

## ENGINEERS' WALK IN BRISTOL (Blue Plaques) - Part 1

by *John Coneybeare*

*There were three reasons why I suggested that the Retired Professional Engineers Club (now sadly closed) should set this up.*

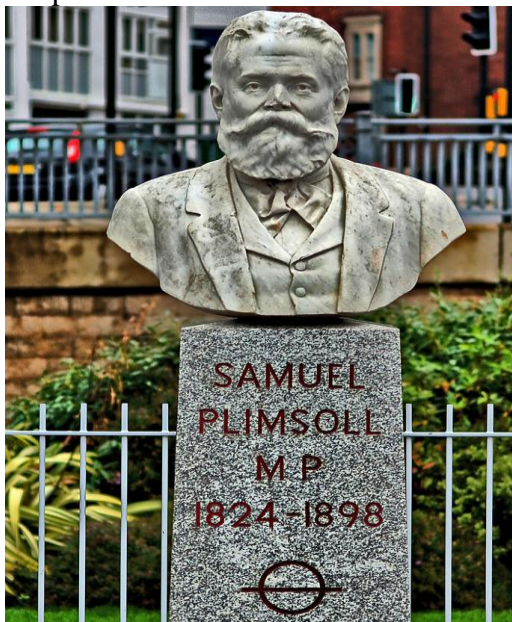
- a) In Sydney I saw the recently commenced series of pavement mounted plaques, celebrating famous Australian Writers at Circular Quay.*
- b) The Retired Chartered Engineer's Club in Exeter had already erected wall mounted plaques in their city and kindly showed me around.*
- c) Bristol was planning to celebrate the bi-centenary of Isambard Kingdom Brunel's birth in 2006.*

*There are now 15 plaques erected on walls belonging to a science museum in Bristol called 'We the Curious'. We are indebted to this museum for their great support. The following are mini biographies but you can see more by visiting [engineerswalk.co.uk](http://engineerswalk.co.uk).*

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### **Samuel Plimsoll (1824 – 1898)**

Plimsoll was born in Bristol but by his teens the family lived in Sheffield. He wanted to be a coal merchant exporting coal to Kings Cross, London by rail. Great Northern Rail tricked him into buying coal trucks which they would not transport and he was bankrupted.



Mr John Chambers, of a mine owning family, gave him another chance. Following the dismissal of corrupt staff there was cooperation between GNR and Plimsoll. Plimsoll designed and built a revolutionary new kind of coal delivery depot adjacent to Kings Cross using, in modern words, the 'just in time' principle.

In later life Plimsoll became an MP and fought in the House of Commons, in Court and in a Royal Commission for better working conditions for sailors. On one occasion he lost his temper in the Commons and was dismissed for a week. Plimsoll is revered in Bristol where there is a bust of him.

### **Humphry Davy (1778 – 1829)**

Humphry Davy was a bright boy, born in remote Penzance where he learned about mathematics, scientific method and French. He studied the works of the chemist Lavoisier and he wrote poetry. At 18 he was appointed to run a pneumatic hospital in Bristol and

soon found that inhaling Nitrous Oxide gas induced euphoria and also relieved the pain of toothache. In 1801 he was appointed Chemistry lecturer at the new Royal Institution in London.



**Humphry Davy**

Using electrolysis he discovered the elements Potassium, Sodium, Magnesium, Calcium, Strontium and Barium. He also invented first electric arc lamp by getting his assistants to put together a pile of Volta cells connected to two carbon rods. In his lecture audiences was a young book binder who wanted to be a scientist. His name was Michael Faraday and he became Davy's assistant. Davy famously designed a miner's safety lamp, proof against the gas firedamp. He travelled widely in Europe meeting other scientists and poets and died in Geneva where he is buried.

### **Ralph Benjamin (1922- 2019)**

Ralph Benjamin was born in Darmstadt, Germany. At just 14 he was sent to Switzerland to avoid Nazi persecution. In 1939 he moved to London to live with an aunt. His parents were murdered in Auschwitz. He graduated at Imperial College during World War!! and joined the Royal Navy, soon moving to Surface Weapons Establishment at Portsmouth. Capital ships, like Aircraft Carriers, were protected by smaller picket ships around them, but radar transmissions of targets, both friend and foe, were very poor. Benjamin invented a desk mounted roller ball device with a separate switch (years later this device was inverted and called a computer mouse). Using the ball, a cursor could be located over a target and the switch could extract x:y digital

coordinates which were easily transmitted by radio. The capital ship could then construct a map of a whole battlefield. In 1964 Benjamin was appointed Director of a newly formed Underwater Weapons Establishment. He had to manage 2,500 staff, brought together at Portland, from various establishments. His next appointment in 1971 was Superintendent at GCHQ in Cheltenham. He set up the hotline between Mrs Thatcher and President Reagan and communications systems for the army during the troubles in Northern Ireland. Benjamin retired from Government Service in 1982 and set up home in Bristol but soon undertook the refurbishment of NATO communications. At 65 he retired again and returned to Bristol. He became visiting professor at Imperial College, Bristol University and others and was active well into his nineties.



**Ralph Benjamin (left) with Michael Clinch founder of RPEC.**

### **Abraham Darby (1678 – 1717)**

Following his marriage in 1699, Darby moved to Bristol where there were many adherents of the Quakers faith. After studying brass making in the low countries he set up the Baptist Mills Brass Works (1700) using copper from Cornwall and calamine (zinc ore) from the Mendips. The

works included a laboratory, the first for metallurgy, to improve the quality.

Brass pots and other wares were exported to West Africa to buy slaves for the evil triangular trade. In 1706 Darby established an iron works in the city. Iron wares were cheaper than brass. Between 1708 and 1710, with support from Bristol merchants, Darby moved all his interests to Coalbrookdale. He died there in 1717. His son Abraham Darby II eventually bought the whole business. Abraham Darby III joined the business in 1768. He is best remembered for building the Iron Bridge in 1781.

### **George White (1854 – 1916)**

George White was probably the greatest Bristol entrepreneur of modern times. He never trained as an engineer, yet he had a remarkable talent for choosing good engineers to work for him. At 15 working in a solicitor's office he was entrusted with setting up The Bristol Tramways Company in 1874 on behalf of a group of local business men. They appointed him Company Secretary with a salary of £150 a year. White set himself up as a stockbroker. He took over Gloucester tramways, and a clutch of railways and became a director of York tramways.



**4th. Baronet Sir George and Lady White  
And left John Coneybeare of RPEC**

In 1893 White engaged **James Clifton Robnison** to electrify the trams in Bristol, the first overhead wire system in the country. **Horace Field Parshall** from Edison General Electric in the USA built two generating stations. The White and Robnison team took over tramways in Dublin, Middleborough, Reading and set up London United Trams. In

1912 White hired **B.A.Payne** from Thornycroft to build Bristol buses and lorries. In 1909 White saw a demonstration of flight by Wilbur Wright in France, and founded what became Bristol Aeroplane Company. **Denniston Burney** designed Bristol Burney seaplanes and the Paravane for mine sweeping. **Frank Sowter Barnwell** designed the Bristol Fighter, probably the best in the Great War, and over 6000 were built. Sadly Sir George White died in 1916. Barnwell designed the Bristol Bulldog, a mainstay of the RAF in the 1930s and the Blenheim light bomber in 1938. Unfortunately Barnwell died in an air accident.

### **Archibald Russell (1904 – 1995)**

Russell's joined Bristol Aeroplane Company in 1925 in the era of biplanes. He assisted Leslie Frise, Chief Designer in further development of the Blenheim and derivatives like the Beaufighter night fighter. The company was invited to design a big bomber able to carry an 80,000 bomb load to Berlin. Russell succeeded Frise as Chief Designer and in 1944 Lord Brabazon replaced the big bomber idea with a contract to build a luxury airliner for BOAC. The Brabazon flew in 1949 with Bristol Centaurus propeller engines.

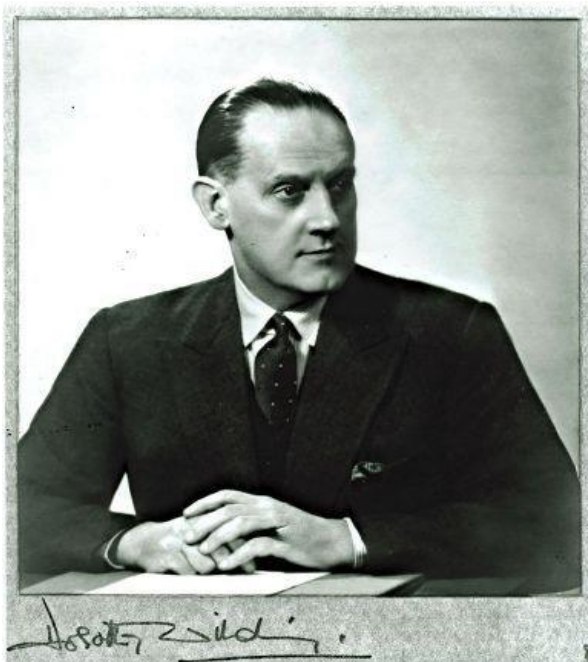
The Bristol Proteus propjet engine was not powerful enough and the Brabazon project faded into history. The Freighter a sort of aerial truck, and the Wayfarer a passenger version, were successful. Russell was made responsible for Bristol Helicopters and Bristol Ferranti guided missiles. In 1947 Bristol and BOAC started on another airliner. After redesigns for increased capacity, mishaps, exhaustive pressure testing, and engine icing problems, the Britannia with Proteus III engines entered service in 1957. It was the first airliner able to cross the Atlantic in one hop, in all weathers.

In the lean years that followed Russell learned all he could about supersonic flight from the type 188 stainless steel supersonic planes. He also learnt that a narrow delta wing produces

a strong vortex over the wings and reduced stalling so much that landing flaps were unnecessary. Concorde was designed to fly at mach 2. Politics were involved and the cost was very high so Concorde became a joint venture with the French.

### **Roy Fedden (1885-1973)**

Fedden was educated at Clifton College and the Merchant Venturers Technical College. At 21 years old he designed a car and persuaded Brazil Straker Co. to build it, which was successful. During The Great War the factory built Rolls Royce water cooled engines. Fedden preferred air cooled rotary engines because they were lighter (no cooling system) and had short crank shafts. He designed 3 aero engines, the Mercury with two rows of 7 cylinders (300 HP), the Jupiter with 9 cylinders (450 HP), and the Lucifer with 3 cylinders (100HP).



**Roy Fedden**

In 1920 the company was bought by Bristol Aeroplane Company with Fedden in charge. He insisted on quality, thorough investigation of every failed engine and continuous development. The Jupiter was soon the best aero engine in the world and was made under licence in 17 other countries. Over two decades a wide range of engines were produced in various configurations and fitted

to over 200 types of aeroplanes. The Hydra had 16 cylinders and required 4 poppet valves per cylinder making design very difficult. Fedden didn't invent sleeve valves but adopted them with success, producing new versions of existing engines. With Word War II imminent, the Centaurus with 18 cylinders in 2 rows (2000 HP) was designed. However the company reduced his pay and never made him a director of the company. In 1942 Fedden was knighted, but later in that year he was sacked.

### **Stanley Hooker (1907 – 1984)**

Stanley Hooker was a brilliant mathematician and studied hydrodynamics and aerodynamics for 9 years. Rolls-Royce called him to Derby for interview in 1938. He increased the power of the Merlin engine by improved supercharger design. In 1943 Hooker was appointed Chief Engineer of Rolls-Royce's new jet engine division at Barnoldswick.



**Stanley Hooker**

From Frank Whittle's W2 engine Hooker developed in quick succession the Welland, Derwent, Nene and Tay engines. Hooker resigned in 1948 after falling out with the company over the Avon engine, which successfully powered the Comet and the

French Caravelle airliners. Hooker moved to lead Bristol's engine division where he designed the Proteus III engine that powered the Bristol Britannia airliner. He worked with Gordon Lewis over many years to raise the thrust of the Olympus engine from 10,000 lbs. to 40,000 lbs. Versions powered the Vulcan bomber and the supersonic airliner Concorde. The light weight Orpheus was Hooker's design from the beginning and powered small fighters like the Fiat G91 and trainers like the Gnat. Many were made in India. With Gordon Lewis he created the unique Pegasus turbofan, with its vectored thrust nozzles, to power the Harrier 'jump' jet.

When Rolls Royce took over Bristol Siddeley Engines, Hooker decided to retire in 1967. High bypass turbofan engines were under development in the USA. Rolls-Royce entered this market with their RB211 but its development costs pushed the company into bankruptcy in 1970. Hooker was brought out of retirement to be Technical Director. He diagnosed the problems and within two years Rolls Royce had the finest turbofan engine available. Hooker was knighted in 1974, and retired again in 1979. There are another 7 plaques in Engineers' Walk so look out for part 2 in a future newsletter.