THE FORGOTTEN *engineer* WHO MOVED IN HIGH CIRCLES

The work of Wilson Weatherley Phipson had gone largely unrecognised until recent research unearthed his extraordinary achievements. **Neil Sturrock** explains how the Victorian engineer exploited family connections to bring innovate heating and ventilation to some of Britain's grandest buildings

Until recently, few people would have heard of Wilson Weatherley Phipson (1838-1891), but recent research by the CIBSE Heritage Group means his contribution to the development of building services can now be revealed.

Phipson's family connections enabled him to win work on some of the Victorian era's most famous buildings, including the Natural History Museum, the Royal Albert Hall and Gilbert Scott's University of Glasgow. A European education introduced him to pioneers of heating and ventilation, and it was their techniques that he brought back to England at the height of the Victorian building boom.

Building services in the 19th century

The use of steam for heating buildings was first proposed in the middle of the 18th century, by Colonel William Cook. Rapid development in the early 19th century led to it being used for heating factories and mills, and occasionally houses – as at Quarry Bank Mill in Styal, Cheshire.

Hot water had been used for heating greenhouses in the 18th century, but the main developments in hot-water heating took place in France and were then brought to Britain in 1816 by the Marquis de Chabannes. High-pressure hot-water heating was devised by Angier March Perkins in 1831.

Ventilation had been provided in mines for many years by fans turned by hand or by animal power, and a hand-driven 'ventilating' fan was installed in the House of Commons by John Theophilus Desaguliers in 1735. In the 19th century, however, early attempts at providing 'powered' ventilation in large buildings often relied on fire-assisted stacks, such as in the temporary House of Commons (1836, see 'The pioneer who rid Parliament of hot air', *CIBSE Journal*, January 2015). The General Prison for Scotland in Perth (1840) and Pentonville (1842) also relied on this principle, as did most subsequent prisons.

Steam engines were probably first used to power a building's ventilating fans in London's Reform Club (1841). They required only a fraction of the fuel of a fire-assisted stack, but – if the steam engine failed – there was no backup.

Phipson's birth, in Queen Victoria's coronation year, roughly coincided with the development of 'warming and ventilating' as a major 19th century industry. There was a frenzy of church development in the 50 years up to around 1870; thousands were built and they all needed heating.

Social reform in the Victorian era also meant hundreds of institutional buildings were erected, including town halls, museums, public baths, schools, hospitals, workhouses, lunatic asylums and prisons. The stately homes of the rich and famous were another major source of business for the industry.

Phipson, the man

Wilson Weatherley Phipson was born, the third son of Samuel Ryland Phipson. As well as two older brothers, Phipson had three younger sisters, although the first of these sisters died in infancy. Samuel's occupation is given on Wilson's marriage certificate as 'Gentleman' and he appears to have occupied a prominent position in society. He was educated at the University of Jena, in Germany, and his home – at Ladywood, near Birmingham – hosted MPs, French ministers of state, writer and philosopher Thomas Carlyle and many other distinguished visitors, such as actor and theatre manager William Charles Macready.

Around 1847, however, Samuel suffered severe financial losses after the collapse of both the North of England Joint Stock Bank and a US bank in which he was a shareholder.

Prudential Assurance, High Holborn

> An indication of the circles Phipson moved in is that Joseph Bazalgette supported his application to be an Associate Member of the Institute of Civil Engineers

Phipson's combined extract stack and fireplace chimneys at the Liverpool Royal Infirmary

This led to the family moving to Brussels, where living and education were cheaper.

Wilson Phipson's formal education took place in Brussels and Paris, where he was enrolled at the École Impériale des Ponts et Chaussées from 1854 to 1856. He then worked for two years in Brussels with Dr Englebert-Theophile Van Hecke, who discovered a new method for heating and ventilating hospitals that had proved economic and efficient.

Phipson helped Van Hecke in Paris – warming and ventilating hospitals at Necker and Beaujon – and accompanied him to Bordeaux and the Netherlands, where similar work was done on government buildings.

By the late 1850s, Phipson was well known among high society in France and Belgium. He was a talented pianist and singer, and became a favourite of Prince George of Prussia, who wanted Phipson to be his secretary and travelling companion. Phipson was not fluent in German, however, and he decided to return to England to try to bring Van Hecke's methods to a new market.

Engineering breakthrough

Phipson was somewhat dismayed by the prejudice and ignorance he had to overcome to try to get Van Hecke's principles adopted in his native country. Controlled ventilation was in its infancy, and Phipson could not attract any interest in the Van Hecke system. Finally, through the influence of his father, he was able to obtain a contract to warm and ventilate the bank of Baron Rothschild, in St Swithin's Lane, and the Baron's private residence in Piccadilly.

His success attracted the attention of some of the leading architects of the day, and his next project appears to have been The Strand Music Hall. His father's influential circle of friends may have helped further, but very soon Phipson was employed to design systems for the Royal Albert Hall, The Natural History Museum and the rebuilt Alexandra Palace.

Formally, Phipson was a civil engineer and it is an indication of the circles he moved in that – when he applied to be an Associate Member of the Institution, in 1869 – one of his supporters was Joseph Bazalgette, London's principle sewer engineer. His application to be a full Member was supported by William Thompson (Lord Kelvin).

Phipson married Elizabeth Newcombe in 1867 and later – because there were no children from the marriage – he adopted and educated one of his wife's nieces. The 1881 census shows this niece and her younger sister both living with the couple .

Phipson worked with many well-known architects of the Victorian era, including Sir George Gilbert Scott, George Edmund Street, Thomas Verity, Augustus Pugin and, most closely, Alfred Waterhouse. The Royal Albert Hall was not designed by an architect, but by Henry Young Darracott Scott, a Major-General in the Royal Engineers, and Phipson designed the system for this. Unfortunately, the Heritage Group has not been able to gain access to the venue to view anything that remains of the Phipson system.

No working link has been established between Phipson and the architect Matthew Digby Wyatt – a member of the dynasty of Wyatt architects and sculptors – who may just have been a family friend. He is listed as a witness at Phipson's wedding and that of his older brother, Thomas.

Many of Phipson's best-known projects were carried out on the buildings of Waterhouse; as well as the Natural History Museum, he worked with him on Liverpool Royal Infirmary (see Case study, p28), the University of Liverpool, and the National Liberal Club.

One of the most significant buildings they worked on together, however, was the Prudential Assurance Building in High Holborn, begun in 1878 (pictured). Phipson specified steam-driven dynamos, installed in 1886 by Drake & Gorham, for the electrical services – primarily direct-current lighting – and the exhaust steam from the engines was used for space heating. This was probably the first major application of combined heat and power in the UK, and the system was extended in 1904 to provide electricity for 8,000 lamps.

Phipson also designed a very elaborate system for the University of Glasgow, which will be described in a later article.

Despite the CIBSE Heritage Group's research, no picture of Phipson has come to light. If anyone knows of an image of him, the group would love to hear from you. **CJ**

CASE STUDY: LIVERPOOL ROYAL INFIRMARY

The present Liverpool Royal Infirmary buildings were designed by Alfred Waterhouse in 1885. Remnants of an earlier infirmary, from 1824, remain on the site, but the shortcomings of this original building had been highlighted by Florence Nightingale during her visit in 1858. It was not until 1882, however, that the hospital trustees finally decided to rebuild according to her guiding principles.

In the May 2015 edition of *CIBSE Journal*, Chris Iddon describes Florence Nightingale's recommendations about the supply of fresh air to hospital wards. 'Pavilion' wards were preferable, she suggested, and these should be no more than about 30 feet wide and about 16 feet high. They should be 'well-ventilated and spacious', with the window space being not less than one third of the total wall.

Waterhouse was not entirely convinced because he was an admirer of the 'circular ward' concept, which purported to provide light and ventilation from all directions, and give extra headroom and floor space.

His design, however, allowed for eight Nightingale 'Pavilion' wards, although he also incorporated two circular ward blocks. All were heated by means of circular radiators, each of which was supplied with fresh air from below, via floor ducts.

Extraction from all wards was powered by the heat from the fireplace chimneys, the vitiated air from other spaces was gathered at the central extract tower, where a steam coil provided additional buoyancy. Phipson calculated that the wards would enjoy four air-changes per hour.

An additional – and very unusual – feature was the inclusion of a miniature train running in the infirmary's roof space, to deliver food from the kitchen to the ward blocks.

The last patient left the building in 1978 and it has since been refurbished to provide a primary healthcare facility, among other functions. The University of Liverpool recently converted the original boiler house to use as its energy centre.

For more on the CIBSE Heritage group, visit **www.hevac-heritage.org** For more information on Wilson Weatherley Phipson, visit **http://bit.ly/1Mfv7A5**

Liverpool Royal Infirmary and its central extract tower

Each circular ward was heated by three radiators and three fireplaces

Fresh air inlets on outside walls