

## CHAPTER XXXI.

DOWLAIS AFTER THE DEATH OF SIR  
JOHN J. GUEST.

WILLIAM MENELAUS.

**T**HERE was a great blank in Dowlais life after the death of Sir John. His individuality was pronounced, and as one of the old school of Paternal Ironmasters, his influence had been felt in all details of working and social life. Thanks, however, to the vigorous administration of Mr. G. T. Clark, who became resident Trustee, and also of his colleague, Lord Aberdare, the works were carried on energetically. Mr. William Menelaus was the chief manager, Mr. E. P. Martin assistant manager, Mr. Clark became the commercial manager, constantly visiting London, where he was regarded by the metal and financial leaders as one far above the run of ironmasters' representatives in general. He wisely allowed the practical direction of the works to remain in the experienced hands of Messrs. Menelaus and E. P. Martin, who soon became absorbed in the problems of steel-making, then coming to the front.

As Mr. E. P. Martin stated in his presidential address at the Iron and Steel Institute in 1897, it was in 1856 that the Dowlais Co. was one of the first to take a licence for working Bessemer steel, and it was at their works that Bessemer steel was first rolled into rails. Mr. Martin gives the analyses as follows:—Carbon, 0.080; silicon, a trace; sulphur, 0.162; phosphorus, 0.428; arsenic, a trace; manganese, a trace; iron, 99.330. "I have it," continues Mr. Martin, "on the authority of Sir Henry Bessemer himself, that the pig iron, from which the ingots were made, was grey Blaenavon, and it was converted into soft iron, or steel, without any addition of spiegel or manganese, the converter being lined with Stourbridge fire bricks. The rails



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were rolled by my late esteemed friend and predecessor in the Chair, Edward Williams, from two ingots 10-inches square, made at the experimental works at Baxter House, London.

"When Menelaus, Williams, and Riley made their successful tests at Dowlais immediately after Bessemer read his paper at Cheltenham, I have reason to believe, as the result of enquiries, that the iron they used was best foundry iron, made from a mixture of Welsh mine, Cumberland and Forest of Dean ore, containing much less phosphorus and sulphur than the usual run of pig iron.

"When Bessemer came to Dowlais to continue the experiment, a convenient refinery happened to exist opposite the furnace, making cinder pig, and the iron from this furnace was by a singular and most unfortunate mischance, employed for Bessemer trials. The results were very disappointing, and it was suggested at the time that such irregularities were inherent in the process. By accident, I, some time ago, came upon one of these Bessemer ingots, which has been kept at Dowlais ever since the first experiments were made by Sir Henry Bessemer. This I have analysed with the following results:—Carbon, 0.06; manganese, nil; silicon, 0.01; sulphur, 0.276; phosphorus, 1.930; arsenic, 0.010; iron by difference, 97.714. This fully explains the cause of the failure of the process on that most important occasion, it not having been ascertained at that time that large quantities of sulphur and phosphorus were detrimental to the manufacture of Bessemer steel. It also explains why, although the Dowlais Iron Co. was one of the first to take up a licence, they did not begin to roll steel rails until 1884.

"Referring to this licence in a letter to the author, accompanied with many interesting details which we are reluctantly obliged to omit, Sir Henry writes:—'My royalty for steel had been fixed at £2 per ton on all ingots up to five tons in weight, and £5 per ton on all ingots exceeding five tons. There was also a drawback of £1 per ton on all finished rails. It was not likely that I could allow the Dowlais proprietors to make 20,000 tons of steel instead of iron at a reduction. I felt, of course, that they had no legal right to do this; but I felt also that they had made a bad speculation some seven years

previously, and admitted a moral claim upon me; hence it was that, while absolutely denying their legal right to make steel under the contract to make malleable iron, I, nevertheless, offered to return the £10,000 received, with 5 per cent. interest for the whole period since it was paid to me, and granting them a new licence to make steel under the same conditions as others were licenced. They tried hard for better terms; and, rather than go to war, I eventually agreed to grant them a licence on my usual terms for steel, and to deduct £20,000 from the first accruing royalties. Under these conditions we worked satisfactorily together until the expiration of my several steel patents.'"

"Iron rails," in the words of Mr. Martin, "died hard, as they were rolled until 1882 in large quantities. The substitution of Bessemer and Siemens' steel for the manufacture of rails, plates, and bars in place of puddled iron has reduced the number of puddling furnaces at Dowlais from 255 to 15."

The date given by Mr. Martin (1882) is a memorable one in Dowlais history, for this was the year that Mr. Menelaus died. What he had accomplished is clearly shown by a narrative given to us by the late Mr. L. Richards, for many years engineer at Dowlais, whose statements, somewhat condensed, are annexed:—

"I entered the Dowlais Iron Works in 1846; and, with the exception of some years served under the Ebbw Vale Company prior to 1856, was in the service of the Dowlais Iron Company from 1846 to the beginning of 1890, at which time I left to take the management of the West Cumberland Iron and Steel Company, in succession to Mr. G. I. Snelus.

#### "WASTE GASES IN IRONMAKING.

"During the years I was at the Ebbw Vale Works, the utilisation of the waste gases from the blast furnaces was introduced for the first time in this country by the late Thomas and James Brown. At first the gases were only partially collected. The first plan was superseded by the cup and cone, now termed 'Hopper and Bell.' I believe Dr. Percy, in his work on 'Iron,' assigns the introduction of the cup and cone, or hopper and

bell, to the late Mr. George Parry, of Ebbw Vale. This is not strictly correct; having assisted in the erection of the first at the Victoria Works of the Ebbw Vale Company. It was constructed from the designs of Mr. Tom Williams, who had been connected with some of the French ironworks previous to his being employed by the Ebbw Vale Company at the time referred to. The cup and cone method Mr. Williams introduced was similar in respect to the one now in use. Mr. Parry took a leading part in the question of the utilisation of the waste gases generally, his chemical knowledge being of great value as regards the methods of introducing and burning the gases under the boilers and in the hot blast stoves. Mr. Parry also introduced an arrangement for opening and closing the cone at the Ebbw Vale furnaces by means of bell cranks, one being close to the top of the furnace, and the other at a considerable distance away, the two being connected by a long rod. It was some years after the blast furnace gases were utilised at the Victoria and Ebbw Vale Works—possibly in 1859—that Mr. Menelaus decided upon utilising the waste gases at the Dowlais Works, and I had the supervision of the erection of the first plant for the purpose. I returned to the Dowlais Works in the early part of 1856, and was appointed assistant-engineer to the late Mr. Samuel Truran, sen., and served in that capacity until the time of his death, when I was made chief engineer of the manufacturing department, and his son, Samuel B. Truran, appointed to a like post at the collieries and ironstone mines. At this time the iron trade generally was in a fairly prosperous condition. There were, as a rule, American rail orders to execute, besides Continental orders. The large Russian order for eighty thousand tons of a heavy flange rail was unfinished in 1859. Railway engineers had at this time begun to think that hardness at the head of the rail was a desirable property, for the specification of this rail required that a certain depth of the head should break crystalline, while the rest was to show a fibrous fracture. The test was also to be carried out with hydraulic pressure, and a special machine was ordered for the purpose. This was the first instance of rail test by hydraulic pressure, and I do not remember any following this particular order; and it is somewhat remarkable that this machine was

altered by the direction of the late Mr. William Menelaus into a lever machine for tensile testing, and did that class of work for many years, until the more elaborate hydraulic testing machine of Mr. Wickstad. Previous to the year 1856, Mr. Menelaus had devised the three high blooming mill, which did excellent work for many years; and later on he adopted the White blooming instead at all the heavy mills, and at the 'Big Mill' at the old works it was made to take the place of the roughing rolls as well.

"Mr. Menelaus was the pioneer of appliances to lighten the labour of the men in the forges and rolling mills. The whole of the operations, from the delivery of the iron into the mill on to the furnaces, rolls, saws, hot and straightening banks, was done by manual labour. The iron was charged into and withdrawn from the heating furnaces by sheer muscular force.

"In 1858 and 1859, Mr. Samuel Truran erected the 'Goat Mill,' which was, undoubtedly, the most powerful mill of that time. In this mill were rolled some fine sections of H, or joist girders, from 18in. deep downwards. The 12in. section was rolled in lengths of 50ft. There was also rolled at this mill an iron flange rail 120ft. long. Sample girders and this rail were sent to the London Exhibition of 1862. These girders were the largest rolled girders in that exhibition. I also assisted in getting up the blowing and other apparatus for the first experiments on the Bessemer process at the Ifor Works, and at the rolling of the ingots sent to the Dowlais Works by Sir Henry Bessemer into rails at the 'Big Mill' Old Works. This was done on a Saturday evening, after the regular work of the mill had been finished. This was in 1857 or 1858.

"In 1873 the Dowlais Company, in connection with the Consett Iron Company, and others, formed the Arconera Company at Bilboa, ensuring an unfailing supply of ore.

"At the time when the cogging mill was being erected, Siemens-Martin heating furnaces were also being built for heating the ingots for it, and some years later Siemens-Martin steel furnaces. These furnaces were the first to be erected after those at the Siemens Landore Steel Works, and were the only furnaces of that kind outside the last-mentioned place in South

Wales for many years afterwards. Important machinery for handling the steel from these furnaces had to be designed and erected. Mr. Menelaus had viewed with particular favour an invention of the late Mr. Benjamin Walker, of Leeds, for the purpose of balancing off a large portion of the dead load in Sir Henry Bessemer's hydraulic lifting ingot crane; and about 1876, when the hydraulic pumping power at the steel works was becoming rather deficient, he decided, with an alteration, to adopt the balancing system in preference to increasing the means for pumping."

The death of Mr. Menelaus was one of the startling incidents of Dowlais life. It was not altogether unexpected, for he had been visibly declining for some time. Born in Edinburgh in 1818, occupied for a few years in the engineering shops, then London, coming to Wales to improve the water wheel at Hensol for Mr. Fothergill, then to Aberdare, and eventually Dowlais. He had only reached his sixty-fourth year when the iron-like frame gave way, and in his brief holiday at Tenby, March, 1882, he breathed his last.