

pose there is no calling so satisfying to the man himself as an individual, none to which he may more readily apply every personal quality he possesses or can cultivate, and none to which in a general kind of way public esteem renders a more interested, and in part, romantic regard, than that of engineering.

On the other hand, in relation to its monetary rewards and its official honours, it must be confessed that our profession, especially in Australia, is sadly lacking. I do not hesitate to say that, taking a general view of the situation, the engineering profession in the Commonwealth is not only underpaid, but grotesquely underpaid. Compared with the return made to the community by the engineer, his monetary reward is smaller than it should be when contrasted with that of almost any other vocation.

A Comparison.

Suppose two young men of equal talents to be entering the University, one selecting, say, the medical profession and the other deciding to follow engineering as his calling. The course to be followed by the engineering student is at least as difficult as that taken by his medical brother—in fact is has a really severe curriculum. His opportunities subsequent to graduation in the direction of gaining experience are probably not as readily available, and occupy more time, than does the same work on the medical side, and yet at any stage in his career, from his first year or two of practice up to the time when our supposed men are the leaders of their professions the money return in the case of the engineer is probably never more than from, say, a half to a tenth of what the medical profession will afford. It need scarcely be said that in my remarks there is no suggestion that the medical and surgical professions merit one iota less than they receive. Especially in Australia the medical profession deserves well of the community at

large, for there is no profession that devotes itself more whole-heartedly and generously to meet the needs of the people. I only put the matter in this way in order to indicate as briefly and as definitely as possible the heavy handicap on the monetary side from which the engineering profession in Australia suffers.

Personal Contact.

Of course engineering as a calling is under the inevitable disability that the practitioner does not come into immediate contact with the people chiefly concerned. Every individual man and woman, probably on numerous occasions during the course of their existence, has a very vital interest in the doings of the physician and the surgeon. Their skill and capacity are matters of intense personal moment, and their success a question of such importance that the individual is likely to take a liberal view of the return which such services demand.

There is little of this personal contact between the engineer and the individual members of the community. An unskilled practitioner may build a bridge, a railway, a workshop, or develop a mine in such a way as to be a menace to the public safety, as to extravagantly spend the people's money, also to cause much daily inconvenience and annoyance, but the public do not easily realise that these bad effects may be the fault of the engineer, or that they concern him as an individual very greatly, while if the engineering works referred to are executed with skill and economy they are naturally taken as a matter of course, and there is none of that lively gratitude which comes to the skilled surgeon, say, who has managed to remove various parts of one's anatomy and still leave one happily in the land of the living.

State Control.

This is, of course, a general drawback of the engineering profession, and which affects it almost as much in other parts of the globe as here. But in Australia, there

is a still greater disability owing to the fact that engineering work tends more and more to be concentrated in huge public departments, commissions and trusts, and the scale of rewards hitherto ruling in all such bodies has been extraordinarily low.

This applies perhaps not so much to the first few years of the young engineer's professional work, when of course he is still gaining his experience and cannot properly demand much return for his labours. But once this period is passed his prospect in public departments is distinctly poor, the salaries paid are mediocre, the better prizes are very few and far between, and the best of them in return for practically a lifetime of work are only paid a sum which a young doctor may confidently hope to receive within the first five or ten years of his commencing practice; while, too often, and probably in the great majority of cases, there is no pension scheme available, and in consequence the outlook of those in the middle ranks of the service is none too happy.

I make no apology for speaking in this detailed and intimate way about the subject, for two reasons. First of all, it appears inevitable that the process of concentration of engineering effort in big public departments is likely to go on to an even greater extent than at present, and a grave injustice is being done to the engineering profession, and to those who more and more are being assembled in these departments to carry on the necessary work of the country.

Does Not Pay.

A second and still more important reason is that the system in the long-run does not pay. It will inevitably tend in the majority of cases to drive out of the public services the more energetic aspirants to professional honours, and will tend to produce in the services a rather dead level of mediocrity, which, in its turn, cannot fail to produce insufficiency of service and unnecessary cost

to the community. That this has not already occurred is only due to the fact that, scattered throughout the public engineering services of every description, there are many individual members of the profession who combine with the highest skill the most intense devotion to their work for its own sake.

Nothing is more paltry than the attempted humour on the score of what is commonly known as the "Government stroke," when applied to the engineers throughout the services. Everyone of my audience knows as well as I do that there are men devoting themselves to the practice of our great profession in these services, men who give themselves night and day to the carrying on of their work for the sheer love of it, with an intensity which is worthy of the sincerest admiration, but whose reward for the same service is ludicrously inadequate. If we had not become so accustomed to it, we would be astounded at the spectacle of engineering officers who literally are responsible for the expenditure, yearly, of millions of the public funds, and whose personal return for their services is less than that of the manager of one of the departments of a big store.

Norton Griffiths.

In this same connection there is one matter of great interest to which I would like briefly to refer, viz., the arrangements recently made between the N.S.W. Government and Messrs. Norton Griffiths & Co., under which the latter are proceeding to carry out certain public works in this State. I am aware that this is a very thorny subject, and I must carefully eschew its political and controversial side. But from the strictly professional aspect the matter is of course one of great interest and importance. It is a method of carrying out large engineering contracts common enough in other parts of the world, but practically new to Australia, and the experiment will be watched with very unusual interest by engineers the country over.

The particular reason which makes me refer to the matter here is that, although I have no personal acquaintanceship whatever with the firm concerned, nor the slightest knowledge of any of their plans, yet I am confident that if the salary sheet of Messrs. Norton Griffiths' engineer staff were compared with that of the engineer staff of the average large engineering department or board in Australia, it would be found that the emolument offered in the public service of this country is much lower than what is paid for the same class of work in the large private concern.

I think, for this reason and many others, that from the professional engineering point of view, the establishment of a firm like Messrs. Norton Griffiths & Co. in Australia will be of distinct value.

Remuneration.

But I can imagine that against my argument that the present average of emolument for the engineer in Australia, is neither fair to the man nor economical for the country, it will be alleged that when you are dealing with public affairs the rate of payment is commonly and necessarily low, and that the public servant gets his reward in other ways, and especially in the distinction of position and regard which come to him. I have already freely admitted in my earlier remarks that this might well be the case, but I ask you to consider whether it can be said to hold to any notable degree in the case of the vast number of professional engineers in the public services throughout the Commonwealth. So far from it holding in their case, you will find on closer examination that the circumstances illustrate exactly the opposite.

Perhaps as my own walk in life removes me entirely from any active participation in public works, I may venture to take a freedom of speech in referring to this

question which those intimately concerned would not care to do. But the situation which I will now put before you strikes me as so curious and extraordinary that it deserves to be plainly stated.

What of the Engineer?

I will ask you to look in imagination at this continent, say, a century and a half ago and watch its material development to the present day. Who are the men that carried the roads from one side of the continent to the other across trackless wastes; who located and built the railways; who provided the water-supplies with their monumental masonry dams, their marvellous pipe-lines, such as the Koolgardie scheme—one of the engineering wonders of the world—who developed our coal mines, our gold mines, and made available the array of metals and minerals for which the country is famous; who made the harbours and ports and built the dockyards; who erected the splendid railway shops and all the factories; who strung the telegraph lines from side to side of the continent; who was it that conceived and produced the buildings in which we live or work or worship, magnificent treasures of this country, such as our cathedrals, the Great Hall of our University, the Fisher Library, the public buildings—who was it but the engineer and surveyor and the architect?

The Engineer and Honours.

Has any body of men contributed more nobly to the general welfare of the people? Compare with all the admittedly splendid service rendered to the community in politics, in municipal life, by the legal profession, by the medical profession, by the pastoralist, have any of these done more worthily or served the State better? And yet, looking back over a whole century, I cannot discover one single case of

an engineer, a surveyor, or an architect who has been granted a high public honour as an indication of the recognition which the State gives to his services. In most of the other callings to which I have referred there have not only been instances of it, but it is the customary and almost routine practice from time to time to select men for these honours; and, jealous as I am for the standing of the engineering profession and for the future generation of engineers, whom I am privileged to take a small part in helping to train, do you wonder that I say with the clearest conviction that the total return which the State affords to those who spend a life-time in its engineering and allied services is curiously meagre?

Registration.

There is yet another disability under which the engineering and the architectural professions labour. They are not yet closely and officially organised. In fact they are one of the few bodies of men serving the public wants of the community who are not registered and authorised to so act by the State. If a man requires the services of a barrister, a solicitor, a physician, a surgeon, a surveyor, a dentist, a patent attorney, an auctioneer, a plumber even, or any one of a score of others, he knows that he can only be served by someone who is certified as possessing the necessary qualifications. When, however, he requires to build a house, equip a factory, or construct a railway, he discovers (or sometimes he does not discover until it is too late) that anyone may try his hand on the work. This is perhaps the greatest of all the drawbacks under which our profession suffers. Hence I regard the steps which the Government of this State has recently taken in the direction of introducing a bill for the registration of engineers and architects qualified to practice in New South Wales, as the most important event which has happened in the history of these two great professions, as professions.

When the matter is carried to a successful issue it will undoubtedly result in an immense improvement in the character of engineering work in Australia, and I trust that this Association, in co-operation with the Institute of Architects, will continue to warmly support the Government in this far-sighted measure.

Local Training.

Yet one other notable defect in the engineering organisation of this community—and my only reason for referring to this series of deficiencies in such a marked manner is that I feel the present time in our national history is peculiarly the right one for the sounder establishment of the engineering profession in Australia.

It will be found that in our great public engineering departments (with only one or two striking exceptions) there is an entire absence of any scheme for the continuous training up of an expert staff. This is not to say that there are no experts, but they are the result of individual effort or chance opportunity. Every great department ought to see to it that there are numbers of men coming along available for the most responsible positions, and that these men are provided with every facility for gaining knowledge and experience. The highest positions in the land should be open to the locally-trained men.

“Australia for the Australians.”

This is a proposition which, as a vague statement, obtains general recognition. The trite expression “Australia for Australians” is a popular enough cry in this connection as in most others, but the converse of the proposition I have just stated, viz., that the engineers of this country should be systematically and definitely trained so as to make them **fit** for the highest responsibilities receives nothing like so much attention.

You may recollect that this matter obtained some publicity in a newspaper controversy last year, which arose out of a proposal to bring a man from Europe or America to occupy the position of Assistant Chief Mechanical Engineer for Railways. Great exception was taken to the proposal in letters to the newspapers, and in their editorial comments. But the essential point may be easily overlooked.

It would be absurd to say that if we set out to do it we could not produce an engineer equal to any task whatever. There is no doubt about the necessary brains being in the country, nor that our engineering schools and workshops and drawing offices are sufficient to give the adequate training; and if further experience were required there is nothing to prevent us sending men abroad to obtain it wherever it may be found—in fact on numerous occasions men have been sent for that very purpose. But there is, unfortunately, at present a serious lack of co-ordination in these three directions. The only reason why a Chief Assistant Mechanical Engineer could not be found in a big Railway Service must be that the service took no steps to train men for the highest branches of the work. With the concentration of engineering enterprise in huge public departments to which I have already referred, undoubtedly the very serious duty rests upon the State of seeing that the combined educational opportunities of the younger members of the staff are such as to fit them for their possible future responsibilities.

It will be necessary more and more for these departments to see to it that those entering their workshops and offices shall have had the advantage of a full technical training or that they be given opportunities to obtain this training while they are so engaged, and in either case that large numbers of them are sent abroad whenever the experience available in this country does not suffice to fit them for their responsibilities. If this be not done, re-

cognising our remoteness from the great centres of industry, our engineering practice will run a risk of becoming parochial and inefficient.

I would like to add that the Railway Commissioners take a very liberal view of this question, and that they already have had some negotiations with the Engineering School of the University about it, and although the war has put a temporary block to the movement, there is no doubt a firm determination to provide in this country the best combination of engineering training that is possible.

Education.

Very much has been done in the direction of providing an education for the would-be engineer. Few people perhaps yet realise what extraordinary facilities there are for the youth of high attainment. Not only can he come to the University, either from school or Technical College or workshop without any expense at all, but there are numerous and valuable scholarships due to the beneficence of Sir Peter Nicol Russell, awarded in addition each year; there are scholarships for advancing technical and engineering research at the conclusion of his course, and finally there has been established recently the "Walter Hall Engineering Fellowship," which provides the graduate with an income of £300 a year for three years, and leaves him free to practically gain experience in any part of the world. Indeed the best student can, if he likes, much more than pay his way through all his course of University and subsequent training. Between the time of coming to the University and finally severing his student-connection with it as a Walter Hall Fellow he may have received the sum of no less than £1650. I know of no place on the globe where the highest kind of training is so readily available.

In conclusion, before I leave the subject of the School of Engineering, you will, I am sure, be interested to know that the students and graduates of the school have

put up a very fine record in the numbers that are taking part in the present war. It has, in fact, very seriously depleted our attendance. Practically all the men of the Fourth Year have already left, and there are serious gaps in the earlier years. We now have nearly a dozen men in the Engineer Service of the Royal Australian Navy; some have joined the Royal Engineer Service of the British Army; one or two are attached to the Flying Corps; a large number have enlisted in the Engineer Companies of the Australian Expeditionary Force, and the names of a few, alas, are already inscribed upon the honourable roll of those who have laid down their lives for their country in Gallipoli.

Three Recognised Classes.

If it is important to have good engineers in the country, it is not less so to have good foremen, good mechanics, good workers of every grade. If officers are necessary to the industrial army quite as much so are the rank and file. One may say that there are three clearly recognisable classes of engineering workers in the community although the types are not sharply defined:—

- (a) The artisan type, merging gradually from the practically unskilled labourer through various types of skilled workers to
- (b) The foreman type, with opportunities and occasions for advancing to
- (c) The professional and scientific type.

The arrangements for the training of the first two of these are equally as urgent as for the professional engineer. There is no possession of more importance to a country than a great community of skilled and efficient workers, and up to the present our efforts to produce these men of skill have been nothing like as satisfactory as the steps we have taken to produce the professional engineer. In fact, till quite recently, these