

## MINUTES OF PROCEEDINGS.

12TH NOVEMBER, 1885.

Walter Shellshear, President, in the chair.

The following candidates were balloted for and duly elected as

### MEMBERS:

THOMAS SCOTT.

E. M. DE BURGH.

MR. WALTER SHELLSHEAR addressed the meeting in the following terms on taking the chair at the first meeting, after his election as President :—

GENTLEMEN,—My first duty in assuming the chair to-night is to thank you for the distinguished honour you have conferred upon me by electing me your President. The office is, indeed, one of some distinction, and one which any gentleman might feel honoured in fulfilling ; and so much do I appreciate the dignity and the responsibilities of the position that I promise that, while I occupy this chair, my best endeavours shall be exerted to disseminate a knowledge of the Society's existence and worth, and to increase its prosperity and usefulness. I feel that it will be a pleasant and easy duty to uphold the position you have placed me in, for I feel assured that your hearty support will always be accorded in promoting the harmony and interest of the meetings. I trust that during my tenure of office there will be no dearth of contributions by the members on subjects of interest connected with our profession, as it is to Associations of the character of our own that the public look for information on all matters connected with the rapid development of engineering science. I propose briefly to consider our position as an Association, and the great future that is before the profession in developing the vast resources of this rich land.

The Association was established in October, 1870, and in 1871 the number of members did not amount to more than sixteen, but it is gratifying to find that even with this small beginning the Association was not without its influence in imparting good to the profession. At that time the rising generation of engineers in Sydney were without any of the advantages which the junior members of the profession now

enjoy by the recent establishment of the Technical College and kindred institutions, and but for the instruction imparted by the pioneers of this Association they were practically without teachers. The energy and devotion with which the promoters worked in imparting useful knowledge, especially to the younger members, is worthy of all praise, and the name of our worthy past-president, Mr. Cruikshank, will long be remembered by the mechanical engineers of Sydney, for his disinterested services in the cause of Australian engineering. In its early days the Association performed much of the work which is now being so well done by the Technical College, that useful institution being brought into existence mainly by the exertions of the members of this Association, and at the present time Sydney is as well provided with the means of imparting technical knowledge as the majority of towns in the older countries of the world of a corresponding size and importance. The instruction given at the engineering classes of the University and Technical College is of a most useful character, and well calculated to lay the foundation of a substantial engineering education.

Within late years the colony has progressed by leaps and bounds, the comparatively insignificant engineering works that were in progress at the time of the foundation of this Association have been succeeded by vast undertakings, and, in proportion to the population, I believe a larger amount of engineering work is going on in this colony than in any other part of the world. These works necessitate the employment of many members of our profession, and it is daily becoming more manifest that the system of centralization which now obtains must give place to local boards of works. The necessity and importance, therefore, of this Association as the representative body of the profession in the colony must daily increase, and it may be well to remind the members that much of the success and harmony that exists among the leading engineers in England is due to the friendly relations established among the members of the profession by the skilful and energetic labours of the leading members of the great Institution of Civil Engineers. Following the example of that great body, it should be the constant endeavour of the members of this Association to establish a like good feeling and friendly co-operation among the members of the profession resident within the colony, and it is to be hoped that the day is not far distant when our ranks shall include all the members of the profession in our colony, and our position be fully recognised by all kindred institutions in the world.

By an Act of Incorporation granted by Parliament last year, this Association moved out of its former position of comparative obscurity to one of recognised publicity, and it is incumbent upon us to show to the public that the Association was worthy of this recognition.

During the past year many useful and interesting papers have been presented to the Association and read before the meetings, copies of which have been circulated among the members, and I am hopeful that by the end of this year we shall find ourselves in a position to be able to publish an annual volume worthy of the Association. I have in connection with this but to express a hope that the members will furnish papers and other useful information to enable our Honorary Secretary to have ample material upon which to show his ability as an editor.

#### THE COMING EXHIBITION.

The next matter which I desire to bring prominently before you is our proposed Exhibition, and this is an adjunct of the Society's business which may do much if properly carried out to give the public a knowledge of its existence and its usefulness. Judging from the experience of the past, our labours, if properly directed, should be crowned with success, and it should be the endeavour of all to make the exhibition a credit to the Association. We shall have an opportunity by this means of showing many of the latest inventions in electricity and science. One great aim of the Association should be to see that the colonial manufacturers are well represented, and I think if this be done we shall be able to show that New South Wales is able to hold her own in the march of engineering science, and in the production of many articles of commerce. The thanks of the Association are specially due to the City Council for their great liberality in placing the Exhibition Building at our disposal for the exhibition, thus showing their sympathy with us and giving a substantial earnest of public support.

In previous years we have had opportunities from time to time of visiting various works in progress, and I consider these outings of great importance in helping the advancement of the Association, as on these occasions members not only have an opportunity of seeing much that is interesting, but they bring them together in friendly and social intercourse which is not at all times possible by a mere attendance at the monthly meetings. They further promote friendly discussions on

matters of congenial interest, and generally result in the acquisition of new found knowledge. There are several works now in progress near the city which it is to be hoped we may have an opportunity of visiting during the year, among which may be mentioned the new dock at Cockatoo Island, the railway workshops, Eveleigh, the Gasworks, the syphon for the main southern sewer under the Cook's River, and other important works.

Of our last year's outings, our visit to the main outlet sewer, Bondi, was perhaps the most interesting from a civil engineer's point of view, and I am sure all the members who visited these important works must have been struck with the high class of material and workmanship used in their construction. Although I have seen many works of the same class in the old country, I must confess I have never seen more substantial and really creditable work. Our mechanical engineers have great cause for congratulation. The ingenuity of the mechanical appliances designed and brought into use by Messrs. Hudson Brothers for the manufacture of wrought iron pipes for the temporary water supply are deserving of special notice, and every member who recently visited the works at Clyde with the Association, must have been greatly impressed with what they saw; the works being not only a credit to the proprietors but a decided step in the progress of colonial enterprise.

#### ENGINEERS UNDER LOCAL GOVERNMENT BOARDS.

Now that the question of Local Self-government is under discussion, a few remarks on the subject as affecting our profession may not be out of place. Perhaps there is no better example of the success with which the system of Local Self-government can be carried out under skilful oversight than is to be seen in the management of the river Clyde in Scotland. The works that have been carried out in improving this river are a master-piece of engineering. Although unlike the rivers of this colony, the Clyde was not obstructed by a shifting bar, yet at the beginning of the present century the river was little better than a ditch, which could be forded with ease at several points, at low tide. By the patient labours of the engineer this state of things has changed, and where this river could be forded only a few years back, there is a sufficient depth of water to float the "Austral." Up to 1883 £9,908,592 had been expended on these improvements, but the revenue had more than kept pace with the improvements. In 1800 the revenue amounted

to the insignificant sum of £3,319 16s. 4d., but in 1883 it was no less than £283,998 8s. 5d., and so well has the financial part of the business been managed under the local self-governing body, the Clyde Trust, that although they have expended the large sum just mentioned, their debt in 1883 was only £4,259,685, or considerably more than half the money that had been spent on improvements has been derived from the revenue resulting from the improved trade brought about by the altered condition of their river and the development of ship building and other manufactories. The Commissioners for the river Tees have been equally successful in the management of their river, and their finances are also in a very sound condition.

It is to be hoped that when the various shires are formed under a Local Government Act, that the shires may be of sufficient extent to enable the boards to pay a competent engineer, and that a similar system of examination as to qualifications of shire engineers may be established to that in vogue in Victoria.

#### IRON v. WOOD FOR BRIDGES.

The present low prices of iron and steel afford a good opportunity of extending their use in the construction of bridges and other permanent works where timber has previously been in use; in places with easy access the difference in prices is insignificant, and in a climate like that of New South Wales the life of an iron structure (where not erected within the influence of the sea) if a reasonable amount of care be taken with it, would be many times greater than that of timber, and whereas the condition of a timber structure is at all times doubtful when decay, or the inroads of white ant has once set in, in the case of an iron structure its condition can be seen by ordinary inspection, as any defects at once become apparent.

#### METALIC PERMANENT WAY.

Steel sleepers are coming largely into use on the Continent and in England, the London and North Western railway has laid down many miles of road with steel sleepers, and are still extending their use. In parts of the colony where timber is scarce or unprocurable, except from long distances, steel sleepers could probably be supplied at the same price, if not somewhat cheaper than timber, and would be more durable.

## WATER CONSERVATION.

Much has been written and said on the subject of the conservation of water, and this opens up a most extensive field for the operations of the engineer. In time to come Australia will require very extensive irrigation works for its development. At present much could be done to alleviate the effect of droughts by the construction of tanks, and improving the arrangements for watering stock at existing creeks and water holes. During a recent visit to the Richmond River district I came across large numbers of cattle dead and dying at the various water holes; the water being low in the holes, the cattle became bogged in attempting to reach it. This evil might have been avoided if suitable approaches to the water had been made, which could have been done by the expenditure of a small amount of labour in drawing branches of trees and scrub to the holes. Those who take a special interest in this subject should read Mr. W. E. Abbott's paper on "Water Supply in the Interior of New South Wales," read before the Royal Society; this paper is of great value, as it deals with the subject in a really practical way.

## MINING.

The sudden development of silver mining in the colony marks an era in its history, and goes to show how limited our knowledge of the mineral resources of the colony is at present. I hope that the Association may be favoured with some valuable papers on the subject of silver mining and the treatment of its ores, at an early date, as, no doubt, some of our members are largely interested in this new development of the colony's wealth. The depreciation in the value of copper is a very serious blow to the producers of that metal in the colony, and I am glad to be able to inform the members that a paper has been promised for the next meeting describing a new method of treating copper ore, and one that bids fair to revolutionize the whole process of manufacture, and which I hope may be a great help to the copper industry of the colony, as by this process the cost of treatment promises to be but a fraction of the present cost of production, and may possibly, if introduced, make all the difference between a paying concern and a losing one for those interested in the industry. Although the present low price of copper is a misfortune to the copper industry of the colony, it should have the effect of extending the use of the alloys of copper, especially manganese and phosphorus bronzes, these materials offering a practical solution of

the question of preventing the rapid corrosion which takes place in torpedo boats and light steam launches when made of steel, whereas if made of the above alloys the rapid deterioration would be avoided.

With the exception of the single blast furnace at Eskbank, the manufacture of iron in the colony is so far undeveloped, and through the want of skill in dealing with our iron ores at Mittagong, the erroneous impression has gone forth that there is something peculiar about the iron deposits of the colony. The ores of iron found in the colony are mostly brown hæmatite, a somewhat refractory ore, but one that has been largely used in other parts of the world, and with suitable furnaces there is no reason why first-class iron and steel could not be made in the colony. The question of making it at a profit with the present low prices is doubtful, but local ironworks would be of inestimable value in the event of an extensive naval war, when the free passage of ships would be obstructed. It is to be hoped that when another attempt is made to develop this industry it will be done on a scale of more magnitude than has hitherto been the case, and that plant suitable for hæmatite smelting will be used instead of the smaller type of furnaces generally used for less refractory ores.

#### OUR RAILWAYS.

The colony may be justly proud of the rapid development of its railway system, and a few facts relating to the advance of this public work since the foundation of the Association may not be out of place. At the close of 1870 there were only 339 miles of line open for traffic ; the number of passengers carried for the year was 776,707, and 117,854 tons of goods were carried, with the unsatisfactory result that the lines only paid 1.817 per cent. on the capital invested. At the end of 1884, 1,618 miles of line were opened for traffic ; the number of passengers carried was no less than 11,253,109, and 3,124,425 tons of goods were carried, and the lines paid 4.201 per cent. on the capital invested. Thus in the short space of 14 years the passenger traffic has increased something over twelvefold, and the goods traffic nearly thirtyfold, and this great advance has been secured at such a reasonable figure that the lines now pay a fair dividend on the capital invested, to say nothing of the enormous gain of wealth that the railways have brought about in the development of our otherwise practically inaccessible back country.

The progressive development of the country must mainly depend on the extension of the railway system, and if part of the increased value of the land resulting from the construction of the railways was set off against the capital account, the burden of interest would be so far reduced that lines could be worked in many localities where, according to the present system of keeping the land accounts separate from the railway, or, what is worse still, letting the land near the lines be taken up at a nominal price immediately before the lines are constructed, the profits resulting from the improved communication go into private pockets instead of that of the State, and the lines can then only be worked at a loss. The land grant system of constructing railways has been largely in vogue in America, and has been proposed in some of the colonies. Although this system has its drawbacks, there are many points about it that could be adopted with advantage in the development of State railways. By resuming a certain proportion of the land along the proposed lines of railway, and disposing of it as a set off against the capital cost of the line after the railway has been open for traffic, not only would the country be opened up, but the indebtedness of the community would be kept down, and the evil day of taxation avoided.

#### THE CITY RAILWAY.

The question of extending the railway into the city is becoming more urgent, the capacity of the trams being so far taxed that every day the necessity of this important work becomes more apparent. In looking round at what has been done by our neighbours in the way of developing suburban railways, we have an example that is worthy of imitation, for with the Melbourne system of suburban lines the population is able to spread over a large area, and instead of the unsatisfactory and unhealthy terrace houses so largely in vogue in the suburbs of Sydney our neighbours have allotted a respectable block of land to most of their houses, and every man if he likes can live under his own vine and fig tree. Not only are suburban lines a great boon to the public, but as the suburbs develop they afford most remunerative traffic for the railway proprietors.

#### STREET PAVING.

Having thus briefly referred to the proposed extension of the railway into the city, there is a matter in connection with recent city improvements that deserves notice. I refer to the great improvements

that have been made in the principal streets within the last few years. I consider the wood paving a great credit to the city, and their general appearance and the excellent way they have been laid will compare most favourably with any other street paving I have seen in the old country. It would be difficult to find a better paving material than the hardwoods of the colony.

#### THE TRANSIT AND PRESERVATION OF MEAT.

The supply of the city with good meat is a matter that, in my opinion, has not received the attention it deserves, and I think that a very wide field is open for the inventive genius of our members in connection with the perfecting of refrigerating plant for the carriage of dead meat over long railway journeys, and in this matter the best road to success can only be by the co-operation of the various parties interested in the trade, both in town and in the country. I feel sure that with proper arrangements, the whole of our meat supply could be procured from the country ready butchered, in a much better condition than at present, even in the hottest weather, and not only would the cattle and sheep be spared the painful journey, but the trade could be conducted with greater profit to all parties concerned, as with proper chill rooms, the large amount of waste in the hot weather could be greatly reduced, and the meat being in a better condition would command a higher price, and consequently a better profit to those engaged in the trade. In England and America great attention is now being paid to the storage and transit of frozen meat, and with the improved facilities the supply can be regulated to suit the demand. The meat trade should also be a great source of wealth to the coast districts, if the coasting steamers were fitted with freezing chambers, and proper frozen meat stores were erected in Sydney.

#### RIVER IMPROVEMENTS.

I am afraid I have nearly exhausted your patience, but before concluding, I desire to say a few words regarding our eastern rivers. With our dry and uncertain climate, the extent of country available for agriculture is limited. With the exception of the coast district, the rainfall is so small and irregular that agriculture must of necessity be very precarious until some system of irrigation is developed. The fertile areas of the coast districts may therefore be considered the garden of the colony, and the development of these deserves more attention than they have as yet received. I recently visited the Richmond River

district, and was more than surprised at the vast extent of splendid country in crossing what is called the big scrub, which extends from the Richmond River to the Queensland border. There is an almost uninterrupted stretch of country, the soil of which is of the richest possible description. The natural vegetation is so luxurious and beautiful that a student of botany could almost imagine himself in an ideal paradise. The soil is a black volcanic earth derived from the decomposition of the basalt, and in most parts is of great depth. The agriculture of the district is mostly confined to sugar-cane and maize, which grows most luxuriously both in the volcanic soil and also on the alluvial flats of the river. But there can be little doubt that the country is suitable for the growth of many other products which in time to come will be one of the greatest sources of wealth to the colony. The alluvial flats of the Clarence are equally fertile, and I believe that the other eastern rivers have also large extents of equally valuable land, but as you all know the entrances of these rivers are all more or less obstructed with dangerous sand bars which are a constant source of vexatious delays and dangerous to those who trade with these otherwise splendid districts. Almost from the time I landed in the colony I have taken a deep interest in the problem of how this difficulty could be overcome, and in the study of the question I have collected information as to what has been done in all parts of the world. The result of these inquiries has been embodied in two papers, one of which I recently forwarded to the Institution of Civil Engineers. If it were not for the fact that the Government had been fortunate enough to secure the services of Sir John Coode to report on the subject I should probably have devoted much of this address to the consideration of the question, as I consider it one of the greatest importance to a large section of the public, but I will merely say that I am convinced that safe entrances can be secured to all the principal rivers at a moderate cost, by the execution of judiciously planned works, and I think the colony has great reasons for congratulation that Sir John Coode has had an opportunity of reporting on the subject, for, judging from his various published reports and speeches, there can be no doubt that by the same consistent application of sound principles that has brought this great engineer into his present high position, these barriers, which many sages have said could not be removed, will ere long be a thing of the past, and we may look forward with confidence to the speedy removal of the great obstacle in the way of the advancement of the rich coast-district.

In conclusion, it is to be regretted that the importance of the work of the engineer is not better appreciated, and also that the vastness of the field of knowledge which embraces the science of engineering is not better understood. We find members of the medical profession doing well, the legal profession on all sides making a fat living, and yet the services of the engineer are so highly valued that a year or two back, when discussing the estimates in Parliament, no less than three hours were employed on the question of an increase of £50, which was placed on the estimates for an engineer having an important and responsible position in one of the departments, and whose salary, I believe, was the munificent sum of £350 per annum, and yet the same night a vote of £1,500,000 was passed in a few minutes, only one member thinking it worth his while to speak on the subject. It is to be hoped that under a good Local Government Bill the profession may be better appreciated.

There are two passages from recent speeches that I think worth quoting for the information of those who consider it possible for one man to know everything in connection with the science of engineering, from turning a  $\frac{5}{8}$  bolt to building a harbour; and to show how small their comprehension of the vastness of the subject is, I refer to this passage from the President's address recently delivered before the Institution of Mechanical Engineers. Mr. Head says:—"In the earlier days of engineering it was possible every few years to give with some approach to completeness, and within the limits of an address, a more or less complete *résumé* of the past, a description of the present, and an indication of the future. The immense developments, however, of the applied science in recent years has made this increasingly difficult. No one can now do more than aim at 'knowing something of everything, and everything of something.' I say 'aim at' because attainment of perfection in the narrower sphere, and of universality in the wider, is equally impossible. The great mass of technical literature published nowadays, which inevitably and punctually arrives to flood the office of every known engineer, is almost bewildering. The supply of information and facilities for circulating it seem to be fast getting out of proportion to the time, the brain power, and the eyesight of the most energetic readers. The book-shelf, and even the waste paper basket, are, I fear, too often or too immediately, the sources of relief. Many a paper, article, and book has to be put aside with a sigh till a more convenient season, which perhaps never arrives; and so it comes that every engineer must feel more and more as he grows older that he knows but very little even of his own profession."

The second passage is Sir John Coode's reply when asked to report on the water schemes by the Government regarding the Prospect and Kenny Hill scheme. Sir John said :—" That with regard to this particular water scheme, he thought it was a question upon which great divergence of opinion existed, and one which—with even more time at his disposal than he had—would require closer attention than he was prepared to give to it. There was a still stronger reason which prevented him from taking up such an inquiry. He was, like most other men of his profession, a specialist, and during the past forty years and more his attention had been almost entirely devoted to harbours and rivers. Therefore, he would hardly feel disposed, in any circumstances, to undertake such an inquiry."

The question that naturally arises from the above expressions of two of the greatest engineers of the day is :—Can the public of New South Wales reasonably expect that with the present system of centralization it is possible for two or three engineers, however experienced, competent, and well-informed they may be, to grasp and enter into even the general scope of the vast undertakings that are necessary for the development of this noble colony ? or would it not be more in accord with common sense, economy, and advancement, to institute a good comprehensive system of Local Self Government under the management of those who profit by or lose by the judicious or injudicious expenditure of public money in their district ?

Finally, before resuming my seat, I cannot refrain from impressing upon members the great benefits that accrue from an Association such as ours, where many minds are concentrated on any one given subject, and where they have the opportunity of giving expression to their opinions on any matter affecting the engineering world. We should always remember that :—

“ It is by mutual intercourse and mutual aid  
Great deeds are done and great discoveries made.”

---