13TH MARCH, 1902.

PRESIDENTIAL ADDRESS.

BY HECTOR KIDD.

In opening the first meeting of the thirty-second Session of our Association I may be permitted to briefly refer to the work of the last Session; but before doing so it is my sad duty to refer to the loss by death since our last meeting, of one of our honorary members, Mr. W. F. Poole. Mr. Poole was well-known in engineering circles as a successful contractor in connection with the railways of the State, and for his efforts, while he was in Parliament, in advocating the carrying out of works for the conservation of water and for irrigation.

The papers read during last Session were of a high standard. Mr. John Scoular's paper on a "Method of Balancing and Revolving and Reciprocating Weights in Locomotives" as applied to inside cylinder engines, is one of considerable merit, and an important contribution to the literature on that subject.

The paper on "Smoke Prevention," by Mr. J. B. Meldrum, led up to an interesting discussion on the merits of different systems and methods in use for the prevention of smoke.

The next paper was a topical discussion on the efficiency of screw bolts and their application to steam pipe flanges, and other uses. The paper compared the practices of some of the principal makers, and led up to a most interesting discussion. In this connection I may be allowed to refer the members to some useful remarks on steam-pipe joints and flanges by Mr. McKechnie in a review of marine enigneering during the last ten years,

appearing in the proceedings of the Institution of Mechanical Engineers; and also to a standard design and proportion of bolts in steam-pipe flanges adopted by a special committee of the leading makers in America. The schedule of proportion came into use on January 1st, 1902, and for full particulars thereof I would refer members to "Engineering," of 27th November, 1901.

The attendance at our monthly meetings has been fairly good. During the year the members had the pleasure of visiting the modern saw milling plant of Mr. H. Mackenzie, at Blackwattle Bay, and also the North Shore Gasworks, in order to witness the working of the "Meldrum Patent Furnace." It is, I think, a very desirable thing to have as many outings as possible during the recess, for they undoubtedly have a great educational value to members, and give them the opportunity of comparing notes on the progress of engineering and other industries in the State.

Having thus briefly referred to the work of the last Session, I have to ask your kind indulgence for a short time, while I endeavour to interest you in a few thoughts which I purpose bringing before you.

On meeting you again as your president, at the opening of another Session, I have to express my sincere thanks to the members and council for the special mark of confidence they have shown in electing me to a second year of office as president of this important Association. The honour which a second election confers is one that should be highly esteemed by any member of this Association, as it affords him an opportunity of devoting his labours and best efforts to the services of the Association to which we are all proud to belong.

In my inaugural address at the opening of the last Session, I attempted to review, however imperfectly, the progress of engineering in this State up to the year 1900; and as there have been very few engineering developments during the past year, I will not occupy valuable time by referring to them, but will leave that to some future president. On this occasion I will essay to give a short historical outline of the inauguration, progress, and development of our Association, and endeavour to briefly outline some of the functions of the engineer, and

refer to some of the branches of applied science with which our profession specially deals.

First, then, as to the history of our Association. A circular dated September 12, 1870, signed by our esteemed fellow-member, Mr. J. Laing, was issued calling a meeting of gentlemen interested in engineering for the purpose of considering the advisableness of forming an Association of Engineers. The circular read as follows:—

"Sir,—You are earnestly requested to attend a meeting of leading members of the Mechanical Engineering and Iron Trades of Sydney, to be held at the School of Arts on Saturday, 24th September, at half-past seven o'clock in the evening, to consider the advisibality of forming an Association for the discussion of mechanical subjects and exchanging opinions thereon, watching the progress of mechanical arts in other countries, and keeping in view their adaptation to the wants of the Colony. The friendly discussion of such subjects cannot fail to be of advantage both to employers and employed, as well as to those who take part in them, and it would not only increase our knowledge, but also the kindly feeling and respect for each other which ought to animate men whose pursuits and interests are identical. It is, therefore, hoped you will lend your aid in the accomplishment of these ends.

For the Committee pro tem,

(Signed) J. LAING."

In response to this circular a large number of gentlemen met at the School of Arts on the date specified, when Mr. Laing read a paper dealing with the advisability of forming such an Association, and outlining the various advantages to be gained by its formation. The meeting unanimously decided to carry the proposal into effect, and forthwith elected a committee of twelve to draw up a constitution embodying the necessary rules and bye-laws, which committee during the ensuing month held several minor meetings for the purpose of compiling rules and framing regulations for the management of the Association. On Wednesday, 26th October, 1870, another large meeting was held, when the rules were submitted and adopted, and the following officers

elected:—Vice-president, Mr. Rose; secretary, Mr. Downing; treasurer, Mr. Halliday; while the committee, or council, consisted of the following gentlemen—Messrs. W. Smith, W. Grant, W. D. Cruickshank, G. A. Morrell, N. Selfe, G. Davidson, W. Scott, H. Broderick, and J. Laing. I am pleased to say we are privileged to have still among us five of the original founders of our Association, and I fervently hope they may be long spared to assist us by their wise counsel and mature experience. It will be noted that at this meeting the first vice-president of the Association, Mr. Rose, was elected; but it was decided that the election of the first president should be postponed until a future date. At a meeting held soon afterwards Mr. John Fyfe was unanimously chosen by the members to occupy the presidential chair. Mr. Fyfe, who may justly be termed the father of marine engineering in Australia, was one of the pioneers of marine engineering in the Old Land. There is an interesting memoir of our worthy first president in our proceedings, vol. IV., to which I beg leave to refer the members, more especially the younger ones, of our Association, as they will learn from its perusal something of the difficulties, long hours, and hard work experienced by the engineering apprentice in the early years of our profession, when he had very little time to study, and was entirely without the opportunity to acquire technical learning which is afforded to an apprentice of the present day. Since the election of Mr. Fyfe as our first president, when he so worthily carried out the duties pertaining to the chair, it has been occupied by a number of well-known engineers who have made their mark in the history of engineering development and technical education in this State.

The first meeting of the Association after the election of its officers, was held in the School of Arts, Pitt-street, on Wednesday, the 16th day of November, 1870, when the vice-president, Mr. Rose, delivered an interesting and instructive address, setting out the objects and advantages to be achieved by the formation of such an Association. Mr. J. Laing has been good enough to hand to our honorary secretary a large number of valuable and interesting papers in connection with the early

history of our Association, among which is the first presidential address I have just referred to. I am sure the members will experience a sense of gratitude to Mr. Laing, and I take this opportunity of thanking him on their behalf for his generous gift. I hope that at an early date we may have the papers reproduced in the proceedings, so that our history of the inauguration and growth of this Association may be made as complete as possible.

The month of August, 1884, marks an important epoch in the history of our Association, for in that month —fourteen years after the date of the election of the first president—it became incorporated by Royal Charter. The Act of Incorporation states that the objects for which the Association is formed, are primarily—

"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, and to discuss at its stated meetings original papers on civil and mechanical engineering."

It will, I think, be admitted that our Act of Incorporation affords great facilities to our members for the reading and discussion of all kinds of papers appertaining to mechanical science and engineering subjects, while at our monthly meetings the opportunity occurs for the interchange of ideas, the cultivation of personal friendship, and the diffusion of that spirit of comradeship which should animate all engineers.

It would be well that the younger members of our profession, who are surrounded with many opportunities for acquiring technical knowledge, should remember that at the time when this Association was inaugurated there were no schools or colleges to which the junior members could go in order to receive technical instruction, and the founders of our Association in those early days took a deep interest in their advancement, and, in many cases, performed much of the teaching work that is now done at the technical colleges, so that to them belongs not only the credit of performing the pioneer work relative to the inauguration of our Association, but also of assisting to lay the foundation of technical education

in this State. The wisdom of their early endeavours in the cause of technical education, and their appreciation of its importance and value to the rising generation, has been abundantly testified by the efforts that are now being made in all parts of the civilised world to extend the system of technical education into every branch of engineering and other industries. There is no doubt whatever that it is only by the adoption of a thorough system of technical, industrial and commercial education that any country can hope to keep in line with the rapid march of industrial development.

I need not refer in detail to the long list of names which go to make up the roll of our past presidents, vice-presidents, councillors and members: suffice it to say that they number among them the leading members of our profession, while the work which they have performed will be landmarks showing the great strides made in the engineering and industrial progress of this State, for many years to come.

Time will not permit me to refer at length to the great services rendered to engineering in this State by our Association. However, I may be permitted to claim for it that it has been the means of bringing engineers together for the purposes of exchanging experiences and ideas, the cultivation of personal friendship, and the inculcation of that spirit of comradeship which is so essential to any man who has at heart the interests and advancement of the profession to which he belongs.

Since the incorporation of our Association, the progress made has been very gratifying. The papers read at our monthly meetings and recorded in the proceedings are of a high character, and deal with nearly every branch of civil and mechanical engineering, and there can be no doubt whatever that our Association can be raised to a similar position in this State to that occupied by the leading Engineering Associations of England and America, if the members will give the Council their hearty co-operation and support. We should endeavour to make our meetings attractive to the younger members of our profession, so that they may be induced to join our ranks and take part in our discussions, and thus

help to place on record the engineering experiences of the State. I would very strongly advise them to so apply themselves to their studies that they may qualify for membership, and thus enjoy the privileges and benefits to be derived from taking an active part in the reading and discussion of papers brought forward at the meetings. The field of usefulness of the engineering profession is extending in all directions, owing to the advance of practical science, and the duties devolving on the individual members thereof are also increasing. It has, therefore, become a necessity for the engineer to join some association having for its objects the general advancement of engineering and mechanical science, so that he may have the opportunity of exchanging past experiences and of discussing with his fellow-members difficult problems awaiting solution. We should ever remember that we are dependent on the co-operation and help of our fellow-workers for whatever success we may attain, for although many past engineering achievements have been credited to successful engineers, it would be difficult to say how much of the merit for any particular work is due to an individual, and how much is due to the assistance and help received by him from others. Our Association has done good work in the past, and I think its usefulness may be greatly extended, for instance, by the appointment of committees of members to undertake research work and to standardise the design of many parts of engineering structures, and to report on various questions of interest not only to engineers but also to manufacturers, and thereby assist in reducing the cost of work. I need only refer to the important work of standardisation in connection with engineering designs carried out by some of the American Engineering Societies to show that there is ample scope for extending the usefulness of our Association, as far as doing similar work for this State is concerned. Now, having reviewed briefly the inauguration and growth of our Association, I would ask your attention for a short time while I try to enumerate some of the functions of the engineer. It may be safely said that they are so numerous that it would be a much easier task to attempt to specify what he is not called upon to

do, than to enumerate what he is required to perform. Sir William Henry Preece, in a recent address on this subject, has outlined and endeavouerd to classify them. He points out the antiquity and the universality of the functions of the engineer, and traces his early history as far back as the Flood, for Tubal-Cain was an instructor of every artificer in brass and iron. It is not, however, to the functions of the engineer of antiquity that I wish to refer (although that would be an interesting subject for a quiet half-hour's chat), but to those of the engineer of the twentieth century; and in considering his present position the most striking features are undoubtedly the universality of his work and the great demands made upon his skill in devising means to supply our requirements and comforts. It would lengthen this address too much to attempt to enumerate all the functions of the present-day engineer. It will, therefore, suffice if a few of the more important ones be referred to. It may, I think, be safely said that his most important responsibility is that of chief custodian of the most valuable component of our national wealth, represented by the coal supply, and to devise means to utilise the many sources of power in Nature for the use of mankind.

Attention has recently been drawn to the great increase of the coal consumption in Great Britain. Indeed, it has assumed so serious an aspect that it is proposed to appoint a Royal Commission to investigate the question of demand and supply, and to endeavour to determine the probable extent of the latter. The important question of conserving the coal and other sources of fuel supply of the world should be the constant study of the engineer. The world's output of coal per year, up to the latest dates which are available, is shown in the following figures:—

Country.	Year.	Tons.
United States	1900	.. 245,422,000
Great Britain	1900	.. 255,301,000
Germany	1900	.. 109,225,000
Austria and Hungary .	1897	.. 39,315,000
France	1900	.. 32,587,000
Belgium	1900	.. 32,326,000

Russia	1897	..	12,350,000
Japan	1896	..	5,531,000
Australasia	1900	..	5,450,000
India	1899	..	4,937,000
Canada	1898	..	4,172,000
Spain	1898	..	2,784,000
South Africa	1897	..	1,792,000
			751,192,000

In the year 1816 the coal raised in the United Kingdom was 20 millions of tons; in 1855 it had risen to nearly 64 millions; in 1892 the total production was 186 millions; while in the year 1900 it reached a total of 225 million tons. This enormous quantity of coal is distributed approximately as folows:—

Used in iron, steel, and smelting industries	26 per cent.
For steam-raising in factories generally ..	19 per cent.
Shipped to other countries	18 per cent.
Used for domestic purposes	15 per cent.
Used by steamers at sea	6 per cent.
Gasworks and waterworks	5 per cent.
Used in collieries and mines	5 per cent.
Chemical and salt works	3 per cent.
Potteries, gasworks and brick-kilns	3 per cent.
	100 per cent.

The figures just quoted are very significant, as they indicate how rapidly we are depleting the world's stock of coal. Enormous deposits, no doubt, remain untouched in other parts of the world, which will probably suffice for our requirements for many years. But a time must come—and that within a few generations, at most—when some other form of energy than that of combustion of fuel must be utilsed to do the work of the civilised world. In the meantime, it is the special function of the engineer to do what he can to conserve the vast store of fuel in the world; and his first step in this direction is the exercise of special care in seeing that it is used in the most efficient and economical manner in the production of power and in carrying out the working in connection with various industries.

Before considering some of the methods by which coal may be more economically used, the question may be asked: Is sufficient care exercised in getting the maximum amount of coal from the mines? Sir Frederick J. Brammel, in a presidential address in 1874, referring to the question of the preservation of our coal (which he very aptly described as "the very breath of our nostrils"), raised the question: "Are not the coal pits worked with no other object than that of obtaining the utmost present profit out of them; and do we not thereby leave behind the less immediately valuable coal, and, leaving it unassociated with that which is more profitable, render it all but impossible for those who come after us to get, except at too great a cost?"

We must leave this question to be answered, however, by the mining engineers.

Referring to the figures giving the percentage of coal used for different purposes, it will be noted that the iron, steel, and smelting industries use a little more than one-fourth of the total quantity; but as these industries have scarcely made a commencement in this State yet, there is not the opportunity afforded us of putting into practice the well-known systems which have economy for their object. I may, however, briefly refer to some recent developments in the utilisation of the gases from blast-furnaces for the production of motive power.

The importance of this discovery may be gathered from the following figures:—The annual production of iron from blast-furnaces throughout the world is about 40 million tons, and as the estimated quantity of gases going to waste after 28 per cent. thereof has been utilised for heating the blast and 40 per cent. for steam boilers fitted in connection with the plant, there remains 32 per cent. actually going to waste. The average heating value of the waste gases is such as to yield about 12½ indicated horse-power per ton of iron melted, or equal to five hundred million horse-power per annum, which would mean a saving of 150,000 tons of coal per annum assuming 2lbs. of coal to yield one horse-power per hour. The keen competition which now exists in the production of iron has led to the rapid development of a gas engine designed to use the gases from blast-