

"THE WAR—AUSTRALIA AND THE ENGINEER."

*Presidential Address delivered to the Engineering Association
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(By PROFESSOR S. H. E. BARRACLOUGH.)

Before vacating the Presidential Chair to my successor, it falls to my lot to address some valedictory remarks to the Members of the Association, whose goodwill and generous support have enabled me to fill, however inadequately, so distinguished a position.

Presumably every president of every institution the world over, has been faced with the same difficulty of determining an appropriate subject. Some few presidents there have been, so successful or courageous in their choice of a subject and so skilful in their discussion of it, that their address from the Chair has become a classic instead of being relegated, as is the proper fate of most presidential addresses, to the general limbo, where such utterances meet a suitable oblivion. Professor Huxley and Professor Tyndall, in their addresses to the British Association in by-gone years, may occur to you as striking illustrations of this achievement, while in more recent times, Sir Oliver Lodge has found, in the presidential address, means of expression by which he will be long remembered. In the majority of instances, however, the president is content to confine himself to references to the performances of the particular society during the year, and to a description of special developments along his own line or a summary of the progress of events in engineering matters during the term of his occupancy of the chair.

ARE WE READY?

In the present case, although I shall have occasion to refer to some of the activities of our Association, I think you will agree with me in deciding that the time is not appropriate for any review of engineering development in the past, or of anticipations for the future. Such considerations are in place when one feels that we are in the course of development and of preparation for the future—of the Society—of the profession—of the community, as the case may be. But in this particular juncture of the world's history it is futile to discuss signs of progress, the preparations for and possibilities of the future, when everyone is oppressed with the realisation of the fact that the testing time, particularly as regards engineering and technical matters, has already arrived. The question to-day is not "Are we progressing?" but "Are we ready?"

Whatever be the quality of the manhood of the country, whatever be the skill and willingness of the workers, and whatever be the value of the material products of our industry; whether it be good or bad, whether our rate of progress is more or less than other people's, are questions that at this moment are not worth the discussion. Let the quality developed in the men of our race be what it may, they are, as they are, the men upon whom we have to depend. Let our material products be good enough or not good enough to pit against those of our foes, it is to these materials that we are compelled to trust. It is too late to refit the ship when we are in the storm. As was said in an ancient scripture: "Let him that is unworthy, be unworthy still."

"An Engineers' War."

This is rather a time for the consideration of more fundamental matters. In periods of stress, definite ideas have a way of emerging; and I think in a very literal fashion one may say, without risk of contradiction, that

one of the matters to come to the surface of public comprehension, is that of the function of the engineer, and the extraordinary part which his efforts play in modern life. Engineering may indeed be said to have suddenly come into its own. It has become proverbial. The man in the street says, with an air of conviction, "This is an engineer's war." Mr. Lloyd George continually preaches from the text, "This is a war of mechanics." "Give me men and munitions," Lord Kitchener is reported to have said, "and the enemy is in the hollow of our hand—men and munitions; but, above all, munitions."

"Munitions."

A wonderful word is this word "munitions" in the present day. Although popularly and erroneously thought of as meaning weapons and ammunition, munitions is of course a technical term denoting all the material equipment required for war. Its connotation in our time has a wide sweep. Embraced under the heading of "munitions" are all the ships of the sea—battleships, cruisers, troopships, submarines—the finest products of naval architectural skill—with all their marvellous equipment of engines and machinery, their stupendous guns, their horrific torpedoes, their beautiful instruments of precision, their range-finders, their magical wireless installations; every product of electrical science, of generations of chemical investigation, of the hard-won knowledge of the internal combustion engine; the legions of motor cars, the aeroplanes—all the beautiful materials that make these possible; the wonderful alloys, the marvellous array of modern steels; all the output of all the workshops and factories; the products of the mines, the collieries, the oil fields—all these and ten thousand things more are "munitions," are the stuff of modern war, and the engineer in his various grades and degrees is called upon to produce these things—urgently—in millions, moun-

tains of them, to pile them up furiously so that in the final scrap-heap of Europe there will be more of our stuff there than the enemy's.

Then shall we win. As Ruskin said, this "is modern war—scientific war—chemical and mechanic war—how much worse than the savage's poisoned arrow!" It is an awful and appalling spectacle this. Ten thousand million pounds worth of good stuff gone to scrap in a year—waste that should belong to a century accomplished in a single day.

The Scrap Heap.

I suppose no one realises like the engineer, even in peace time, the pathos of a scrap-heap—the regret at discarding some splendid piece of machinery that has been a friend and served one well, because it is no longer good enough and must be replaced by something newer or more cunningly devised. It is a thing always happening of course. I should think that Mr. Brain, the Chief Electrical Engineer for Railways, must have felt like an Oriental executioner when, a while back, he cast into outer darkness those beautiful vertical engines, out of his power-house—a wonder of their day, and that not so many years ago—because with all their elegance and splendour they could not keep up with modern demands.

The extraordinary interest of a "junk" shop, the curious fascination of walking around a collection of old stuff that has seen its best day, is known to every engineer—here a pile of ancient material, rusty and slowly deteriorating; there an assemblage of odd machine-parts waiting vainly for someone that might use them; or again a row of antiquated engines, pumps, machines of all sorts that have broken down, and it was not worth anyone's while to repair them, or that have proved inefficient, and it was more economical to buy a new machine rather than try and improve them—a great mass of mere material that only the molten fire of the blast-furnace

can reincarnate once more into something useful. All this is melancholy enough on the small scale, but to witness the reduction of a whole continent to a scrap heap is a spectacle to appal both gods and men.

The Legend of Prometheus.

You remember the old Greek legend about that wise and compassionate deity, Prometheus. He was the father of all engineers, who, in the early dawn of history, looked upon the earth and saw the sons of men feeble and more miserable than the beasts of the field, living in dark and gloomy caves, impotent, but blindly conscious of undeveloped powers, fearful of destruction lurking for him everywhere. Bent on an errand of mercy, stored in it the mysterious seed of Fire, and went his way to the dwellings of men with his priceless gift—Fire, the mother of all arts, and source of all material comfort to men. When they had learnt its use he revealed to them the treasures hidden in the bosom of earth—gold and silver and iron—and taught them to make weapons and tools and vessels for daily use. Forthwith they began to till the ground and build houses, and make ships, in which they braved the unknown terrors of the sea.

Such is the fascinating legend, such is the brief story of the material development of mankind; but had that wise old god of the ancients foreseen the spectacle of the sons of men in our twentieth century, he might well have paused before entrusting to them the secret which was to unlock the door of that material development.

“Engineering.”

There is indeed something to be said for the view that the engineer has been too successful. It would almost appear as if the civilisation of the engineer were about to be consumed of itself. The material arts of life sud-

denly take on the form of a monster about to destroy the creator of them. The oft-quoted definition of what constitutes engineering, given by Tredgold, and which was permanently adopted by the Institute of Civil Engineers in its Charter, seems possibly something of a mockery. "Engineering," says Tredgold in brief, "is the art of directing the great sources of power in Nature to the use and convenience of man." That surely is no definition of German engineering! It rather is surely the art of preparing every worker, training every faculty, investigating every material, devising every contrivance, and constructing every weapon that might conceivably enable the German nation to crush its competitors and rule as lord over all.

What is the conclusion then? Are we possessed of the same devil as our enemies in that we are hurling our "pile of stuff" at him as he hurls his at us? It is a question that one asks with some heart-searching and answers with some diffidence; but—we think not. If we have developed the resources of our nation—possibly selfishly enough, and with too much of the desire to amass riches and comfort for ourselves—we at least had no wish to forcibly prevent other peoples also succeeding. If we saw with pleasure and exultation the expansion of our Empire in the world, we at least have not been fiendishly designing a national scheme of things as one might design a battleship so that when we had it perfect enough we could annihilate our neighbour with it.

Machines and Men.

Much as we believe in machines in their right place, we do not believe that mankind is built on machine principles. We do not desire to get our "place in the sun" by forcibly kicking the other man out of it when we think our boot is more "hefty" than his. The old adage of "Live and let live" is one that peculiarly appeals

to the British race, and perhaps to no part of it more than to those who dwell here beneath the Southern Cross. Meanwhile none will deny that this is indeed the day of the engineer, and whether one regards him as the betrayer or benefactor of mankind, none will gainsay his importance, and the function of an Association such as ours takes on from this time forth an added significance and urgency which we do well to mark. For the time being the engineer, and all his works, is the chief support of the nation.

It is with this feeling in my mind that I venture, therefore, to take the opportunity to make a few remarks—prosaic and almost domestic remarks—about engineering, about its place in Australia, and about the part which I conceive that this Association should play in connection with it.

The Engineering Association.

It is the oldest of such Associations in Australia—if one can speak of age in a country where all is young, but we are within a few years of our fiftieth anniversary. It is an association broadly based in its aims and is most fortunate in having all classes of engineering represented in its membership. Its relationships with the technical and scientific work of the University and other laboratories, with the activities of the workshops and factories, with the operations of the great Public Departments, and with industrial undertakings generally—are cordial and intimate.

We publish a not unworthy volume of proceedings which we trust to improve each year. The Association is perhaps the richest (in a small way) of such bodies, thanks to the generosity of our benefactor, Sir Peter Russell, and the warm support of our active members—although I only mention the question of funds as an indication of the responsibilities that accompany them—and we are, I suppose, as experienced as any other in-

stitution in Australia, and being placed in the midst of what we hope is going more and more to be the great centre of this country's activities, we should be able, as an Association, to play a useful part in the progress of engineering as a profession, and in that industrial development of the country which will undoubtedly constitute its chief resource.

This Association, indeed, is already doing a good deal for the advancement of the engineering profession—thanks to the warm support of the members, and very largely, I would like to take the opportunity of saying, to the unselfish efforts of our Honorary Secretary and Treasurer and some of the Members of the Council who are devoting to the work a generous amount of time and trouble. Two or three of these matters are well worth referring to in somewhat greater detail. Perhaps I might remind you of the fact that we are a body incorporated under a special Act passed by the Parliament of New South Wales, and that the stated objects of our existence are “the general advancement of Engineering and Mechanical Science, and more particularly those branches of Civil and Mechanical Engineering which tend to develop the resources of Australia.”

In order to achieve these ends it is obvious that the membership of the Society must consist of those who are able and willing to work towards such ends, and that such efforts shall be put forth by by the Association as will provide the community at large with the information and the stimulus necessary to achieve them. Now, I venture to think that two steps we are just taking will do much to improve our efforts in both these directions.

Membership.

First of all we have expressed in the amendments to the rules which were passed by you a few weeks ago that only such persons shall belong to the various grades of membership as are professionally fitted for them.

Hitherto, perhaps, in the election of members of this Association, and possibly of most similar bodies in the Commonwealth, the qualification of candidates for membership has not been too minutely scrutinised; but by our recent action we have expressed a determination that in the future, membership of the Association shall constitute a definite guarantee of the corresponding qualification.

In this we are following the example of the older societies in other parts of the world, and we may reasonably anticipate that, in the time to come, full membership in the Engineering Association of New South Wales will be regarded as a possession of much value.

I venture to hope that the fullest support to this movement will always be afforded the successive Councils by the members of the Association, and that any temptation to increase the number of members at the expense of their quality will be firmly resisted. In this way more than any other will the strength and reputation of our Society be enhanced.

A Library.

The second important effort consists in the recent adoption by the Council of an energetic policy in the development of a high-class Engineering Library. This may not appear at first sight of quite such obvious importance as the other, but in my opinion the value of it cannot be exaggerated. In these days of extraordinary multiplication of knowledge and of a rate of technical and scientific advancement that was undreamt of fifty years ago, it is quite impossible to make even the attempt to keep up with it unless the most careful efforts are made to have available the vast treasuries of knowledge which are accumulating all over the world in the proceedings of the great scientific and engineering societies.

To accumulate these volumes and to have them so catalogued and classified as to be readily available to the searcher, is a task of unusual magnitude.

Your Council considered the matter with great care, and found that in Australia there was no good Engineering Library in existence, and they decided to make the attempt to build one up. The funds at our disposal are, of course, not great, but, given the customary support of members, we anticipate that, during the next ten years, it will be possible to spend perhaps £1200 in actual purchases, and this, together with the numerous exchanges of our own proceedings with those of other societies in different parts of the world, will give us at least a good beginning towards what we confidently anticipate will become one of the real engineering assets of the country.

Engineering and the Nation.

It is possible that these matters do not at first appear to be of primary importance. I may seem to be putting an undue emphasis on the value of the development of our profession in Australia, but I am convinced that no statement can really exaggerate the vital importance of engineering (interpreting that word in its widest sense) to this country. At any rate I make no apology for urging on you that the object of our existence, as stated in the Act of Parliament—"the general advancement of Engineering and Mechanical Science"—is one of the most worth-while things to which any association might devote its efforts.

Disadvantages.

Now, it must unfortunately be admitted that engineering as a profession in Australia is not in the happiest position. It labours under certain distinct disadvantages, some of which are general and some due to the conditions that obtain in the Commonwealth. If we examine any particular profession—the legal profession, the

medical profession, the teaching profession, engineering, architecture, surveying—and ask the question: Why should men seek to enter it, and what are its rewards? I suppose we would find that they could be roughly summed up under the following heads:—

- (a) First of all for the self-satisfaction the particular calling affords; the opportunity it offers as a field for the individual's energies; the possibilities that it has for the development of the man's powers, and for enabling him to play the part in the community to which he feels impelled.
- (b) In the second place the profession may attract a man on account of the general public esteem in which it is held and which he may enjoy quite apart from any definite rewards.
- (c) In the third place there is the important question of the monetary return which may be expected as a result of his efforts; not only the immediate and early amounts but also the monetary prizes of a large order which some professions offer as the ultimate reward in the middle and later periods of a man's life.
- (d) Then, finally, there are the rewards in the shape of public honours and titles which, to some men, are a great and not unworthy inducement to follow a particular profession.

Now, if we suppose a young man to sit down and look carefully at the various professions and consider which he should choose (a middle-aged procedure which probably few young men are guilty of) he would find that in relation to the engineering profession he would have to decide which of the above considerations he thought mattered to him most, and he would find that, looked at from the point of view of the first and second, engineering has almost everything to recommend it. I sup-