

## PART II.

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# PAPERS.

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11TH MARCH, 1897.

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## ADDRESS BY THE PRESIDENT.

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I cannot say that I enter upon the duties and responsibilities of office with any degree of anxiety, as this is the sixth occasion that you have done me the honour of electing me President of the Association. The experience of the past has taught me that I will have in the future the same ready assistance which has at all times characterised the Council when I have had the honor of filling the position of President, with that knowledge and experience already gained it is only reasonable on my part to again accept the position with every possible confidence, feeling sure that as in the past, your Association will continue to hold the foremost position of all kindred Associations in the Colony. I need hardly tell you that your Council have to devote a large amount of time to matters which are of interest to the Association, and now that the work of the Exhibition is well in hand it places an additional responsibility on some of the Members of the Council, nevertheless it is gratifying to me to think that whatever duties be attached to the office, they will be carried out to the best interest of the Association. Speaking of myself I know

that I shall not be able to devote as much time to the duties as I have done in the past, yet it is my intention as far as it lies in my power to diligently discharge the duties imposed upon me, and I earnestly solicit your hearty co-operation and support in all matters appertaining to the interest of the Association.

Taking a passing glance at the position of the Association, I would like to say that since your Council presented their 26th Annual Report for the year ending September 1896 I am very pleased to say that we have made good progress; our list of Members is increasing steadily, which is a sure indication of the prosperity of an Association such as this. Your Council has formulated an idea to hold an Exhibition, and they are carrying it into effect, it is to be hoped to a successful issue; so far as we have gone we have not the slightest cause to complain. His Worship the Mayor of Sydney and the Aldermen have granted the Association the use of the Exhibition Building, and a great number of business people have met us in the most friendly spirit, a large area of space has been applied for and all things considered we have nothing to complain of so far as the ultimate success of the Exhibition is concerned; nevertheless, I would ask members to take into consideration that the success depends on the united action of the Members who will I hope work with a will for the good of our Association.

I would like to make a few remarks relative to the Exhibition to the Members who are not taking an active part in connection with it. The Council are making every effort to place before the public an Exhibition worthy of this Association; no stone will be left unturned to obtain the very latest designs of machinery both steam and electrical, and it is the intention of the Council to endeavour to drive each machine by a separate Electric Motor. We have received a large number of applications for space; many of the applicants have expressed their intention of exhibiting models and ap-

pliances which from an engineer's point of view should be of very great importance to the public. Amongst the many exhibits will be an electric fountain of variegated colors in connection with which will be used a 25,000 C.P. Search Light; no doubt this will form a very important and attractive exhibit. We also expect some very high class engines for electric lighting purposes, including steam gas and oil, a large number of dynamos and electric motors; in fact there will be many new and important machines and models that I feel justified in saying that the forthcoming Exhibition will be the most attractive the Association has yet held.

Speaking of the past year, I would like to touch upon a few matters which should interest the Members. We have two responsible Officers who devote a large amount of time to the Work of the Association. Mr. Ahrbecker our Hon. Editor, whose energy and ability is clearly displayed in the volumes issued by him, Mr. Fitzmaurice our Secretary who devotes a large amount of his spare time for our benefit, whose correspondence and books are a credit to himself and the Association. I must say it would be hard indeed to find two more energetic Officers, and I do congratulate the Association on having the services of these gentlemen. I consider that the best thanks of the Members are due to them for the efficient and painstaking manner they have performed the duties appertaining to the two offices. During the year we have had some very interesting papers read before the Association. Messrs. A. H. Howarth read a paper on a proposed Sub-Aquaes Viaduct across Sydney Harbour, Mr. Hector Kidd a description of the Impounding Reservoir Condensing apparatus and Cooling Tower for Water at the Sugar Co.'s Mills, Queensland; Mr. J. B. Henson on Cook's River, its condition and destiny; Mr. A. E. Cutler on "Monier Structure"; Mr. W. B. Dick, The Thistle Milking Machine; Mr. Harry Franks on the Linotype Machine. These papers elicited a healthy discussion, in some instances occupying the whole

evening. Before leaving this subject let me say that I am indeed anxious to impress upon Members the necessity for preparing papers for discussion during the Session if our Association is to progress (and it must) it will only be by the active co-operation of its members making the Meetings intellectual to the Engineering mind.

On an occasion such as this is, it has always been the custom for the President to deliver an Address on a subject connected with Engineering. Members will admit it is more difficult every year to find a subject to deal with unless a subject is taken in connection with a man's every day life, as scope in the Colony is limited so far as extensive Engineering work is concerned. I did intend to deal with the question of Mining and Mining Machinery to-night, but while collecting my notes they began to assume such magnitude that I found it would be impossible to touch anything more than the very fringe of the question during the evening; consequently I abandoned that idea and will content myself by giving you an account of what is being done at the Dapto Smelting Works under the Management of Mr. John Howell, and Mr. Blackmore, who kindly granted me what information I required.

The Smelting Co. of Australia, Limited, whose works I am about to describe is situated at Dapto, and has been designed to smelt for the public, a want long felt. In designing these works special care has been taken by the Management to lay down a plant capable of treating the ores of Broken Hill, which are known as the Zincon Sulphide of Lead, and other refractory ores which abound in many parts of N.S. Wales, the want of knowledge as to how this ore should be treated to get the best results has been the cause of many good Mines being shut down, and hundreds of thousands of pounds squandered for no purpose, but now this difficulty has been overcome and these works are being erected for the purpose of treating any class of ore that may be sent to them.

I trust that it will be the means of opening up mines that have been closed for years, and cause a healthy feeling to exist in the minds of the public, for it will mean that mining can be carried on at a much lower cost owing to the fact that there will be no necessity for the large expenditure of capital on smelting plant, concentrates, etc. I should say that all that would be necessary would be a good winding plant and the appliances to convey the ore to the rail from where it would be delivered right into the Works at Dapto where provision will be made to receive it. On arrival here it will undergo a classification to separate it into oxidised ores and sulphide ores. These two divisions are again divided and kept in separate bins according to the valuable metallic contents of each class. For instance in the oxidised ores those containing respectively copper, Carbonate of lead with Silver or Gold, Quartz ores with Gold and Quartz ores with Silver and Gold separately, so that any particular class of ore may be drawn on when required.

Sulphide ores are divided into three, iron, sulphide or pyrites carrying gold, sulphide of lead (such as concentrates) with gold and silver and zinc sulphides of lead with silver.

The sulphide type of ores require roasting to drive off the Sulphur and reduce everything to an oxide. Of these the zincon ores are the only ores which are treated by any method other than smelting direct.

The zinc in these ores is extracted with Sulphuric Acid and the oxide of zinc precipitated from the sulphate of zinc solution obtained or metallic obtained by the electrolytic process invented by Messrs. Siemens & Halske the well-known Berlin electricians. The residual ore left after extracting the zinc is then smelted. Before smelting all ores are bedded in three large floors capable of each holding 4,000 tons of ore and it is in the making up of these beds that the advantage of the large storage bins before mentioned comes in.

By bedding the ore uniform mixtures of ore are obtained

giving increased smelting capacity, economy in flux and fuel, and increased recovery of the valuable metals contained in the ore to say nothing of the better control the metallurgist has over his men and furnaces. The base bullion made in the lead blast furnaces (of which there are two 125-ton capacity each daily) will be required to effect the separation of the silver and gold from the bullion. The fine silver and fine gold, together with the merchant or soft lead obtainable from this part of the Works is then ready for the market. Two copper blast furnaces each of 60 tons of ore daily capacity are also being erected for the smelting of all copper ores received.

The plant erected and in the course of erection is as follows: One 250 I.H.P. compound condensing Fowler engine, two 26" Krom Rolls, three No. 2 Gates Crushers with all necessary elevators, trommels, storage bins for crushed ores, fitted with automatic feeds to the furnaces, three 35 ft x 6 ft cylindrical revolving furnaces, flue from same 560 feet long delivering into a stack 180 feet high and 9 feet in the clear at the top.

THE SULPHURIC ACID PLANT consists of 30 pyrites burners, acid storage house fitted with lead lined tanks, air compressors, 1 Glover and one Gay Lussac tower 55 feet and 80 feet high respectively, 4 leaden chambers each 130 feet x 20 feet x 19 feet, all properly housed in: these are almost complete. The storage rooms in bins and floors is equal to 23,000 tons of ore.

THE SMELTING PLANT consists of one 250 I.H.P. compound condensing engine, two No. 7½ Baker Blowers, two No. 5½ Baker Blowers; two 125-ton lead blast furnaces; two 60-ton copper furnaces, the furnaces being water jacketed throughout and fitted with all modern improvements as regards separators for slag and matte made in them. When the furnaces are working at normal condition the clean slag is carried off by water, at other times there is a sufficiency of

slag pots for this purpose if required. The blast furnace flue is 960 feet long to base of stack which is square 160 feet high and 8 feet in the clear at top. This stack contains 221,000 Hurstville bricks, the 180 feet stack contains 260,000.

**THE LEAD REFINING PLANT:** The base bullion as it arrives is softened in reverberating furnaces to take out Antimony, arsenic, tin, copper, etc., then run into large steel kettles to hold 20 tons of lead which are heated by coal fires, here metallic zinc is added and well stirred into the hot lead. On cooling (not quite so far that the lead commences to crystalize) the zinc rises to the top and with it the silver which it has combined with. This scum of zinc and silver contains lead and is first liquated, i.e., heated quietly to expel the lead in a reverberating furnace or in another kettle. The dry alloy of zinc and silver is then retorted to drive off the zinc and the silver combined with some lead, and is then refined in an English cupelling furnace. The lead after the zincing has been completed in the 20 ton kettle is then syphoned off into another similar kettle and then blown with dry steam to oxidise the trace of zinc left in. The face of the softened de-silverised lead is then skimmed clean of the layer of zinc and lead oxides and cooled to the correct temperature and then syphoned off into bars, for the market and sold as soft lead.

The rich in silver products from the retorts is melted in the cupelling furnace heated to bright red heat, and a blast of air turned on, which oxidises the lead to litharge, and leaves pure Silver on the cupel. This is either poured into water to granulate and then remelted, if smooth bars of silver are desired, or else poured direct into moulds, and is then ready for sale.

**FUSING FURNACES:** There are three being erected.

**ZINC OXIDE PLANT:** This plant is yet to be erected, and will contain vats for precipitation of zinc oxide and filter presses for separating this from the liquor, a set of quadruple

effect evaporators are to be erected in connection with this plant. The whole of the machinery for this plant is on the Works, and consists of (besides that already mentioned) 2 large tandem compound Johnson air compressors, Wheeler surface condenser and pump, air receiver, 6 mechanical mixers for the precipitating Agent, 6 Montejus for receiving liquor, and 12 large vats, piping, etc.

**ASSAY OFFICE:** This is fitted with everything in the way of furnaces, muffles, sand furnace, chemical apparatus, etc., that will be required.

**SAMPLING HOUSE:** The Sampling house contains 1 twelve H.P. single cylinder engine, 1 Dodge rough crusher, 1 Bridgman's sampler, and 1 Fraser and Chalmers fine grinding machine. These are all driven by the Engine.

**BOILER HOUSE** consists of five 200 I.H.P. Lancashire boilers with Galloway tubes, each fitted with patent safety blow-off low water valves and steam valves, to work at 120 lbs pressure, also duplicate Blake pumps for feed. There are also 5 similar boilers not yet built in, but on the ground.

The whole of the works will be installed with electric light and telephonic communication. For the light a 75 H.P. engine which (is being erected) will drive a 300.16 C.P. high speed dynamo, this is considered to be ample for the requirements of the Works and Offices.

The communication is by rail, the Company having laid down a line to connect direct to the Government line at Dapto, thus preventing any delay arising through removal of ore from one truck to another, every possible care is being exercised so that the work shall be done at the least possible cost.

In concluding, let me say that I trust this Company will meet with the success it deserves, for beyond a doubt a very large amount of money has been spent on the venture and the man or Company who launches out money in Works of this kind deserve the consideration of the Public.