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BRISTOL TRAMWAYS POWER STATIONS 1895 –1941

Part II

The story of the Counterslip Power Station and the designers

Architect William Curtis Green – Engineer Horace Field Parshall

by Marcus Palmén

Introduction

The previous article covered the establishment of the Beaconsfield Road Power Station and the introduction of electric trams by the Bristol Tramways & Carriage Company. The period from 1900 onwards was also covered but much of the detail of the Counterslip Station was lacking.

This article seeks to correct this and also to give some information about two of the persons involved, the architect William Curtis Green and the consultant engineer Mr H.F.Parshall.

The Building



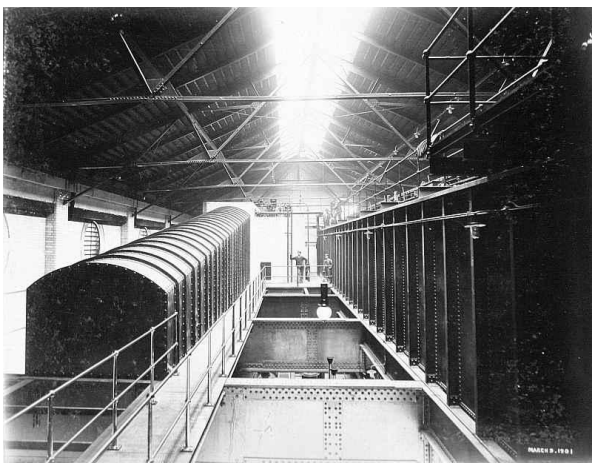
Counterslip Power Station – March 1901

During 1898-99 a new generating station was built at Counterslip to cater for the massive expansion of the system that occurred 1900

onwards. The architectural design was the first substantial work by a young architect **William Curtis Green (1875–1960)**, This building (1899) and the Chiswick Power Station (1907) were the two most important buildings when he commenced in practice. He was elected fellow of the Royal Institute of British Architects (RIBA) in 1909. Curtis went on to design buildings in Piccadilly, London, Westminster Bank among them. The building for Scotland Yard on the Embankment was another of his. The Queens Hotel in Leeds was a hotel design by him, however he is perhaps best known as the architect for the Dorchester Hotel. This was a particularly difficult task as a number of architects had already worked on the scheme and the outline of the building was thus predetermined and building up to ground level including all foundations had been completed.

Finally he also designed numerous private dwellings and four churches. The exterior of the listed Counterslip Building has been preserved.

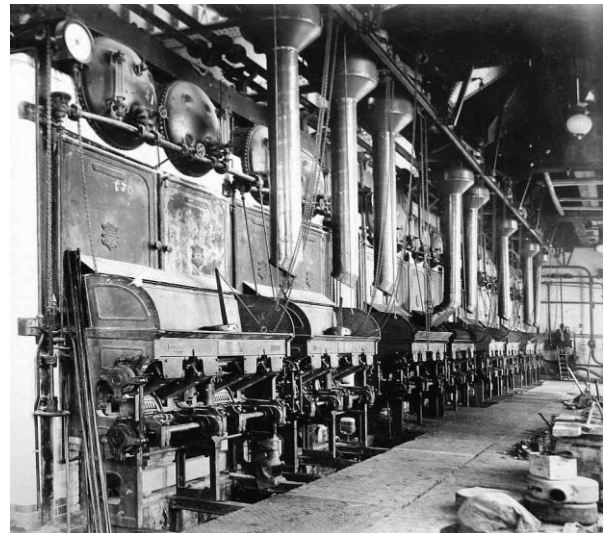
The top floor - Attic



This is where the coal conveyor brings the coal in from barges moored in the Floating Harbour by the building and distributes it to the boilers on the floor immediately below. The conveyor belts are used inside covers to reduce the dust pollution as much as possible.

The Boiler Room

This was immediately below the conveyor floor.



The Boiler Room

The boiler room contained 4 sets of boilers each consisting of 4 Babcock & Wilcox Water-tube Boilers, composed of weldless mild steel tubes from 3 to 4 inches diameter, placed in an inclined position and connected with each other and with a horizontal steam and water drum by vertical passages at each end. A mud drum attached to the rear and lowest point of the boiler collected any sediment.

The end connections were in one piece for each vertical row of tubes. Above the tubes was the horizontal steam and water drum, the water-level being kept at about the middle of the drum, the remainder being steam space. Additional sets of tubes of U-shape, fixed horizontally, were fitted in the chamber between the water tubes and the drum for the purpose of superheating the steam. The steam passed from the steam space of the drum through a perforated pipe downwards into a superheater from whence it was carried by a pipe to the stop valve and delivered to the engine.

The Engine Room

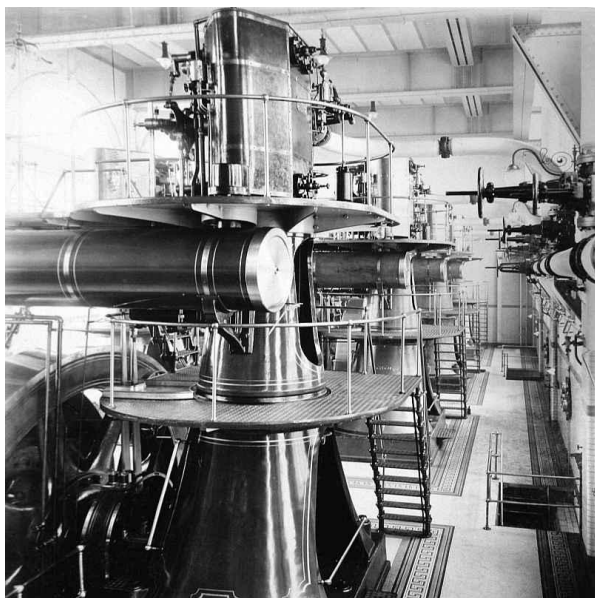
The Plant in the Engine room consisted of :

- 4 - E.P. Allis Company of Milwaukee, Wisconsin Vertical Cross Compound 750 bhp

Steam Engines 44 and 24 inch diameter cylinders with a 42 inch stroke . 90rpm steam pressure 150 psi.

4 - McIntosh & Seymore DC Generators 500v 625 kW continuous rating and a short term capability of 750 kW. Directly coupled to the engines.

2 - 75 BHP steam engines - direct coupled to 50kW 500 volt 6 pole lighting generators running at 400 rpm.



The Engine Room

The 4 Generators were specifically designed for Bristol by Horace Parshall based on his design for the General Electric 12 pole units installed in Chicago 1893.

The power station was commissioned in December 1900 and delivered power for the Bristol tramways until Good Friday, April 11th 1941, when a bomb hit St Philips Bridge and cut the power cables. Trams never ran again in Bristol.

The Tramways System Designers

The electrical design and development of the Bristol Tramways & Carriage Co system is due to two men; James Clifton Robinson and Horace Field Parshall.

The legendary tramway engineer **James Clifton Robinson**, chairman Imperial Tramways Co I believe needs no further introduction, but Horace Field Parshall was unknown to me before researching into The Bristol Tramways.

Horace Field Parshall (1865-1930) was born at Milford, New York, U.S.A., on September 9th, 1865. From Hartwick Seminary he obtained a scholarship to Cornell University. After 2 years he moved to Lehigh from where he graduated with an easy first having been allowed to pursue the subjects he desired. These were Electricity, Magnetism, Light, Heat, and Machine Design.

He now obtained a position at the Sprague Electric Railway & Motor Co. as a special student in the motor testing department. In those days machine design was based on previous experience and rules of thumb, resulting in many failures to meet improved specifications. Parshall had developed mathematical methods and was able to apply these with the result that he became an accepted authority on machine design. At the age of 25 he was appointed the Chief Designing Engineer of the Edison General Electric Company.

The introduction of steel in the magnetic frames for traction motors together with the use of multiple poles and slotted armatures were innovations brought about by him. When the two great American Electrical Companies were consolidated into the General Electric Company of America,. he was appointed chief of the Technical Department, advising generally in connection with the development of traction and power machinery.

He now turned to designing large generators. His first large machine, viz., 2,500 h.p. 75 rpm. was put to work at the Columbian Exposition, where it was assembled for the first time. It was so satisfactory that many more were built without any modification.

He lectured on Dynamo Design in Massachusetts Institution of Technology. At the suggestion of Lord Kelvin and Dr. John Hopkinson, the notes of these lectures were expanded into a treatise on *Armature Windings of Electric Machines* and a treatise on *Electric Generators*, subsequently enlarged into the treatise on *Electric Machine Design*. A degree of Doctor of Science was conferred to him.

In 1894 he came to London to attend to the interests of an American Company who were in dispute regarding machine specifications for machines manufactured by them.. Together with Dr. John Hopkinson he evolved a system described in a paper entitled *Alternating Current Tests* read before the Institution of Civil Engineers. Eventually the final outcome of the dispute was an acceptance of Parshall's contentions. He was then offered membership of the Institution of Civil Engineers

The whole episode took much longer than anticipated and in the meantime out of interest he did some work as a pastime in connection with early traction installations. This led to the publication of a paper on *Electric Tramways* which received the prize of the Institution of Electrical Engineers. He was then invited to act professionally and found himself as an established consulting engineer without really trying. His first major task as a consultant was the Bristol Tramways System with the Beaconsfield Road and Counterslip Power Stations. The Tramways of Dublin, Glasdow, London and several other cities followed.

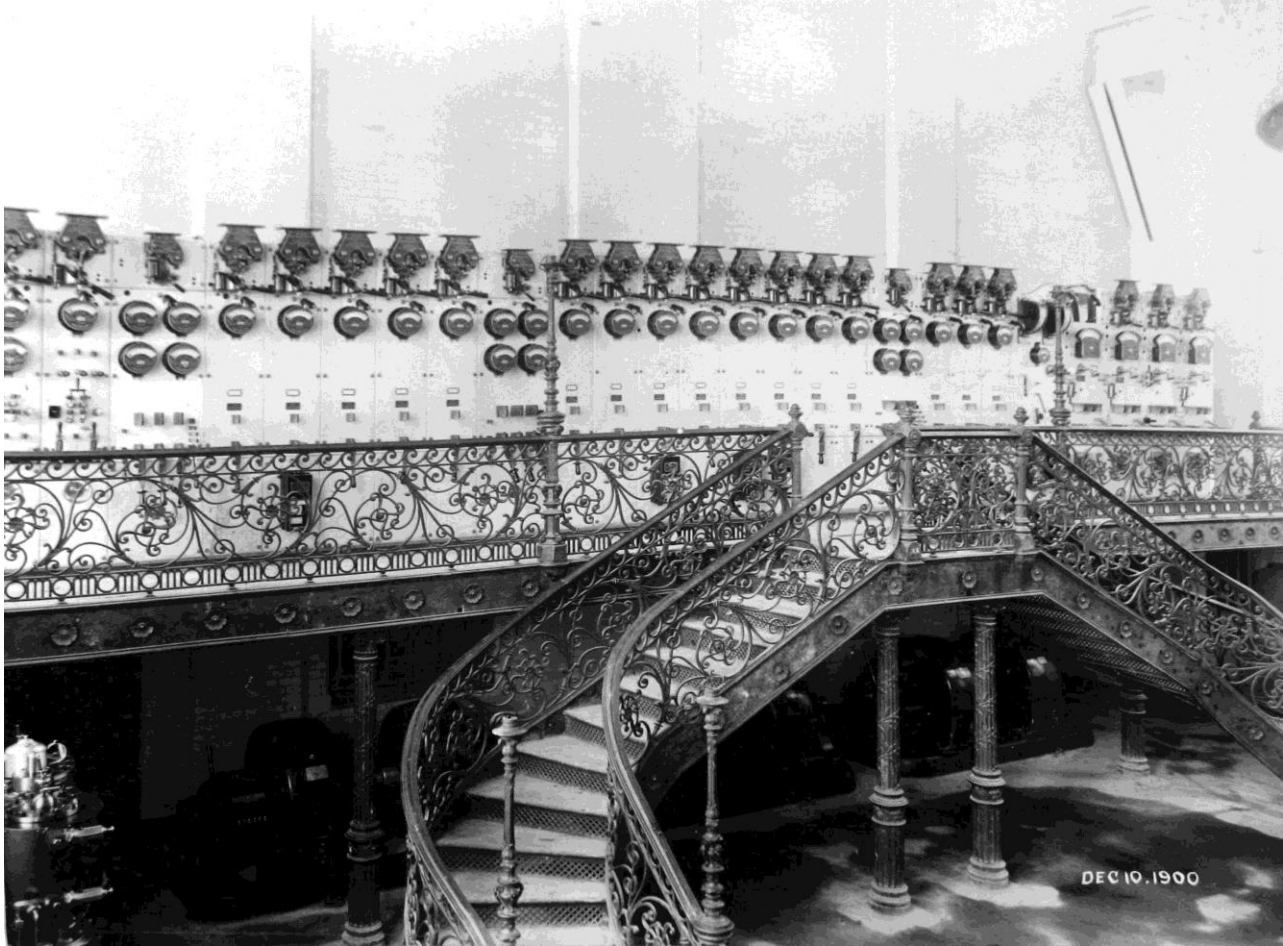
The Central London Railway was tackled being of particular interest as the first traction system using multiphase transmission and rotary transformer conversion. He designed the first machines of this type back in America and they were first used here. This system subsequently came into general use in America and was used for nearly all installations in England. Subsequent to the opening of the Central London Railway he became their Consulting Engineer, and ten years afterwards in 1913 Chairman of the Board of Directors.

His treatise on *Electric Railway Engineering and Economics of Electric Railway Distribution* became essential reading for railway design engineers. In 1909 he visited Spain and became consultant to the Barcelona Traction Light and Power Co. designing for them dams at Tresp and Camarasa.

His fundamental interest in power generation and distribution led to his becoming consultant to the Yorkshire and the Lancashire Electric Power Companies and the chairmanship of the latter company in 1913, which he held until retirement in 1930. He died following an operation in Bayonne at the age of 67 in December 1932

The source of this information is Horace Parshall himself. His home was at Penbury Grove, Buckinghamshire with a fine rock garden, where he collected Chinese porcelain and old English prints as a hobby. He also pursued a study of the genealogy of the Parshall's and collected the results in a book *The Parshall Family A.D. 870-1913* printed in 1915. Pages 161 – 170 contain his personal history.

Dr. H.F.Parshall, Son and Daughter



The Meter Board

metering different sections of the tramway tracks



The Brislington Depot

The Brislington Depot

Here we have the raison d'être for the Counterslip Power Station. The new trams are being prepared in July 1900 for the extended lines. The tracks into the depot are still visible today, but now no trams remain.

The tramways which gave Bristol an infrastructure worthy of the 20th century are no more and in the 21st century no man with the knowledge or capability has as yet come to the rescue of the city, which always has prided itself on its transportation capabilities whether by sea, rail, road or air from the ogre of gridlock.



The Final Touches to the Trams

Bibliography:

The photographs are from an Album by the Bristol Tramways and Carriage Company with photograph of Counterslip Power Station and the Brislington Depot during construction and following commissioning in December 1900.

These are published by permission of the *Bristol Records Office (39735.360)*

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Oxford Dictionary of National Biography – William Curtis Green

The Parshall Family – AD 870-1913 A Collection Of Historical Records And Notes, To Accompany The Parshall Pedigree by - Horace Field Parshall, D.Sc. Published London 1915 - Francis Edwards

Photograph of H.F.Parshall , Son and Daughter obtained from this book.

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