SCOTLAND
HERITAGE BUILDINGS and
ENGINEERING SERVICES

Tolbooth Steeple,
Glasgow Cross

Brian Roberts
CIBSE HERITAGE GROUP
EDINBURGH CASTLE

The Great Hall fireplace
STIRLING CASTLE

Fireplace in the Queens Chambers
BALMORAL CASTLE

Dancing by candlelight in the Ballroom
The General Prison in Scotland in Perth (1840-42) predates its famous English counterpart at Pentonville and is one of the first buildings involving Dr David Boswell Reid, after his work on the ventilation of the House of Commons. Perth’s integration of ventilation and heating resembles and improves on the more famous schemes at the Philadelphia and Trenton penitentiaries in the United States. Reid incorporated their ascending ventilation, hot-water heating for improved temperature control, and centrally placed fresh air tunnels. His major improvement was forced ventilation, achieved by year-round operation of furnaces.

Prison ventilation scheme of Dr David Boswell Reid
Old and modern views of Perth Prison
A vast heating and ventilation system was designed by Wilson Weatherley Phipson (1838-91). Air travelled from inlets at the top of the clock tower to a plenum chamber where it was distributed by a steam-driven fan through a network of underground passages to heating chambers having gravity-fed hot water heating coils served by local Cornish boilers. Heat-assisted exhaust air was passed to atmosphere through upcast shafts. This complex early design generated a great deal of controversy.

Founded in 1451, the present University buildings were designed by Sir George Gilbert Scott in the Gothic Revival style, the clock tower being modified later by his son Olrid.
Typical section showing air warming chamber with supply and extract ducts
UNIVERSITY OF GLASGOW.

VENTILATION AND WARMING.

RULES AND REGULATIONS

FOR

MANAGEMENT OF APPARATUS,

AS DIRECTED BY

Mr. WILSON W. PHIPSON,
ENGINEER.

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MDCCCLXXI.
Glasgow University in about 1895

The University Cloisters
MOUNT STUART, ISLE of BUTE

The house was rebuilt in 1879-1900 in the Gothic style by the architect Robert Rowand Anderson after a fire in 1877. The building is notable for its pioneering engineering services and is said to be the first home in Scotland to have central heating (designed by the engineer Wilson Weatherley Phipson). It also had electric lighting, a telephone system, a Victorian passenger lift and a heated swimming pool.

A large portfolio of Phipson’s heating drawings still exists of which the above is a detail. However, Phipson died through overwork in 1891, travelling night and day by train, covering over 3000 miles in a fortnight visiting his many projects.
MOUNT STUART, ISLE of BUTE

Drawings from the Phipson Collection of Heating & Ventilation Drawings
MOUNT STUART, ISLE of BUTE

Phipson drawings
MOUNT STUART, ISLE of BUTE

The lavish interior
Glasgow School of Art, 1897-1907
The winner of the architectural design competition for the School was Honeyman and Keppie, within which Charles Rennie Mackintosh was a salaried architect. Keppie had earlier worked with the engineer William Key who had designed a plenum system for the Glasgow Victoria Infirmary, opened in 1890. Key, with Robert Tindall, took out British Patent No. 19,900 in 1892 which detailed a basic air conditioning system to control temperature, humidity and air cleanliness, using water sprays, blocks of ice, steam coils and hanging rope filter screens. The specification of 1896-97 for the first phase of construction of the School refers to a ventilation system having water sprays and hung rope air filters, but no direct link with Key has been established. The detailed design was the responsibility of the contractor. In this, B F Sturtevant, who illustrated the principles of such systems in their catalogues of the era and who were suppliers of the two main centrifugal supply fans, may have rendered assistance. During the second phase of construction in 1907-9, both filters and sprays were renewed. The plenum system was taken out of use in the 1920s and replaced by an intrusive radiator system. Recent surveys have shown that the original fans remain with steam heating coils, basement and ceiling ducts and the dampers and grilles largely intact.

Plans of Heating & Ventilation showing Boiler House and Fan Room, 1910
House for an Art Lover, Glasgow,
designed 1900, built 1996

In 1900, the Vienna magazine Zeitschrift für Innendekoration announced a competition for the design of a house for a connoisseur of the arts. No first prize was awarded, but Glasgow architect Charles Rennie Mackintosh won a Special Prize. He died in 1928, his house unbuilt. Then in 1988, Graham Roxburgh, a Glasgow Civil Engineer, took on the challenge of building the Mackintosh house. The story of the fund-raising and the many difficulties, which had to be overcome, are a story in themselves. The completed house stands in Bellahouston Park. It serves as a tourist attraction, conference centre and art school. The M&E engineer was Donald Smith Seymour and Rooley but the services are modern, as required for a public building. However, the decorative lighting is in the true Mackintosh tradition.

HOUSE FOR AN ART LOVER

Mackintosh’s Competition Drawings
HOUSE FOR AN ART LOVER
Circular ornamental column radiators in the Grand Gallery, the Royal Museum of Scotland, Edinburgh. Construction started in 1861 and was completed in 1888. The building was designed by Captain Francis Fowke of the Royal Engineers, the Grand Gallery being inspired by the Crystal Palace.
Now completely refurbished as The National Museum of Scotland with the circular radiators around the columns still in place.
Perkins high pressure hot water heating apparatus, c.1900
THE ROYAL HIGH SCHOOL, EDINBURGH

View of heating pipes under the seating

The Perkins high pressure hot water heating furnace