

Discussion.

THE PRESIDENT said: Gentlemen, it will probably surprise you to hear that the paper which Mr. Harrieks has just given us was, on his part, in the nature of a stop-gap. We had another paper down for reading to-night, but it fell through, and Mr. Harrieks kindly offered to get up a few remarks on the question of the manufacture of shells. Although he describes it as an amateur effort, it has been, I think, a most interesting evening that he has given us.

After all, in this matter, I suppose we are free to confess that the vast majority of us are amateurs. If there are any here that are not, we are very anxious to hear a few remarks from them now.

When I was in Melbourne last week, I heard a very good story about a distinguished firm who made a shell, which was a very beautiful thing, but when an expert from the Ordnance Department examined it, it was found to be, unfortunately, copied from a fired shell, and, most elaborately, the effects of the firing had been worked into the shell. (Laughter.) That may show that we are still amateurs, but, at least, we can do the thing we are told to do.

I might just say that I think it is most essential that those of us who are engaged in the technical work of the country, should have a very accurate notion of what is the technical problem involved in the manufacture of these shells, and of munitions generally. There is a great deal being talked all round the Commonwealth about the way in which we could manufacture this and that type of shell. I think people at large fancy it is a thing that we have only to commence next week, and we can do it at once. It is not at all wise, I think, to hide from ourselves, and the community at large, that if we manu-

facture shells it means that we have solved some extraordinarily difficult technical problems, and nothing can be gained by taking the contrary view.

I think, for that reason, the paper which Mr. Harricks has given us this evening is of extraordinary interest and value—(hear, hear)—which must have suggested to the minds of us all the magnitude of the problem, as well as the importance of solving it.

Just let me take a small illustration which probably will have occurred to you, as it did to me, with regard to the question of gauges. In order for these shells to be of any use at all, they have to be interchangeable with every other shell that the British Empire is using for the particular gun, and, for that purpose, the gauging has to be done most accurately. It is obvious, even in the manufacture of the gauges to be used by various shops that take the work on, that nothing will be of any use unless some central authority (probably the Commonwealth Government is most interested as the authority) first of all takes up the manufacture of gauges, and, when they are ready, distribute them to everybody who is going to manufacture shells. That is only a very small point, but it is, I think, one that forcibly illustrates the kind of difficulty that has to be overcome before we are really successful in this undertaking.

I do not wish to make any further remarks. I am sure the meeting will be very glad if those members of the Munitions Committee present, or anyone else, amongst our visitors especially, will make any remarks to us that they can offer by way of amplification or criticism of the matter that has been put before us.

MR. O. W. BRAIN said: Mr. President, and gentlemen, I should like to say I am sorry that Mr. Franki is not here, because I should have liked the President to have spoken on behalf of the Munitions Committee.

I should like this meeting of Engineers to understand that from the moment when the Premier (who is most anxious that New South Wales should do her part in this

matter) appointed our Committee, we have done everything we possibly could as fast as it could be done. We had our first meeting in the Premier's office in the afternoon; in the evening we had quite an extended meeting until a late hour in my office, and we have forwarded matters in the same way ever since. We had, in the first place, the greatest difficulty in getting any information at all, but we did succeed, after a great deal of trouble—by sending members of the Committee over to Melbourne, and sending cables all over the world—in getting a considerable amount of information. It is due to Mr. Harriks (the author of the paper this evening), to say that I think, practically all the information we got is included in the paper that has been put before us this evening.

After we had got a good deal of information, the difficulty was to get it officially authenticated, without which, of course, the information was of no use whatever. I must say that we derived a very great deal of encouragement from news received from Canada as regards ammunition-making there as it all went to show that there was nothing (although it may take time), but what can be done in Australia, and that a great deal of what had been done in Canada was done in shops which were not equal to many shops in Australia.

As far as the Engineers are concerned, I may say that the Committee has encountered nothing but offers of assistance from firms, and also from Engineers of every class, throughout the State. The difficulties that are standing in the way at the present moment cannot be called engineering difficulties, they are certainly not difficulties for which the Committee is responsible; the Committee is doing all it can to remove them, the Premier assisting all the time. Everything the Committee can do, is being done to give the Engineers of New South Wales the opportunity of taking the position in this matter which we quite know they are only too anxious to take.

THE CHAIRMAN: We shall be very glad to hear from any members of the Committee, or from our visitors, especially.

MR. KING SALTER: As far as Cockatoo Island is concerned, we are not doing anything except in the making of some of the gauges, and I think we have been able to turn out satisfactory articles. The first gauges has already gone to Melbourne, and we have a large number of others in hand. I am sure that the shops of New South Wales will be glad to supply all she can to England in these troublous times, and I am convinced that she will do it well.

THE PRESIDENT: There is one point about the gauges, as to which I do not know whether you can give us any light on, Is there any difficulty with regard to the unit inch? Can you work the gauges to standard units, or have you gauges supplied by the authorities at Home?

MR. KING SALTER: We have Newall's standard gauges from home, and a standard length gauge of 1-10,000ths of an inch. With regard to the gauges being manufactured, they have tied us down to very fine limits, viz., 3-10,000ths, plus or minus. I was told the other day, by somebody who was supposed to know, that there is a little difficulty over in Canada about the standard inch. They have made gauges, but when compared with the gauges at home, in England, it was found that there was a slight difference. The English inch varied somewhat from what they had in Canada. That raised a doubt in my mind whether our gauges were correct, but on looking into the matter I found that the standard length gauge we have, supplied by Pratt & Whitney, corresponds as near as we could get it to the English Newall gauges. The process of the manufacture of gauges is a question of extreme niceness, and, as I have said, our limits are plus or minus 3-10,000ths of an inch.

THE PRESIDENT: Of course the most satisfactory thing would be if a set were sent out from home, and copied.

MR. KING SALTER: Yes; it would be the means of preserving the extreme accuracy necessary. The gauges we are making, we were told, were to be standards from which others are to be made, so that extreme care and accuracy is required.

THE PRESIDENT: You are making the master-gauges?

MR. KING SALTER: Yes. Whatever the difference in the gauges was, that difference would not, I suppose, amount to any appreciable quantity; but where you are working to such fine limits as plus or minus .0003, any difference in the standards would be noticeable. It is not conceivable that the difference between the Pratt & Whitney gauges, and the English gauges, would be anything appreciable. I cannot help thinking that Professor Lyle was trying to be kind to one of the manufacturers in giving that explanation about the accuracy. We understand that the inch gauge is quite safe, but I have heard it said that the standard at Woolwich is different.

THE PRESIDENT: That would be very serious.

MR. KING SALTER: Yes. We have always accepted our gauge hitherto from recognised manufacturers. It was only the other day, when that question was put to me with regard to something about the Pratt & Whitney gauge in Canada, that the question really arose in my mind as to what was a standard inch? Our first set of gauges have gone to Melbourne to be tested at the University. I do not know what standard they have there. I do not know if anybody can tell me?

MR. O. W. BRAIN: That is one of the matters we are dealing with. We are taking steps to see that gauges shall be available as soon as we can possibly get them.

MR. W. REEKS: I do not want to make a joke, but when I was a small boy, I was taught that three barley-corns made one inch. Perhaps it depends on the crop of barley.

MR. SHENSTONE said: I do not know whether the American and English standards differ, but Kent, in 1909, states that the English and American standards are the same. In some figures quoted in the Bulletin No. 9, of the Coast and Geodetic Survey, a comparison is made between the English and American yard, as compared with the metre as a common standard.

The metre, as worked out by different authorities, is as follows:—

In 1817, Hassler gives it as 39.36994;
In 1818, E. Kater gives it as 39.36990;
In 1836, Bailey gives it as 39.36973;
In 1866, Clarke gives it as 39.36970;
In 1885, Comstock gives it as 39.36984;

the mean being 39.36982, and now it is 39.37.

This goes to show that even in America the standard is well recognised as being the same as the English standard. I think that to assume the English and American standards as being different, is difficult.

MR. KING SALTER: I said, I think, that we compared the English Newall gauge with the Pratt & Whitney gauge, and we could not find any appreciable difference.

MR. W. H. MYERS said: As a visitor (and as a representing the New South Wales section of the Electrical Association of Australia), I should like to express the thanks of the Association for the privilege of being here to-night, and also my appreciation of the great amount of care that Mr. Harricks has put into his paper.

I would like to move that a hearty vote of thanks be given to Mr. Harricks for the excellent subject matter of his paper, and for the enormous amount of work he has put in in such a short time.

MR. KING SALTER: I should like to second that. I am sure we all appreciate the value of Mr. Harricks' paper.

THE PRESIDENT: Gentlemen, I am sure it requires no commendation on my part to ask you to carry, with acclamation, a vote of thanks to Mr. Harricks, and to assure him that we are really very greatly indebted to him for the very heavy week or so that he must have spent in getting this information before us.

(The Motion was put to the meeting, and received with applause.)

MR. HARRICKS, in reply, said: Mr. Chairman and Gentlemen, I do not feel that I deserve your hearty commendation. I do not like to get away from the engineering

side of this matter and merge in any respect into politics, and I hope I have not given anyone the idea that we should doubt the activity of our Munitions Committee; the cause of our inactivity in this matter of munitions here in Australia, so far, certainly does not rest with them.

In referring so frequently to the Canadian efforts, I hope I have not become tiresome, but I think in a case of this kind no one should be ashamed to recognise and to follow, if necessary, a very good example.

We have been late in starting—there is no doubt about that—and it does not seem reasonable that Canada could have been told within a month of the commencement of the war that there was such extremely urgent need for shells; she saw it for herself, and got to work.

I am sure our Munitions Committee will do us justice, and can only hope that the Central Munitions Board, and the authorities behind them, will do our Committee justice.

Much has been said on the question of the gauges, and the suspected difference between the English and American standard unit of measurement, but I would like Mr. Brain, or Mr. King Salter, to tell us whether the difference that is suspected is such that it is really going to have any appreciable influence on the dimensions of an ordinary 3in. shell? The limits of tolerance of these latter are fairly generous, and seem to be so great that, unless the suspected difference in the standard falls outside the careful comparative tests that Mr. King Salter refers to, it would seem to have no bearing on the matter and is unfortunately causing delay.

I can only thank you again, gentlemen, for your very generous reception of my very quickly prepared lecture. (Applause.)

MR. O. W. BRAIN: If I am in order in replying to the question asked by Mr. Harricks, I would say that the difference in gauges is not going to make any difference or constitute any difficulty, because the Committee are going to see that ample gauges, are produced. Directly we are in a position to enable engineers to proceed to work, the gauges will be provided freely—gauges for which the authorities will be responsible.

THE PRESIDENT: I am very glad that Mr. Harricks entirely disavowed any political references in his remarks. As he has pointed out, the Engineering Association adheres to this as a principle, for they are strictly a professional, or technical, society. I have no doubt, however, that you could find a good deal of political controversy hanging about the outskirts of this subject.

I should have liked to differ very strongly with Mr. Harricks with regard to the casual remark he make about the Small Arms Factory at Lithgow, but I will try and avoid doing so. Of course, the manufacture of rifles is a very different problem, and there is much room for discussion as to the capacity of the factory, but I trust the number of men we are going to send away from here will not in any way be measured by the number of rifles we can make. I do not think we should mention this subject any further in the discussion.

There are several very interesting exhibits on the table, and I am sure that Mr. Harricks, and the other gentlemen who have brought them, will be glad to show and explain them to anyone present.

I cannot close the proceedings without expressing, on behalf of the Association, our very great pleasure in seeing so many visitors from other Societies, and from the Munitions Committee.