PRESIDENTIAL ADDRESS.

Delivered on Thursday, 15th April, 1909.

By F. Danvers Power.

Before commencing my address this evening, I would like to offer my tribute of congratulations to our distinguished fellow member, Prof. David, on his safe return to Sydney. Those connected with this University have known his worth for many years, both as a teacher and a personal friend, and I am sure no one appreciates his many noble qualities more than his old students, and those who have been brought in contact with him at this University. It was with mingled feelings of pleasure and regret that we learnt he had decided to stay in the antarctic regions for a year. Pleasure that he would have an opportunity of adding more lustre to his name: regret that we would be without his presence and helping hand for so long. Many were the thoughts that followed him to those frozen regions, and they were not always agreeable thoughts; but now he is safely amongst us again, such thoughts are as if they had been a nightmare, and we feel thankful that he has been permitted to return safe and sound, to cast a reflection of the honor his knowledge, pluck and perseverence has won him, on this University, the interests of which we all know he has at heart.

I propose to speak this evening about the Coal Industry of New South Wales. This has already been dealt with from a geological point of view in the very complete monograph on "The Geology of the Hunter River Coal Measures, New South Wales," by Prof. David. I have dealt with it in another place from a technical point of view, but this evening I propose to look at it from an economic standpoint.

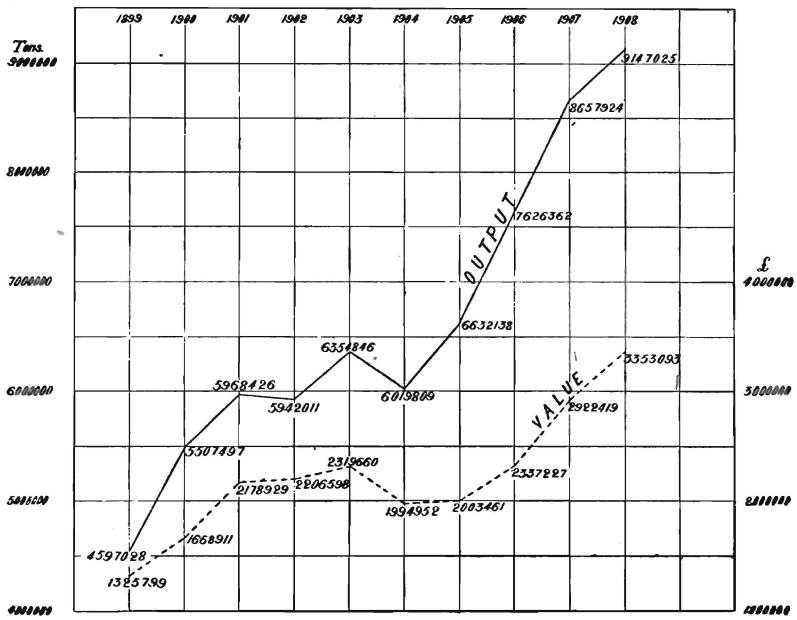
COAL INDUSTRY OF NEW SOUTH WALES.

New South Wales is blessed, so far as is known at present, above all the other Australian States on account of the quantity, quality and position of her principal coal deposits. These three points give her immense industrial advantages over the other States, not only by enabling her to export coal, but by giving her the means of becoming the premier manufacturing State.

Coal was first discovered in Australia at Coal Cliff, on the South Coast of New South Wales, in August, 1797, by shipwrecked sailors of the ship "Sydney Cove," who were making their way to Port Jackson. About a month later, coal was found in the cliffs at Newcastle, on the North Coast, by Lieutenant Shortland, of H.M.S. "Reliance," who was in charge of a party sent to capture some men who had stolen the "Cumberland," the largest and best boat belonging to the Government of that day. The Colonial Government first worked coal in the Newcastle district, where the "dirty seam" was operated, but this was eventually abandoned, and the Australian Agricultural Company commenced work about 1830.

The total quantity of coal won in New South Wales, from the time that coal mining commenced to the end of 1908 is 147,825,174 tons, valued at £56,632,255. Up to 1908, the total value of gold won in New South Wales was greater than that of any other mineral, but in that year the value of coal overtook that of gold, which was valued at £56,319,736. Important as our coal industry is to us, and large as these figures may seem, it is really but a drop in the ocean, being less than one per cent. of the world's output.

Since coal mining commenced in New South Wales, the price has fluctuated, between 16s. 1.51d. per ton in 1853, to 5s.



Output of Coal in N.S.W. for past Decade with Value at the Mines.

4.86d. in 1898. The output of coal has more than doubled during the past ten years. A graph showing the rise and fall of the output and value during this period is given. It will be seen that the output and value do not vary in the same ratio, for the value per ton was not constant. Thus in 1902 there was a drop in the output, nevertheless there was a rise in the value, because the price of coal was higher in 1902 than in 1901. In 1904 there was a drop both in the quantity and value.

The public being accustomed to read in the daily press of colliery disasters that take place in various parts of the world, have an impression that coal mining is a specially dangerous work. The death rate from accidents of persons employed in New South Wales collieries for 1907 was 0.98 per 1,000, or one fatal accident for 621,807 tons of coal raised, which is a great improvement on that of Great Britain, and a smaller death rate than that of some other industries.

In 1908 the total number of persons employed above and below ground in connection with our various collieries was 17,734. The value of coal raised for each person employed in and about the mines was £147 11s. 7d., or for each person employed underground, £173 13s. 9d.; but from this sum not only wages, but depreciation of plant, management, amortization and other expenses have to be deducted before the net profit is found.

Different estimates have been made of our coal reserves, but these reserves must naturally vary, not only with the assumption on which they are based, but with any fresh discovery of seams, and with fresh inventions that enable us to mine coal, we are at present unable to touch or to utilize, such as seams of inferior coal, or thin seams that are now valueless; for we must not conclude that we have reached the limits of human ingenuity.

Coal seams cannot be regenerated in the same way that we can replace forests; when once this valuable substance is mined, there is so much less of it in Nature's storehouse. Unfortunately there is a tremendous waste of coal, not only in the mining, but also in the subsequent use of it. The main object should be, not so much to restrict the mining for coal as to mine it in the most economical manner possible, and with the minimum of waste; also to use it in the most efficient way, for coal is a national asset, and we should see that it is put to the best use. How long our coal supplies will last does not depend solely on the estimated available tonnage and expected increase on present consumption, for new and improved sources of energy may be made available, such as heat from the sun, or wind and wave action which may largely take the place of coal, especially when used in conjunction with electricity. The lack of coal

is already felt in some countries; for instance, France cannot supply all the coal she requires, so has to import about 18,000,000 tons of foreign coal to make up her annual consumption of 54,000,000 tons.

In 1908 President Roosevelt called together a conference of the Governors of the States and Territories of the United States of America, to consider the Conservation of Natural Resources. Our Government might, with advantage, take a leaf out of President Roosevelt's book and form a Royal Commission to consider the better utilisation of our coal supplies. We obtain but a very small percentage of the potential energy that coal is capable of giving. Our methods of consuming coal are even more wasteful than our methods of mining. It has been estimated that in our steam power plants, what with imperfect combustion, natural draught, exhaust steam, radiation, ashes, etc., we lose ninety per cent. of the heat the coal is capable of giving. Gas producers and engines double or treble the power per unit of coal, and moreover can make use of inferior coal.

Good work has recently been done in the testing of New South Wales coal by men at this University. Mr. E. M. Carter having caried out experiments with the coal of the Western and Southern coal fields, while Mr. R. G. Smith is doing the same in respect to our Northern coal fields.

Waste of coal in mining may be classed under the heads of:—

1. The method of mining.
2. Carelessness in mining.
3. Pillars left for support as barriers.
4. Leaving inferior coal behind.
5. Breaking up seams above that being worked.

The character of a seam and the rocks forming the roof and floor, also the depth of cover all influence the method of mining adopted. From an enginering point of view, practically all the coal under a given area can be extracted, but it may not pay to do so. Whether it shall be done is an economic rather than a technical problem; the coal would have to fetch a higher price, and more uses would have to be found for inferior coal.

During the earlier days of coal mining in New South Wales, the pillars of coal left when working by the pillar and bord method were so small that they were not sufficient to support the weight overhead, consequently they became crushed and were not worth winning. Now the pillars are made wider, and increase in width with the depth of cover, the object being to keep the ground open so that the pillars can be extracted in the second working. The first mines were not laid

out so systematically as they are at the present day, with the result that there were many awkward shaped areas of coal left which were not worth extracting.

Doing all the work "in the whole" first, and working "in the broken" last, causes a loss of coal in the pillars which fret at the corners, become weaker and sometimes collapse.

By not working seams liable to spontaneous combustion on the pannel system, a fire may spread and get out of control as at Greta. It is far better to go to the expense of laying out a colliery properly than to risk a much greater expense, if not the total loss of it by neglecting reasonable precautions. An apparent waste may really be the better policy, such as in the case of top coal containing "brasses" liable to spontaneous combustion, which may be too costly to fill out if broken down. By leaving some coal to support it, one may be enabled to extract a certain proportion of the seam that might otherwise be rendered useless.

Advancement in mining methods and appliances have rapidly improved during recent years, as may be seen by comparing those employed at some of the old Newcastle collieries with those at the more modern South Maitland mines. The saving effected by the latter is unquestionable, and yet it would not pay to instal similar plants at collieries which are nearly worked out, for the advantages would not repay the outlay; consequently those collieries, the end of whose life is in sight, have to keep on working at a disadvantage; but even in some of these, cheap money-saving devices might be employed with profit.

The percentage of coal won from a seam may vary from, say, fifty to ninety-five per cent., depending largely on the method employed for extracting it; the longwall system yielding a higher percentage than the ordinary pillar and bord. The nature of the seam will not always permit the longwall system to be adopted; in other cases local prejudice or custom may decide in favour of pillar and bord; or again, if periods of slackness in trade or labour troubles are anticipated, which will necessitate the occasional closing down of the colliery, to use a system such as the longwall, which depends for its success on regular working, and which might otherwise be suitable, would be inadvisable.

By not taking proper precautions when working under bodies of water, a mine may become flooded. Seams are sometimes mined under the ocean, when the law requires that certain precautions shall be taken, such as boring, to ascertain if the required depth of cover exists. Any small cracks that are formed by slight movements will probably be more or less filled up with silt, but if the sea really broke into the underground workings, there is nothing to prevent the rush

of water from drowning out all the workings or mines that may be connected with it to the dip, and causing the total loss of the coal of that seam left in the area affected, if not indeed other workable seams that might exist above or below. On the 18th March, 1886, such an accident did occur at the Ferndale colliery, Newcastle, which ruined that, and the adjacent small collieries.

Fires have been caused underground through carelessness, such as by building furnaces for ventilation purposes right up against the coal instead of leaving an adequate air space around it. Explosions likewise have resulted through neglect of ordinary precautions when fire-damp has been known to exist in the workings.

There is generally a close relationship between economic mining and the economy of natural resources. Waste is often brought about for the want of a little forethought, also by ignorance. Some managers reckon a mine will last their time and leave it in a bad condition for the next man to remedy, as well as he can; forgetting that he is there to work the place in the interests of the shareholders and not for his personal glorification.

Careless mining may result in the making of large quantities of material of no value, or of less value than it would be if in another form. At one time "slack" was looked upon as waste, and left behind in the goaf; but now it is marketable and used for bunkering; or if it cakes, for coking purposes; in other countries it is made into briquettes; slack is, of course, not so valuable as "round coal," so it is still advisable to make as little as possible while mining. Another objection to small coal is that it offers a larger surface for oxidation, and coal begins to oxidize in contact with air at between 120deg. and 155deg. centigrade. The ignition point is higher; in the case of bituminous coal it is about 330deg. centigrade. When spontaneous combustion takes place in a cargo of coal, the origin is generally found to be just under the hatch where the coal has been broken up during loading, and where air can most readily get at it.

The necessity of leaving the surface intact under buildings, railways, water-works, etc., renders pillars or filling imperative. In certain European and Pennsylvanian (U.S.A.) collieries, the space formerly occupied by a coal seam has been filled by flushing; but such a system would not pay at present in Australia, for the filling material would have to be specially mined, and the value of the coal to be replaced would not stand the expense.

There have been several so-called "creeps" at Newcastle of recent years, viz., on the 15th May, 1906, 16th October, 1907, and 17th January, 1908. Strictly speaking, a "creep"