PART II.

PAPERS.

8TH MARCH, 1906.

ADDRESS BY THE PRESIDENT.

MR. W. H. GERMAN.

My first duty is to thank you for the high honour conferred upon me by my election at your last general meeting as your President for the ensuing year; the position is one that I admit having been ambitious enough to aspire to, and yet one that I felt much hesitancy in accepting, for I recognise the responsibilities and duties that devolve upon the occupant of this post almost as keenly as I appreciate the compliment that has been paid to me

In presiding to-night at the opening meeting of the thirty-sixth Session of the Association, I feel that I should congratulate members upon having secured such suitable accommodation in this House—the Home of the Royal Society of New South Wales—though I should say in justice to our late landlords—the Proprietors of the Royal Exchange Buildings—that during our five years tenure there we have received the most considerate treatment, and that the principal and almost sole reason for our making a change was that the accommodation there was insufficient to meet our library and other growing requirements.

Apart from the advantages of increased space and facilities here obtained, your Council is fully cognizant of the benefits that should naturally accrue to our Association through thus being brought into closer touch with members of the Royal Society, and of other kindred societies who hold their meetings in this house; it is undoubtedly appropriate, and should be to the mutual advantage of the Scientific bodies referred to, that, without absolute union, such ready means of inter-communication should thus be established, and I am pleased to say that we have already most ample testimony of a generous welcome.

I will now draw your attention to matters connected with the affairs of the Association during the past year, and, where it may be desirable for purposes of comparison, to those of the past few years.

At the end of last year the membership of the Association numbered 123, as compared with 128 when it began.

During the year, four new members were elected; one member was lost by death, two resigned, and six were struck off the roll. The member lost by death was Mr. J. Barnet—late Colonial Architect.

During our summer recess, the death of Mr. H. J. Diamond further reduced our membership to 122.

By the decease of these gentlemen, the Association has lost two of its most respected members. Fitting reference was made at our meetings at the time to the loss of the late Mr. Barnet, who was one of our oldest members; whilst of the late Mr. Diamond—who was a member of the Council of the Association at the time of his death—it should be recorded that he rendered valuable service in its deliberations during the time he was in office.

The vacancy in the Council caused by the death of the late Mr. Diamond has been filled by the election of Mr. Marr.

The Annual Report of your Council, which has been placed in your hands, shows that, during last session, seven meetings were held, at which there was an average attendance of forty members.

Reference is also made in that report to the valuable and interesting papers read before you at the meetings, to an excursion made, and to the exchange of "Proceedings" with kindred Societies.

So far as these matters are concerned, the work of the past Session requires no further comment.

During the summer recess, through the courtesy of Edward W. Knox Esq. of the Colonial Sugar Refining Company, Ltd., members were afforded an opportunity of inspecting the engineering features of the Company's new building in O'Connell-street, but particularly the drawing office arrangement and equipment, an interesting and instructive evening being thus spent by members.

The Annual Dinner was held on the 2nd November, at which we were pleased to see representatives of our principal kindred societies. The function proved a most pleasant and successful one, and as the attendance was excellent, it fully justified the policy your Council initiated some years ago (and which has since been continued) of arranging these social gatherings, which more readily promote feelings of friendship amongst members than results from the ordinary attendance at general meetings, when some restraints in this direction are naturally felt.

Referring to the meetings of your Council, and to the deliberations thereat regarding matters of internal economy, the year has been one of steady work, and the financial position of the Association has been placed on a sounder basis by a continuance of the policy of removing from nominal membership those, who, after due and oft repeated notice, failed to fulfil their obligations to us.

The figures showing the fluctuations in numbers of members of the Association, together with the amount of income and expenditure during the past six years, may be of interest, and as the figures under the three headings are such important factors in the welfare and progress of the Association, I have thought it advisable to produce them in diagram form for placing in a prominent position in our Council Room, to act as a constant reminder and incentive to your office-bearers and others.

Further, in regard to our membership, it will be seen from the diagram that, although slight fluctuations have occurred during the last six years, a mean of them produces practically a straight line, viz., neither increase nor decrease; but for the Session now opening I am pleased to be able to record a satisfactory influx of new members. Then your Council, recognising that the future strength of the Association must be recruited from the younger members of the profession, have appointed a Sub-Committee to formulate a scheme offering increased facilities to students contemplating joining us, and additional advantages, not only to secure their constant interest in our proceedings, but to ensure a system for inducing free discussion of instructive subjects.

The Library, which has been thoroughly overhauled, sorted, and re-arranged recently, contained on the 1st March, 1906, over 1,300 bound volumes, while the "Proceedings" of the leading Scientific Societies of Britain, America, and the Continent, are being regularly received, also the leading engineering periodicals.

With a view of rendering the above books more accessible, a new catalogue has been drawn up, and any member wishing to borrow books may do so on seeing the Librarian, who will be in attendance at the Rooms every Tuesday night, between 8 and 9 p.m., and on signing the Association's Receipt Book.

Attention may be drawn here to the large number of Back Volumes, No. 1-12 and 18 of the Proceedings of this Association, which can be purchased by members desirous of completing their collection for the moderate sum of 1/- per volume, upon application to the Secretary.

It seems to me fitting at this point to make allusion to the loss by death in July last of an old and valued friend of our Association, Sir Peter Russell, whose name has long been connected with engineering pursuits in Sydney as one of the founders of the engineering firm of P. N. Russell & Co. While Sir Peter's name has always been prominent as a philanthropist, and as a generous benefactor of Sydney's Charitable Institutions, it stands out preeminently, and will long continue to do so, as New South Wales' best friend in the advancement of the science of engineering, as evidenced by his munificent donation in 1895 of £50,000 to the Sydney University, for the purpose of founding Engineering Scholarships, which donation he afterwards supplemented with a further £50,000.

True to his promise to some of our past Presidents and other friends of our Assocation, Sir Peter Russell has bequeathed in his will: "TO THE ENGINEERING ASSOCIATION OF NEW SOUTH WALES THE SUM OF THREE THOUSAND POUNDS." It is difficult to find words to suitably express, on behalf of our Association, the deep gratitude and the keen appreciation that is felt for this splendid gift, more especially as it is untramelled by restrictions of any kind: Sir Peter, with his invariably liberal spirit, thus paying us the compliment of implicitly entrusting so large a sum to our hands for the advancement of engineering interests, a trust that I feel sure will be faithfully administered.

As with Sir Peter's other last bequests to Sydney Institutions, the amount will not be available during Lady Russell's lifetime, so, while we cannot but hope that many years will pass before our administrative is called upon to exercise the Trust, it is, nevertheless, comforting to know that at some future date the objects of the Association may be so vastly promoted.

In accordance with the custom of past Presidents, in January I addressed a circular letter to members, and therein remarked that the new year seemed to have come in on a wave of prosperity for New South Wales, and that engineering interests should receive a share of the benefits. To justify the former assertion, I will now quote some comparative figures relating to three principal sources of industry, which contribute most largely to the wealth of this State:—

PASTORAL.

	Bales Wool.
1900-01	585,291
1901-02	629,159
1902-03	473,289
1903-04	479,135
1904-05	597,174

As the foregoing figures are for the complete years, a comparison of 1904-05 season's clip can only be made with that of the season just ended by taking corresponding periods, thus:—

From July, 1904, to January, 1905 .. 528,995 Bales.
From July, 1905, to January, 1906 .. 637,718 ,,
Increase .. 106,723 bales.

In addition to the increased number of bales, the increased value has been slightly over £1 per bale as compared with season 1904-05.

PASTORAL.

NEW SOUTH WALES SHEEP RETURNS.

	Sheep.
1900	40,020,506
1901	41,857,099
1902	26,649,424
1903	28,656,501
1904	34,526,894
Estimated 1905	40,000,000
Estimated 1906	45,000,000

AGRICULTURAL.

NEW SOUTH WALES WHEAT YIELD.

	Bushels.
1901	16,173,771
1902	14,808,705
1903	1,585,097
1904	27,334,141
1905	16,464,415
Estimated yield of harvest just ended.	
1906	21,000,000

Which will leave a surplus over and above State requirements of about 9-10 million bushels for export during the current season.

MINING.

From the advance particulars of the mineral production of this State, the value of the mineral output for the year 1905 is £7,017,940. This is an increase of £626,176 on that of the previous year, and is the largest production in the history of the State. The previous best yield was in the year 1900, but the figures for that year have now been exceeded by £551,664.

One cannot peruse these figures without recognising, in some measure, how such a vast addition to the State's annual earnings under the three above headings must give an impetus to the numerous trades upon which those engaged in these enterprises depend, and amongst these trades that of engineering, in some shape or other, stands out prominently; for instance, a heavy wool clip must result in the further operation, and, in some cases, the manufacture of shearing machines, wool presses, plant for wool scouring, and all kinds of appliances for transfer to railways, thence to and from stores for shipment later; though in this connection it is pleasing to note that a larger quantity is now being held for weaving locally into clothes, blankets, and other goods.

Figures are not quoted here indicating the rapid growth of the dairying industry, but it is generally known how marvellously this branch has thrived, and here again the engineer has ample scope to provide and work the many mechanical devices needed before the final product is ready for the local market or stowed in cool chambers for export.

Agricultural pursuits, perhaps, provide even a wider field for the engineer, especially if more intense culture, as advocated by experts, be practised, for, without doubt, their claim in this respect is valid, that deeper ploughing and thorough tillage, besides increasing the product during ordinary seasons from a given area, also conduces to better drought resistance of the soil, effects, however, which cannot be secured without stronger and more perfect implements, a larger proportion of which it is to be hoped will, in future, be manufactured in Australia, not only for preparing the soil, but for the sowing, the harvesting and all subsequent treatment.

As regards mining, the enormous increase in the value of this State's mineral output is particularly encouraging from our point of view, for it would be difficult to name an industry that makes heavier calls upon the skill of the engineer, both as regards the many problems that he is asked to solve in the opening up and the working of a mine, as well as in the supply of plant and machinery of too varied a character for an attempt to be here made to enumerate.

In metals, a satisfactory increase for 1905 as against the previous year is recorded for gold, silver, copper, and tin; while in minerals, although the output of others is worthy of notice, that of coal is the one that more closely appeals to us as Engineers, not so much on account of the numerous mechanical devices that are needed for obtaining it, but principally owing to its subsequent use, as upon an ample supply, at reasonable rates, depend so many of the industries that we look to for employment. It is, therefore, gratifying to learn that, in spite of many difficulties and disputes, the output of coal for 1905 was valued at two millions sterling, the amount being 6,632,000 tons, or an increase as compared with the previous year of 612,000 tons. It is, further, interesting to note that, in the winning of our coal, cutting machines now seem to be fairly established, for there are at present quite a number of different types that are being successfully operated.

In reviewing the engineering trade from a manufacturing point of view, it cannot be said that the present state of affairs in New South Wales is either satisfactory or encouraging, for, although some establishments are fairly busy, one hears constantly from many shops, especially those that deal with general work, that times are bad. Some blame the tariff, others blame the Government for importing its machinery and for other sins, but I hold the opinion that the slackness alluded to is due, in some measure, to the fact that this is an age of specialities, and that the cure is to a great extent in our own hands. A quarter of a century ago, if a man required a boiler, an engine, or a machine, it was customary for plans and patterns, etc., to be made to suit him; now it is the exception, for the engineer of commercial instinct has cut out line after line and made a speciality of it, concentrating his entire energy and thought upon perfecting the design, improving the workmanship, cheapening the production, and advertising its merits, until he practically defies competition under these and other headings, his name and that of the machine becoming linked together, and thus known throughout the world. In this way the man with the general shop has been left to do repair work and to tender at cut rates for odds and ends. This may not be news to any of you, but even as a reminder, should prove useful, for although in this State many small factories are already engaged upon special items, we can barely claim to have commenced specialising. It is frequently said our labour bill is too high, or our market is too limited.

In reply to the former I would say, look at the quantity of machinery our American friends, who pay high wages, sell here, and, do you know how largely specialising reduces cost, for instance, consider the price of machine made watches as against those hand made; while as regards the market, have you ascertained the consumption of the article in question?

I will name one line for instance: Direct acting steam pumps, a simple enough article and for which I venture the assertion that there is an ample market in Australia, one firm alone, the Colonial Sugar Refining Co., having made for their own use during the last five years some £13,000 worth, besides buying many others; so, when we consider the requirements in this line for pastoral and agricultural purposes, for mines, for irrigation, for town supplies, for factory and for domestic uses, surely there is scope in Australia for a "Pump Works." It is not an easy or simple matter, however, to secure success in such a venture, for it calls for capital for special tools, the special laying out of a shop, and much skill in design, to produce at lowest cost the best article adapted in its different sizes to suit various purposes, and constant improvement and cheapening in all the branches of manufacture, to say nothing of the commercial side, in pushing the finished article on the market; nevertheless, I am convinced that a reward awaits in this and other special lines for the man of energy and enterprise.

To counteract too pessimistic an inference being drawn from the above remarks upon "slack times," it seems reasonable to call attention to a brighter side of the picture by mentioning works of some magnitude that have either been recently completed, or are now being proceeded with, and with regard to the former, the following description of steamers engined (one of them built entirely) by Mort's Dock and Engineering Co., Ltd., will doubtless interest you:—

ENGINES.								BOILERS.			
Steamer.	Trial Trip.	Speed in Knots.	I.H.P.	Cylinders. High.	Cylinders. Int.	Cylinders. Low.	Cylinders. Stroke.	No	Dia.	Length.	Working Pressure.
				in.	in.	in.	in.		ft. in.	ft. in.	
S.S. "Kulgoa"	9/1/05	11¼	500	13	21	34	21	2	7 2	18 0	170 lbs.
S.S. "Cooloon"	11/1/05	10½	380	15	...	30	21	1	11 3	10 0	120 lbs.
S.S. "Wauchope" ...	21/9/05	10¾	490	16	...	33	21	1	12 0	10 6	130 lbs.
S.S. "Bingarra"* ...	26/10/05	14¼	1245	17½	27½	45	27	2	10 8	18 6	160 lbs.
S.S. "Lady Northcote"	20/12/05	12	...	13	...	...	27	1	8 0	18 0	125 lbs.

*190ft. x 31ft. 6in. x 14ft. 3in. Built at Woolwich. Launched, 18/7/05.

A pleasing feature in connection with the "Bingarra" is the fact that the design for the hull, the engines and all accessories, was worked out in the drawing office of Mort's Dock, and the result, both as regards the general arrangement, the speed, the symmetry of the vessel's lines and the workmanship throughout, reflects the highest credit upon the skill of the builders.

Now, concerning the Iron Industry, the outlook for which is promising owing to a Government Contract having been entered into by Wm. Sandford, Ltd., of Lithgow, some particulars thereof may be mentioned here:—

The area set apart for the new works comprises some 95 acres, on which a modern Blast Furnace is to be erected, also coke ovens, Convertors and Rolling Mills, though at first only the Blast Furnace will be installed. This will have a capacity of 500 tons of pig iron per week when worked with one blowing engine, but the output can be increased latter on to 1,200 tons per week when a second engine is provided.

The blowing engine to be at first laid down has been built by Messrs. Davey Bros., of Sheffield. It is of the vertical type, having a steam cylinder of 45 in. diameter 60 in. stroke, and an air cylinder of 96 in. diameter.

Lithgow has unusual facilities for the production of pig iron, for the whole of the ore required can be obtained within a radius of 100 miles and the lime stone within 20 miles, while the requisite coal is mined on the site itself.

The contract with the Government is for a period of seven years, and includes the supplies of pig iron required by the Government, and other sorts and sizes in both iron and steel, for the preparation of which machinery is now on the ground.

The contract time for the commencement of the new furnace is March, 1907, but it is hoped that everything will be in working order by January next.

That Mr. Sandford's enterprise will carry the wishes of this Association for a successful and profitable issue is beyond question, for the advantage to this State that the establishment of such a basic industry will ensure, can scarcely be overestimated, and as Australia generally should also largely benefit, it is to be hoped that the Federal Government will see its way to foster the fuller development of this concern.

The dimensions and capacity of the existing works are very considerable, and as they are not known to all of you, I would mention that they include two Siemens New Form Open Hearth Furnaces (the only ones in Australia, I understand) producing steel castings up to 4 tons in weight, or ignots for blooms, slabs and billets for subsequent rolling into rails, angles, bars, tees, channels, etc., etc. Then there is an 18 in. Bar Mill, a Forge Rolling Mill, an 8 in. Guide Mill, Sheet Mills, a Foundry, Fitting Shops, appliances for Corrugating, pickling and galvanizing sheets, and a complete plant for producing bolts and nuts, spikes and pins of every description.

A recent visit to these works proved most interesting to me, and as Mr. Sandford will doubtless extend an invitation to Members of the Association to visit Lithgow Ironworks when the new furnace is in operation, we may look forward with pleasure to a most interesting and instructive outing.

The much debated question of the supply of Locomotives for our State Railways having resulted in the Clyde Works securing a large contract, should be most gratifying to us as engineers, so it will not be out of place to repeat some of the particulars already published and to give some further information.

According to the contract, 60 engines are to be delivered within six years, and the first six are to be completed early in 1907; the total contract price is £322,000.

The engines will be built to the design of Mr. Thow, the Chief Mechanical Engineer for N.S.W. Government Railways; they are of the heaviest type used on our lines, the respective weights of the two classes—Passenger and Goods—being given below:—

30 PASSENGER ENGINES, CLASS "P."

Total weight without coal or water, 70½ tons

Boilers:—Belpaire type. Copper fire box and tubes. Heating surface, 1840 sq. ft. Fire grate surface, 27 sq ft.

Engines:—Outside cylinders 20 in. diameter, by 26 in. stroke. Balanced Slide Valves. Allan straight link motion. 6 coupled wheels 4ft. 6in. diameter. A 4 (four) wheeled bogie, wheels, 2ft. 9in. diameter.

Tender:—Mounted on two 4 wheeled bogies. Wheels, 3ft. 1in. diameter. Water capacity, 3,650 gallons.

30 GOODS ENGINES, CLASS "T."

Total weight without coal or water, 79½ tons.

Boilers:—Belpaire type as mentioned above. Heating surface, 2174 sq. ft. Fire grate surface, 29.75 sq. ft.

Engines:—Outside cylinders 21in. diameter x 26in. stroke. Balanced Slide Valves. Allan straight link motion. 8-Coupled Wheels 3ft. 9in. diameter. A 2-Wheeled Bogie, wheels 2ft. 9in. diameter.

Tender:—Same as for passenger engines.

Locomotive construction during the past 30 years has had spasmodic trials in this State, though, previously, considerable portions of unfinished work have been imported for them; this time, however, such parts can only be introduced in the rough or unfinished condition, while, in other respects, as the material is to be dealt with in the raw state, it would seem that a truer effort is being made to manufacture our engines on similar lines to those adopted in British shops.

From a recent inspection of the Clyde Works, it is evident that the management have laid out their plans with much care and forethought, as is apparent from the manner in which they have extended their buildings, increased their facilities in the shape of cranes and other means of transporting the heavy parts, and in the purchase of additional tools, many of which are already in place and the reception of others arranged for. It is obviously their intention not only to turn out the engines upon which they are now engaged, upon systematic lines, but to leave themselves with such an organization for locomotive construction that they will be able, with still better advantage, to cope with future orders, which this Association must naturally prefer to see placed locally than elsewhere.

In the matter of "Power Generation," the struggle in many countries for supremacy still continues between "steam," "oil" and "gas" engines, the latter including those used in conjunction with producers, but in N.S.W. the first mentioned has the great advantage of cheap and suitable coal, whereas the lack of a natural supply of oil and of anthracite coal would seem to militate respectively against the chances of the two latter gaining the ascendency, though it may yet be demonstrated that our bituminous coal is a suitable fuel for gas producers.

Modern steam engine practice is too deep a subject to here admit of more than casual reference, so I shall content myself by simply remarking upon the growing tendency, both "ashore and afloat," towards the speedier revolving engines in preference to those having reciprocating parts; perhaps the most recent and notable instance being the Parson's Turbine Engines of 21,000 h. p. applied in such a masterly manner by Messrs. John Brown & Co., of Clyde Bank, to the S.S. "Carmania," the latest addition to the fleet of that enterprising firm—The Cunard Shipping Co. A perusal of the excellent description and and illustrations of these engines, as published by the English Technical Journals, is full of the most engaging interests, and commands from engineers the highest admiration for the skill of the builders and the pluck of the owners.

Then again it is worthy of notice how this tendency towards revolving mechanism has taken practical shape in "multi-stage" turbine pumps. A few years ago centrifugal pumps were only regarded as efficient raisers of water for comparatively low lifts, but now, largely owing to scientific design, there are records of four chambered centrifugal pumps forcing water to a height of over 300 feet, and yet with a pump efficiency of 75 per cent. The Colonial Sugar Refining Co. have some of these pumps delivering against a head of 345 feet. In connection with this class of pump, I cannot resist alluding to an article in the "Practical Engineer," 29/9/05, by Professor A. Inokuty, Professor of Mechanical Engineering at the Tokio University, which describes some tests of a 7 in. Forced Vortex Centrifugal Pump made at Shibaura Engineering Works, Tokio. From the account it appears that this pump (a single chambered one) delivered water against a head of 127 feet with a pump efficiency of 75 per cent.—although I believe this result has been more than equalled.

Reflection upon such instances as these is sadly remindful of the distance to be covered by Australian Manufacturing Engineers before we are abreast of the times, and of the need of activity to prevent further lagging behind.

In lightly touching upon boiler practice from the construction point of view, I may, without trespassing upon debatable ground, comment upon the gradual but steady introduction of the several types of water tube boilers. Allusion to the subject seems not only permissible, but desirable for the purpose of drawing attention to the obvious result upon the boiler shops of our State, and here again one sees the effect of the specialization, for the most ardent advocate of the fire tube or tank boiler cannot but admire the workmanship that has been the outcome of years of concentrated thought and energy expended upon some of the water tube types—regarding the construction of which it would seem that Australian engineers must be content to look on, until the makers in other countries either start works here or grant licenses for the manufacture in these States.

Concerning the generation of steam, it is interesting to note the excellent practice that is gradually being adopted by owners of large boiler installations of employing trained chemists to analyse fuels and waste gases, in order that the former may be burned to the best advantage and the most effective combustion be secured by the proper regulation of air supply and control of dampers--many cases of considerable savings made in this manner are now upon record. The advantages of mechanical draft also seem to be more fully recognised than heretofore. In special cases where flexibility in the steam supply is important, and facility of control essential, mechanical draft, either on the forced or the induced system, may prove of the greatest benefit, quite apart from its being independent of climatic conditions, or that by its use an extended application of retarders and economisers with accompanying minimum of temperature of waste gases becomes practicable where, with a chimney only, great height and high temperature of gases would be imperative. In this connection I quote below some instances that have come under my notice of fans installed in consequence of poor results from chimneys, the effects being satisfactory in each case, except the last two, which are not yet in operation, though a pleasing feature, of which mention may be made is, that both the fans and engines are being constructed in Sydney. (For particulars see opposite page.)

Of all subjects that call for the attention of the Australian engineer, there are few—if any—for which such urgent demand exists as that of WATER CONSERVATION AND IRRIGATION, which to a large extent affects our most crying need "Increase of Population," yet in this respect how slowly do we advance. Take the last six years for instance:—

1900	1,364,590
1901	1,379,531
1902	1,407,621
1903	1,431,629
1904	1,461,533
1905	1,496,050

Considering our unreliable rainfall, it seems almost hopeless—except in the Eastern Division—to look for a satisfactory increase of population, unless we adopt the means successfully established in other arid countries for rendering closer settlement practicable; and yet year after year we have irrigation talked of, both inside and outside of Parliament House, but with how little results.

The proposed Northern Murrumbidgee Irrigation Scheme and Barren Jack Storage Reservoir now under consideration, contemplate works of great magnitude, as admirably described in a report by Mr. L. A. B. Wade, Principal Engineer for Rivers, Water Supply and Drainage. As indicative of the dimensions of the proposed undertakings, I may mention the following figures:—

PARTICULARS OF MECHANICAL DRAFT INSTALLATION.

Factory	Owners	Total H S. of Boilers.	Fuel Burnt.	FANS. Sys.	FANS. Dia.	FANS. Wid.	FANS. Revs.	FANS. Cub. ft. p. min.	ENGINES. Type.	ENGINES. Makers.	ENGINES. Cyl. Dia.	ENGINES. Cyl. Str.	ENGINES. Est. I.H.P.	ACCESSORIES.
					ft in.	ft. in.					in.	in.		
Macknade	C S.R.	12,533 B 2,300 E	Megass and Wood.	Ind.	11 6	3 0	150	45,000	Hor.	Tangye	10	12	32	Economisers and Retarders.
New Farm	C S.R.	4,200	Coal.	Forc'd	3 0	...	700	16,800	Hor.	C.S.R.	8	12	27	Underfeed stokers, Economisers.
Labasa	C.S.R.	12,880	Megass and Coal.	Ind.	11 0	3 6	180	70,000	Ver.	Robey	$16\frac{1}{2}$	11	95	Economiser contemplated, Retarders.
Fairymead	Young Bros	... ...	Ditto	Ind.	11 0	3 6	18[illegible]	70,000	Ver.	Robey	$16\frac{1}{2}$	11	95	Economiser
Childers	C.S R.	19,050	Ditto	Ind.	10 0	4 3	175	75,000	Hor.	C.S.R.	12	12	46	Economiser contemplated, Retarders.
Goondi	C.S R.	15,850	Megass and Wood.	Ind.	10 0	4 3	150	60,000	Hor.	C.S.R.	10	12	32	Economiser contemplated, Retarders.

Engines for LABASA and FAIRYMEAD provide for extensive additions to boiler plant.

The reservoir when completed, will have a capacity of 33,380,000,000 cubic feet of water, covering an area of 12,740 acres, or 19.91 square miles, and having a depth of 200 feet. The catchment area is about 5,000 square miles. It will back up the Murrumbidgee River for 40 miles, and two other rivers for 24 and 15 miles respectively. The irrigable area commanded comprises 196,000 acres of first class land, and 162,000 acres of second class land, or a total of 358,000 acres.

I would commend a perusal of Mr. Wade's report as being most interesting to anyone at all interested in irrigation matters, for, apart from describing the proposal, it is full of most instructive data.

It is to be earnestly hoped that the Government will lose no time in completing the exhaustive enquiry into questions of policy, cost and probable returns, that such a scheme demands in the interests of the taxpayer before the country is committed to it, and that, if the verdict be favourable, operations will be commenced at an early date.

As regards the collection of information on this subject, it is assuring to know that Mr. J. Davis, Under-Secretary and Consulting Engineer, Public Works Department, is now on a tour through the Districts of Egypt, India, and U.S. of America, where water conservation and irrigation is so extensively practised, for, without doubt, the more data that can be gathered of what others have done and are now doing, the better prepared our engineers will be for dealing, not only with the main items of a large scheme, but particularly in successfully coping with the details thereof, which, in this, as in most other extensive works, so largely affects the balance between success and failure, and particulars thus gained should enable us to profit by other people's experience and mistakes.

Now, coming down to irrigation works of smaller dimensions and especially to those involving pumping schemes, which thus come more properly within the functions of the mechanical engineer, I consider it desirable to again allude to a paper by Mr. J. M. McGechan, read during Session 1904, entitled "A description of Irrigation Plant in operation on a Bundaberg Sugar Plantation." One reason for referring to it is to express regret that such valuable information as it contains should be practically confined to our members and others who happen to have access to our bound volumes, but a second and stronger reason, is to urge that some means should be secured for publishing this and other similar valuable literature on the subject, so that it may be placed in the hands of the people who want it, viz., the men on the land. When one reflects that this paper explains the system by which a volume of water nearly equal to Sydney's daily supply is in a like period raised from a few feet below the surface (not within sight as is the case of a river or creek) and successfully distributed over the plantation, it requires no high flight of imagination to recognise that such knowledge might be of widespread benefit.

I desire to lay emphasis on this suggestion, being convinced that one of the main factors that operate against the rapid adoption of irrigation by agriculturists is their lack of knowledge of how to do it.

As regards "Electricity," it would seem strange in touching lightly upon engineering topics of general current interest if the subject were entirely omitted—especially when one considers the enormous extent to which this subtle power intrudes itself for consideration when dealing with the every day problems that engineers are called upon to solve. It goes without saying that it has been a most welcome addition to the other forces of nature that man is learning how to harness up for administering to the necessities and comforts of modern life, though much discrimination is needed in many cases regarding the extent to which electricity may be profitably employed. In this connection I am pleased to say we shall shortly have an opportunity of gaining much information, as Mr. E. J. Erskine, the Australian Representative of the English Electrical firm of Messrs. Crompton and Co., is preparing a paper on the electric drive, to be read at our general meeting next month. The paper itself and the discussion to follow should prove of unusual interest, because the many adaptions so necessary for conformity to local conditions will doubtless be fully dealt with. For this reason alone, I have an ample excuse for such brief reference to so important a matter.

There are many questions relating to the engagement and employment of apprentices in our engineering shops that need attention, both in the interests of the lads themselves, of their employers, and the future of the engineering profession. I refer not only to the conditions under which they may be indentured, such as the term of service, the rates of pay, and the course they are to pursue, but particularly to their technical education. It would, however, be inappropriate to here express definite opinions on the subject, though as it is quite within the functions of this Association to consider and discuss the matter, we have a promise from Mr. G. H. Knibbs, Director of Technical Education, to shortly read a paper on the latter phase of the subject.

Re-inforced or Ferro-Concrete is a class of work that has added to the scope of the engineer, as many structures formerly built of timber or brickwork are now composed of this durable material, which thus promises to have a big future, a fact that is evidently appreciated by the Americans, for it is quite remarkable what a number of firms in that country have taken this line up as a speciality, and are erecting buildings, chimneys, bridges, wharves, bins, etc., of the material in question, while in the American press one sees quite a number of special sections of steel advertised for this purpose. The durability of Australian timber is perhaps one reason why this form of construction has not made more rapid progress here. In Fiji, where good building timber is almost unobtainable, Ferro-Concrete has been satisfactorily adopted for a variety of purposes, while in Auckland, N.Z., one wharf at a cost of £56,000, has been nearly completed, and another to cost £89,000 is in progress. It seems to be a matter worthy of closer study than has yet apparently been given to it here.

In selecting the subjects alluded to in the foregoing pages, I have endeavored to treat upon those having some bearing upon the engineering interests of this State, and if they provide food for profitable thought I am amply paid for my task.

In conclusion, I would urge upon members the necessity of promoting the objects of our Association, both as regards the reading of papers and the influencing of eligible persons to join us, in which connection young men are apt to consider the question purely from a business point of view, looking for some immediate tangible return, and overlooking how slow is the progress consequent upon individuals each working in their narrow groove as compared with the rate of advancement due to debate and intercourse with one's fellow craftsmen. Without doubt, we should look to "Union," not only as a factor in our personal welfare, but as a means of improving the status, and advancing the interests of the calling we have adopted.