.

(Signed) C. V. MILES,
Incorporated Accountant. 20/4/49.

INSTITUTION OF HOSPITAL ENGINEERS

INCOME AND EXPENDITURE ACCOUNT for the year ended 31st December, 1948

1947 £ s. d.		£ s. d.	1947 £ s. d.		£ s. d.	£ s. d.
	To Disbursements of the Council including Hire of Halls, Stationery, Delegates' Travelling, Hotel Expenses, Annual General Meeting Expenses,			By Subscriptions due for the year ended 31/12/48 including previous year's		
626 13 1	etc.	611 13 0	1054 14 6	arrears	1107 16 6	
	General Branch and Secretarial			*Less* Subscriptions overpaid and refunded to		
131 5 7	Expenses	150 13 9½	40 8 6	unregistered members	9 19 6	
78 17 8	Printing and Stationery	98 8 1	1014 6 0			1097 17 0
2 0 0	Cheque Books	1 0 0	2 2 0	Examination Fees ...		9 9 0
10 10 0	Audit Fees	10 10 0		Interest on Scottish Branch Petty Cash Bank		
3 15 0	Typewriter Repairs	—	2 0	Account		1 8
10 10 0	Donations	18 8 0	—	Donation Received (W. J. Ambrose, Esq.)		5 0 0
4 4 0	Sundry Expenses	—				
—	Examination Expenses	29 12 0				
	Balance being Excess of Income over					
148 14 8	Expenditure	192 2 9½				
1016 10 0		£1112 7 8	1016 10 0			£1112 7 8

BALANCE SHEET as at 31st December, 1948

INCOME AND EXPENDITURE ACCOUNT

	£ s. d.	£ s. d.
Balance as at 1/1/48	1114 8 2	
Add Balance of Account for year ended 31/12/48	192 2 9½	
		1306 10 11½
Current Liabilities.		
Subscriptions in Advance	60 18 0	
Due to Benevolent Fund.		
Interest on £750 2½% Defence Bonds ... 18 15 0		
Deposit Account Interest 1 9 10		
	20 4 10	
Sundry Creditors	58 19 1	
Petty Cash due to Branch Honorary Secretaries	40 10 0½	
		180 11 11½
		£1487 2 11

FIXED ASSETS

	£ s. d.	£ s. d.
Typewriter at Cost	15 0 0	
Addition	48 9 1	
		63 9 1
Investments.		
£750 2½% Defence Bonds at Cost ...		750 0 0
Current Assets.		
Barclays Bank Ltd., Pontyclun, Glam.		
Current Account ... ... £ 224 10 9		
Defence Bond Interest in hand 18 15 0		
	243 5 9	
Deposit Account 300 0 0		
Interest in Hand ... 1 9 10		
	301 9 10	
Subscriptions in arrear	112 12 0	
Sundry Debtors	1 17 0	
Petty Cash in Hand. Branch Honorary Secretaries	14 9 3	
		673 13 0
		£1487 2 11

AUDITOR'S REPORT TO THE MEMBERS

In report to the members that I have examined the foregoing Accounts together with the books of the Institution and the vouchers relating thereto and have verified the assets and Cash Balances. I have obtained all the information and explanations I have required and in my opinion the Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the affairs of the Institution, according to the best of my information and the explanations given to me, and as shown by the books of the Institution.

23, Edward Terrace,
Cardiff, Glam.

(Signed) C. V. MILES,
Incorporated Accountant, Auditor. 20.4.49.

FREER AND HAYTER
PRINTERS
HIGH WYCOMBE