

gusted at the manner in which Mr. Gray sought to prove the insufficiency of the boiler, and, certainly, never were two more opposed to each other than the Coroner and the Government Inspector. The Coroner objected to figures being brought into the question, and said that the jury were to understand that these questions by Mr. Gray were permitted by him for the information of the general public only, but they were not to be taken by the jury as having any legal bearing upon the question before them, as to how these men lost their lives. In directing the jury he told them that they were either to find a verdict of accidental death, that no one was to blame; or, if they found that the boiler had been subjected to an unsafe pressure, they must bring in a verdict of manslaughter against the engine-driver, Simmons, who had also lost his life. This is legal engineering, and this is how Coroners make explosions! The man, Simmons, engaged only three weeks before the explosion to shovel coals into the furnace, and to open and shut the steam valve and the feed valves—this was the man whom the Coroner points out as the culprit, if there was one culpable, or if he had been so grossly negligent of his duty as to work the boiler at a pressure at which it was not safe. Such, he says, is the Law, and if so there is, in the near future, a big humiliation for “Law,” and a probable elevation of engineering and of practical good sense. The question of the strength or weakness of a boiler is not one for the stoker, but for the steam-user; and if those poor people who lost their bread-winners were not so poor and friendless as they are, it would not have been so easy to have shut them out from legal redress. The Coroner and the Government Inspector came to words over the direction to the jury, and the Coroner’s only vindication of his charge as to the responsibility of the stoker was that he (thé

Coroner) had been twenty years at the Bar, and he ought to know. We would now recommend him to try a year at the shovel, and he would by that learn more about a stoker's duty than by fifty years at the Bar."

Of course, this is an old story, and things are different in the old country now; but we are slow to profit by its experience.

I have been led to make these remarks on the practical man and this explosion by considering the Legislature current in other Australian States on regulation of land boilers. That regular inspection of such by competent men, either with or without the authority of the Government, is a necessity, is recognised by everyone, except a certain class of boiler-owners themselves, as the reports re explosions of farm boilers in the United Kingdom show. But who are competent inspectors? The Boiler Act in a neighbouring State prescribes that they shall be boilermakers possessed of theoretical knowledge of boilermaking, or practical engineers possessed of theoretical knowledge of boilermaking—the old fallacy of a distinction between practical and theoretical knowledge being evidently recrudescient.

What is a practical engineer? If practical workmen, engine-fitters are meant, I have known good workmen who had no idea of what the use of many of the fittings they put on the engines they built was. "Engineer" is too indefinite a word to use here; boiler-making is an engineering trade, and a boilermaker is as much an engineer in a sense as a fitter. But a man may be a thoroughly good boilermaker or engineering workman, with the so-called theoretical knowledge of boilermaking besides, and yet know little of the difficulties met with in the actual use of boilers. What does workshop practice teach about water-hammer in steam pipes, the cause of so many accidents, or about the

treatment of hard feed water, or of boilers fed with it? By all means let inspectors be competent engineering workmen, but it is of even more importance that they have a knowledge of the working of boilers, of the defects caused by incrustation and corrosion—the laws and phenomena of combustion, heat, and steam, of the strength and fitness of materials, not only boiler plates and rivets, but of gun-metal and other alloys, of fire-bricks, of jointing materials, of many things. In other words, they must be truly practical engineers in the sense of the word which I have endeavoured to elucidate in my reference to Thomas Telford.

For very much depends on the boiler inspector. The great majority of casualties result from defects in the boilers themselves, and not in the attendants; and the boilers need examination and certificates rather than the men. It is doubtful if making all boiler attendants pass an examination will appreciably diminish the number of casualties; it will prevent utterly ignorant men being put in charge of boilers, but it is not ignorance that is the cause of such explosions as are attributable to attendants' faults, so much as carelessness and thoughtlessness.

Of the 77 explosions reported on by the Board of Trade as having occurred in the United Kingdom in the year ending June 30th last, 36—less than half—were of steam boilers proper, 41 being of steam pipes, heating apparatus, and miscellaneous. Of these 77, twelve only are set down to ignorance or neglect of attendants. Twenty-two were on board ship, and many of these must have been of boilers in charge of certificated engineers. Although the number of explosions (77), in which very minor casualties are now reckoned, was above the average per annum of the last 24 years, which was 68.2, the number of lives lost was just the average (28), and of

persons injured slightly over the average (65 instead of 58.4). Although this loss of life and injury to persons is most deplorable, considering the vast number of steam boilers, the casualties that occur are relatively few. And some of these would doubtless have been prevented if the moderate requirements of the inspectors had been attended to; but the cumbrous processes of the law handicapped them. One factory inspector reported that in a certain factory he found the boiler under steam, the water-gauge cocks stopped up, no register, no boiler report, and, as far as he could ascertain, there had been no examination made for the past two years at least. The firm had been previously cautioned on several occasions; they were now prosecuted, and at the hearing of the case, six weeks after the inspector's visit, although the defendants admitted that the boiler had not then been examined, and would not promise to cease using it until it had been, and notwithstanding the previous cautions, the Resident Magistrate had difficulty to persuade his colleagues to convict and fine the defendants five shillings! Had the boiler attendant required to possess a certificate, as in most Australian States, these gentlemen might have thought the ends of justice were met by depriving him of it, while the reckless owners went uncensured.

I trust that a statesmanlike endeavour will yet be made by our Legislature to bring in a Bill which will ensure the maximum possible absence of danger from the use of steam boilers with the minimum interference with personal rights and liberties; that certificates ensuring a monopoly of employment about boilers will not be lightly issued, but only to men who are to hold really responsible positions, and can pass a real examination; and that the inspectors under the Act will necessarily have heads as well as hands.

At the end of last Session, your Council appointed a Committee to consider, and report on to the Minister for Labour and Industry, a draft Bill for the Regulation of Land Boilers. The members of the Committee are Messrs. Arnot, Boulton, Christie, German, Irons, H. Kidd, King, Petrie, Sinclair, and myself. We have devoted much time and consideration to the Bill, and have presented our report, which I trust will be of service to the State.

I think that it is a point made that our Association should thus be recognised by the executive Government as the representative of the collective engineering science and practice of New South Wales, unprejudiced by any sectional proclivities, for practically the first time since the Legislature granted its charter of incorporation in 1884.

The object of our Association is stated in this charter to be the general advancement of engineering and mechanical science; and its history, I think, shows that this impersonal and unselfish aim has ever been kept in view.

This year, gentlemen, is the semi-jubilee of the Engineering Association as a chartered corporation, though our history goes back to 1870. Some of the office-bearers and members of Council named in the charter are still with us—may I particularise our Honorary Treasurer, Mr. John Sands? I hope, when our jubilee year comes round, he and many of us may still be here, and will see the Engineering Association a power for good in Australasia, and membership in it a universally recognised and coveted distinction.

On the motion of Mr. J. Scoular, seconded by Mr. Russell Sinclair, a very hearty vote of thanks was accorded the President for his valuable Address.

(Letter referred to by the President in his  
Address.—Ed.)

14 Wharf-road, Balmain, December 14th, 1908.

The Secretary, Engineering Association.

Dear Sir,—In your letter of the 7th instant, in which you informed me of the acceptance by the Council of the report I possess of the inaugural address delivered by Mr. Rose at the formation of the Association in 1870, you also mention their appreciation of some of the remarks I made respecting the objects of the Association “and hopes that they are carrying out faithfully the duties and responsibilities entrusted to them.” I assure you it is the integrity and completeness with which the objects he pointed out have been adhered to and the results attained which caused me to term some of his remarks “prophecy.” I think I also remarked that at that time “there was no scientific engineering taught at the University and no Technical Schools or Colleges in Sydney or New South Wales.” Now we have engineering taught at the University and technical education spreading over the land as part and parcel of our public school system, and that result seems to me in a great measure due to the papers read and discussions at the Engineering Association. It was at their suggestion that Professor Liversedge was instructed to make the official inquiry in Europe and report on the various systems of school education there, and his report led to the establishment of an Engineering College at the University.

I believe also that the adoption of technical education as part and parcel of our public school system was also due to the influence and action of our Association, for at the end of 1871 or beginning of 1872 a Sub-committee had been formed to consider what classes should be formed, and at the monthly meeting in March, 1872,

the Chairman (Mr. Broderick) said he "regretted the report of the Sub-committee had not been submitted to the meeting. He might state, however, that that report went so far as to recommend the formation of classes in connection with the Association," etc., etc.

In the April meeting it was again discussed, and in the May meeting again it came up; and it was "agreed to call a special meeting for Thursday next to consider the report of the Sub-committee who had been appointed to devise means for forming a School of Design in connection with engineering."

After this, I have no record of what took place; but I remember that classes were formed and met in a small room in Bathurst-street (I think), and Mr. Cruickshank was one of the teachers. For the next three or four years, being employed partly in deepening the eastern channel at the Heads and partly employed at Newcastle, I have little distinct knowledge of what took place in connection with these classes. I only know that the interest in technical education was increasing and the value it would be to the community better understood. After I returned to Sydney in 1876 I was present at a special general meeting of the Association, held in October. The report of the proceedings, as reported in the "S.M. Herald," and also a report of the meetings held in November and December of the same year, are at the disposal of the Council if they wish it.

They will, I think, prove good historical proof of the fidelity with which the Association carried out, so far, the objects for which it was formed, viz., the opportunity to "acquire and impart knowledge"—a purpose which I think has been faithfully and successfully carried out. I may add that I think the success would be still greater if the members could or would induce some change to be made in the indentures of apprentices, by

which the masters would have some power to ensure the attendance of their apprentices at some evening school or class at which they would acquire some of the theoretical knowledge requisite in these progressive days for a good workman, whether he is employed on shore or afloat.

This is my opinion as an old engineer who has seen the wooden walls of England turned into ironclads, who, when working in Liverpool in 1846, saw the Cunard boats or liners as wooden paddle steamers which could run about eight knots; now they are iron or steel ships propelled by turbines and screws, and do their 25 knots. And changes as great have taken place in every branch of engineering and mechanical industry with which I have been conversant for the last 75 years; and I have felt the want of education and thereby learnt its value, not only to the individual, but also to the community of which he is a member. I may also remark that by-and-bye the rising generation will have to compete with the Japanese, Chinese, and Russians of Siberia in commerce and various industries; and I think that in the scientific and technical education and training requisite to meet that competition the Engineering Association should still lead the van in preparing their young students and apprentices for the coming struggle.—Yours, etc.,

(Signed) J. LAING.

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CIRCULAR CONVENING MEETING  
FOR THE FORMATION OF

THE ENGINEERING ASSOCIATION OF N.S.W.

*And Original Manuscript of Paper read thereat. Presented by J. Laing, Esq. (Hon. Member of the Association).*

Sydney, 12th September, 1870.

Dear Sir,—You are earnestly requested to attend a meeting of leading members of the Mechanical En-

gineers and Iron Trades of Sydney, to be held at the School of Arts on Saturday evening, 24th September, at half-past 7, to consider the desirability 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 interest are identical. It is therefore hoped that you will lend your aid in the accomplishment of these ends.—For the Committee, pro. tem.,

J. LAING.

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I think you will all agree with me that it would be a great advantage to us as a body, and I believe to many of us individually, if we could form a Society here similar to some of those at home, and also in America, for the purpose of discussing mechanical subjects and by the friendly interchange of opinions, ideas, and knowledge assist each other, not only in keeping up with the progress and advance of mechanical skill in other parts of the world, but also in adapting it to the wants of the colony.

For I think it can scarcely be doubted that by keeping ourselves well informed of the constant progress made in all branches of our trade, and endeavouring to adapt that knowledge to the various and increasing wants of the country we have adopted, we would thereby increase the value of our class to the society we live in and also the wealth of the colony by adding to its products and enabling it to retain and expend within itself

a portion of the money hitherto sent home and abroad for the machinery and appliances required for the various trades and manufactures carried on here, and thus finding employment both for ourselves and our children. I have no doubt all of you, since your arrival here, have known people send home for machinery merely because they thought it could not be made in the colony or that they would get a better article, although they would willingly have paid a higher price if they were sure they could get as good an article in a shorter time. I think a Society of the kind proposed would, if well conducted, assist in removing many false impressions and opinions which float around us regarding what we can and cannot do, and also quicken our own movements by enabling us to obtain a better general knowledge of what is required by the new industries springing up around us in the shape of sugar mills, kerosene works, paper mills, tweed mills, meat preserving, etc., etc., and which it is our duty to make ourselves acquainted with and assist in preventing other colonies getting the lead and taking our trade from us, although we have all the materials for carrying on mechanical trades around us or under our feet in the shape of timbers, coal, iron, copper, lead—in fact, all the materials required for a manufacturing country.

If such a Society had been in existence and in good working order while the present Inter-colonial Exhibition was open, I feel confident both ourselves and the colony would have benefited more by it. Many of the exhibits would have furnished material for good papers, and I have no doubt they would have been taken up and discussed systematically and with more good, practical results than will arise from isolated individual efforts.

Some of those I have conversed with on this subject, while admitting the great advantages it would confer,

express doubt as to our ability to keep such a Society alive for any length of time, but I think many of the obstacles in our path would soon disappear if fairly met; the same was said of the Association of Foremen Engineers in London when it was first started, and if you will allow me I will read an extract from "The Artizan" of 1858 to shew their position at starting, and one from "The Practical Mechanic" of this year, to shew their present position.

\*                     \*                     \*

If they can achieve such results, why cannot we? Some of the engineers here came out to erect machinery for the quality and success of which their masters' credit was pledged—some with steamers their masters had guaranteed (and masters are not in the habit of choosing their most useless men for these purposes). The rest of us, who came out here principally to try and improve our condition in life—partly, perhaps, for love of change—proved by the very act that we had energy and self-reliance. We have now got colonised—or climatized, if you choose to call it—and I believe if we determine to form and work such a society, we can do it both with advantage to ourselves and others, for I have great faith in the words of the old song, "Where there's a will there's a way."

I believe, as a rule, the mechanics here are more energetic, more intelligent, and possessed of more general information than the same class at home. Take the shops at home: as a rule, they only carry on one branch of our trade—one is a marine engineer, another a locomotive engineer, another an agricultural engineer, or, perhaps, studies flax, cotton, or woollen machinery from one year's end to the other; but here masters, draughtsmen, foremen—aye, and workmen, too—have to

open their eyes wider and look over a greater variety of work. The man who designs a marine engine may have to start a wool-washing machine next day, or it may be a sugar mill or a mud dredge, a locomotive or a horse mill. Two articles of the same class seldom follow each other, and the engineer or mechanic who is to carry out the work must have some knowledge of all. This acts on the mind like healthy exercise on the body, and gives the go-aheaditiveness which good colonists, generally possess. But still, men are generally better informed in one branch of trade than they are on others, and always better able to form a correct opinion on any subject after they have heard others explain their views and taken part in a spirited discussion on its various merits or demerits.

One of the greatest difficulties to be encountered in forming and working a Society of this kind would, I believe, be the fear of the different shops that their work might be exposed to unfriendly criticisms; therefore, in drawing up rules, there are one or two matters which would have to be kept in view—mainly, all matters connected with trade or politics would have to be prohibited. And no mechanical work being done in any shop should be taken up as matter for discussion or criticism unless introduced by the masters of the shop where it was being made, or with the knowledge and consent of the master. With these exceptions, I think, all mechanical subjects ought to be left open to the choice of the member who is to open the discussion; but it (the subject) should be named at the meeting previous to the discussion, to enable members to read up or otherwise prepare themselves to take part in the debate which should follow, and thereby assist to render it both pleasant and instructive.

I think it would also be advantageous to allow members to read from a mechanical work or from any article

or extract on any new subject which he thought would meet or assist in supplying a want in colonial manufactures.

I think, by members meeting for these purposes and carrying them on with courtesy and kindness to each other, they would both increase their own knowledge and the kindly feeling and respect for each other which ought to exist between men whose pursuits and interests are identical, and which is often destroyed by misunderstanding when they never meet except when in direct competition with each other. But still, holding these opinions firmly as I do, I would advise none to join who do not make up their minds to assist to the utmost of their power in carrying out the objects of the Association, for if we determine to succeed we will succeed, but if we get dispirited or careless at every little difficulty and crying out "It won't work! it won't work!" it would be like throwing a wet blanket on a fire and then crying out "It won't burn! it won't burn!" To make a good fire requires good fuel, plenty of oxygen, and a good draught; to carry on a Society as proposed we have only to find the fuel in the shape of regular attendance. Diversity of opinion and a pull together will furnish the other two and prevent any stoppage for want of steam.

J. LAING.

(Read at Meeting held at the School of Arts, Sydney.  
Sydney, 24th September, 1870.

After the reading of the above paper, a resolution was passed in favour of forming such a Society, and a Committee was appointed to draw up rules, which were afterwards submitted to a subsequent meeting and the Engineering Association formed.

(On the authority of Norman Selfe, Esq., the following named gentlemen were the founders of the Engineer-

ing Association:—Messrs. Henry Broderick, W. D. Cruickshank, George Davidson, J. P. Franki, John Fyfe, Sen., William Halliday, Peter Hunter, John Laing, and Norman Selfe.—Ed.)

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A meeting of the Engineering Association of New South Wales was held at the School of Arts, Pitt-street, on the evening of Wednesday, September 24th, 1870, when Mr. Rose, the Vice-President, delivered the following address:—

It is now my pleasing duty to address to you a few brief remarks on the inauguration of this Association. I had wished this duty had fallen on a President, but as there has been some delay in the election of that officer, I have been requested to give an address this evening. As, no doubt, you are all aware, the primary object for which this Association has been formed is to bring together members of the engineering fraternity, to read papers, and discuss various scientific topics in connection with engineering. Kindred institutions have of late years sprung up in nearly every manufacturing centre of Great Britain; and it is thought that Sydney should no longer be without its own. The necessity has been long felt, and we therefore, to-night, meet to inaugurate under favourable auspices an institution which every member will be anxious to see rival those above referred to. It is generally admitted that there is a great deal of isolated talent in the colony—talent which it will be the province of this Society to foster; and we shall welcome anyone having an idea to communicate, and who wishes to have it thoroughly sifted. There is no excuse now: the only thing to be done is to come and join us. The main object of this Association will be our mutual improvement. Each individual member cannot hope to excel in all branches of engineering; some will take

kindly to one, some to another. Well, by meeting together we shall be able to interchange our ideas, the result being we shall most probably be wiser, and I trust better, men. Some have objected that this Society will not be favourably received by our large firms; but if our meetings be conducted in a proper spirit, I see no cause for alarm on this head. We must strenuously oppose having trade disputes and all business matters introduced into the meetings, our object being rather to create and foster a kindly feeling between employers and employed, to make the employed more intelligent and better workmen, and therefore of more service to those under whom they are engaged; it will then be a matter for congratulation to the owners of our large establishments that such an institution has been formed. To young men commencing an engineering life, this Society offers very great inducements; they will be able to meet with men who have trodden the path before them, have seen and grappled with its difficulties, and who will be ever desirous to give them a helping hand—such timely assistance that may save them from repeating the blunders into which most young men fall. Were this its only object, this institution would not have been formed in vain. Hitherto, little opportunity has been afforded for discussing engineering matters; indeed, no scientific journal exists in which we can communicate our ideas. We boast of our large establishments employing scores of skilled men, and yet there is nothing to draw out the latent talent which it is presumed lies hidden among us. The community at large will be ultimately benefited by the indirect agency of our institution. How much capital has been literally thrown away in this colony on false theories? Some noodle, who would be an engineer, gains the ear of a capitalist, induces him to spend his money on some fallacious principle; failure, of course, is inevitable, disgust is engen-