

# VICTORIAN & EDWARDIAN HEATING

Brian Roberts with photographs by Frank Ferris

## Introduction

This article provides an illustrated outline of the heating branch of building engineering services during Victorian and Edwardian times. Its aim is to provide a simple guide to investigators of heritage buildings to help them recognise some of the types of early heating equipment which may still exist.

The investigation of historical heating equipment generally starts on site when the building itself is being demolished, altered or restored. A major problem is often to understand what survives, assess its significance and make informed decisions about what to do next. Options range from re-use, retention in-situ, to removal to a safer site or, regrettably in some circumstances, to thoroughly record before destruction.

Investigators faced with this choice may include the owner or occupier, architect, builder, services consultant or contractor, local government officers (especially conservation officers), none of who may have the necessary expertise to evaluate a particular item. One possible solution is to seek advice from a person or organisation knowledgeable in this field, where such a person can be found. The other approach, often overlooked due to commercial and time constraints, is to search for all related documents and drawings. Information may be available locally, regionally or at national level –in libraries, record offices or specialist websites.

The following gives examples of such possible sources and how they may assist in identifying the age, type, manufacturer and importance of various heating equipment:

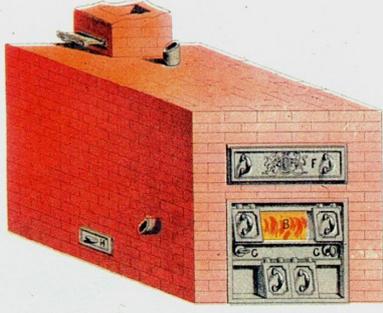
- (1) Architectural and engineering design, construction or record drawings
- (2) Documents relating to tender specifications and enquiries, cost sheets, site reports and correspondence, commissioning records, and operating and maintenance instructions
- (3) Nameplate details: maker and serial numbers with reference to manufacturers' catalogues
- (4) Patent Numbers: refer to Patent Office Records
- (5) Contemporary photographs which, on close inspection, may reveal important details
- (6) Transactions, Proceedings, Magazines and Journals of relevant Professional Institutions, (e.g. The Chartered Institution of Building Services Engineers), Trade Associations (e.g. The Heating & Ventilating Contractors' Association which on 1 March 2012 became the Building & Engineering Services Association) and various Industry Publications
- (7) Company Histories which can be rich sources of information on its products, clients, projects and activities.

## Heating Equipment

**HARTLEY & SUGDEN'S**  
 IMPROVED WROUGHT WELDED SADDLE BOILER  
 TO WHICH THE  
**GOLD MEDAL.**  
 WAS AWARDED AT THE  
 ROYAL HORTICULTURAL SOCIETY'S SHOW,  
 AT BIRMINGHAM, JUNE, 1872.



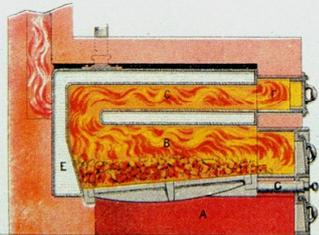
**"GOLD MEDAL BOILER"**  
 REGISTERED TITLE.



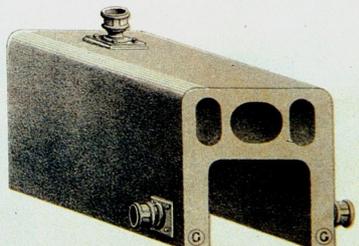
ELEVATION, IN BRICKWORK.



CROSS SECTION.



LONGITUDINAL SECTION.



ELEVATION, WITHOUT BRICKWORK.

<p><b>A</b> Ashes Pit</p> <p><b>B</b> Fire</p> <p><b>C</b> Centre Flue</p> <p><b>D</b> Right &amp; Left Return Flues</p> <p><b>E</b> Water-way Terminal End</p>	<p><b>F</b> Sliding Soot Door for Cleansing Flues, with Fire Brick Casing</p> <p><b>G</b> Sludge Plugs for cleansing internal part of Boiler</p>	<p><b>H</b> Regulating Flues</p> <p><b>I</b> Hollow Space round Boiler utilizing Heat given off from external surface of Boiler.</p>
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ENTERED AT STATIONERS' HALL.

Catalogue featuring the saddle boiler, Hartley & Sugden, Halifax, 1872.

The number of firms engaged in the manufacture and installation of heating equipment and accessories during the Victorian and Edwardian periods was considerable. The number of models or patterns of a particular item, for example radiators, runs into many hundreds. However, it is hoped these notes will aid the recognition and dating of such objects.

The most basic type of heating (other than open fires) is the stove. The first stoves were made of cast-iron, with a door into which a solid fuel, usually coal, could be fed. A low-level ash pit door enabled ash, stones and other residue to be removed. Smaller stoves could be moved and placed in position in one piece, requiring only for a flue pipe, leading to outdoors, to be connected. These stoves were freestanding within the space to be heated. Larger stoves would be assembled in sections. Other stoves were installed in builderswork chambers with a cold air inlet and with the warmed air discharged directly, or through masonry ducts, to the space served. Examples of both types may still be found, often in cathedrals and churches. Some are still in use having been converted to oil or gas firing.

A heating system requires a form of heat producing apparatus (usually a boiler), a means of distributing the heat (pipes or ducts) and heat emitters in the space served. Types of heating system include steam, low-pressure hot water and high or medium pressure hot water. Hot water heating boilers were manufactured in quantity from around 1860 onwards. The first room heaters were pipe-coils, often housed in decorative cases. Radiators were introduced in the 1880s.

## Heating Stoves

Masonry stoves of brick, earthenware and porcelain have been used for over one thousand years in northern Europe, particularly in Scandinavia, Russia and Switzerland. Closed metal stoves were devised in Germany in the 15<sup>th</sup> century and improved over the next two hundred years, spreading across continental Europe. But Britain preferred its open fires.

In England, around 1609, the first metal stoves were imported from Holland to heat the orange houses of the nobility (It is said that the word “stove” is of Dutch origin and the first English heated greenhouses were in fact called stoves.)

In the 1790s, Count Rumford devised a metal stove, while William Strutt with Charles Sylvester installed his *Cockle* (or *Belper*) stove at Derby Infirmary. This cockle stove consisted of a circular iron pot with a rounded dome. Fuel was consumed on a grate at the bottom of the furnace, coal or coke being added through a charging door at the side. Air for combustion was supplied through a duct to a chamber below the grate.

A forced warm-air furnace was patented by Benford Deacon in 1812, using a fan powered by a descending weight, and used at the Old Bailey. In the latter part of the 19<sup>th</sup> century, ventilating and other improved grates (the distinction between grates and stoves is not always clear) were due to Sir Douglas Galton, George Jennings (*London* grate), T Elsey (*Lloyd's* patent ventilating grate), D O Boyd (*Hygiastic* grate) and the firm of Shorland (*Manchester* grate).

In 1818, the Marquis de Chabannes introduced his *Calorifere* stove (air warming furnace) from France. Just before this, in 1816, the firm of G & J Haden set up in business in Trowbridge to erect the steam engines of Boulton & Watt in the West Country. Within a few years Haden was manufacturing heating stoves for churches and the country houses of the gentry.



*Haden stove front, now serving as a private letter box, near Bristol.*

Between 1824 and 1914 Haden manufactured and installed nearly 7000 stoves. Atkins & Marriot introduced their *Thermo-regulated* stove in 1825, followed by the *Thermometer* stove of Dr Neil Arnott (Physician Extraordinary to Queen Victoria) in 1834. The 1830s also saw the development of the famous *Tortoise* stove by Charles Portway who went on to manufacture some 17,000.

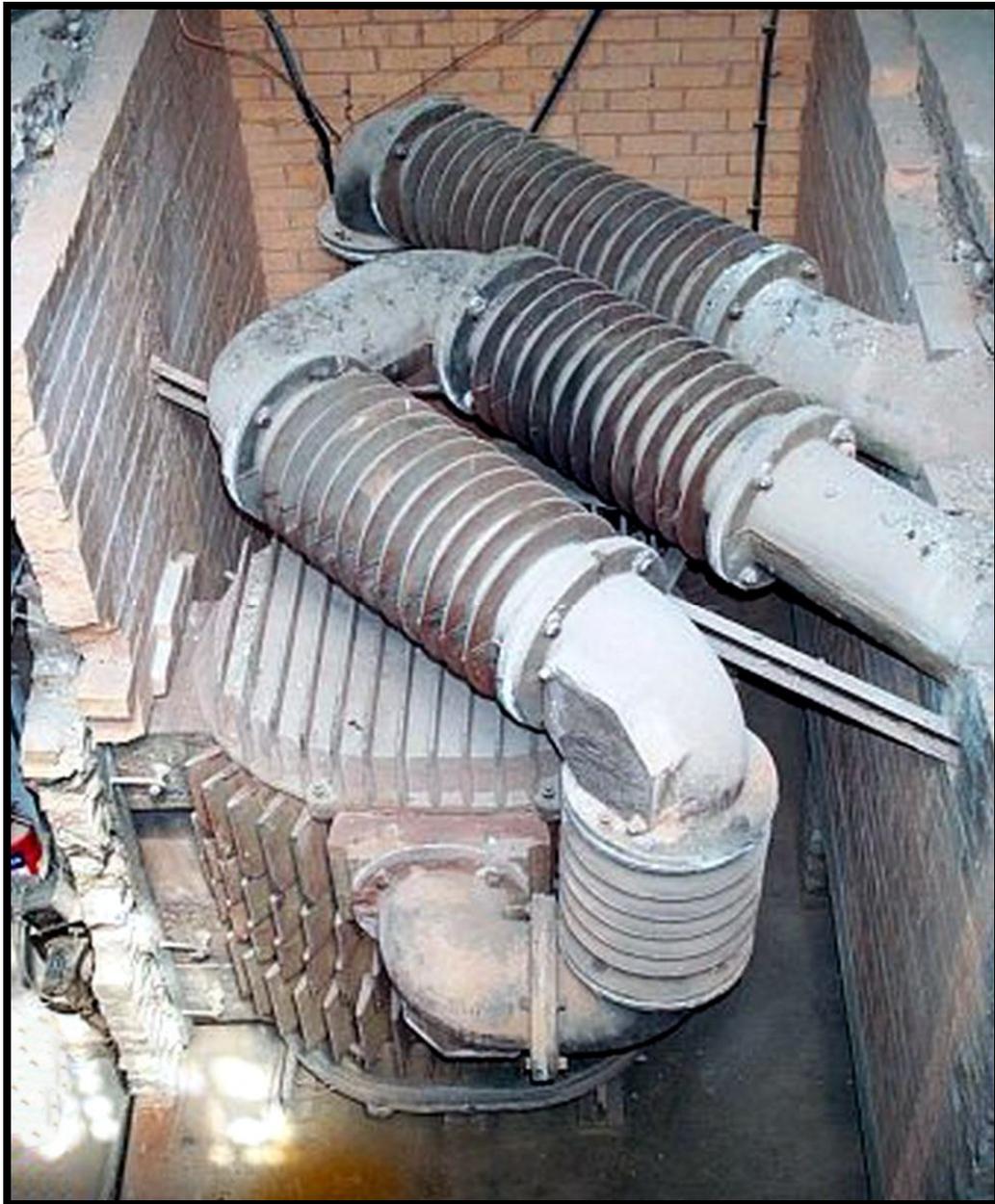


*Portway Patent Tortoise slow-combustion stove in St Leonard's Church, Rodney Stoke in Somerset.*

Use of the warm air stove grew considerably from the middle of the 19<sup>th</sup> century with the tremendous wave of Victorian church building and the construction of many and varied institutions –prisons, hospitals, schools, workhouses and asylums. Around this time Dr Goldsworthy Gurney brought out the large stove which bears his name. It was later sold by the London Warming and Ventilating Company who in 1897 claimed it had been used to warm 22 cathedrals and over 10,000 churches, schools and other buildings. (Cathedrals heated by Gurney stoves include Chester, Exeter, Gloucester, Lincoln, Salisbury and St Paul's). London Warming was also the agent for the *Choubersky*, *Salamandre* and similar continuous burning stoves, which only needed refuelling once a day. Other stoves of the later Victorian period included Saxon Snell's *Thermhydric*, Mr George's *Calorigen*, Dr Bond's *Euthermic*, the *Manchester* stove of Shorland and the *Convolutad* stove of Joseph Constantine. Another notable heating apparatus manufacturer was John Grundy of London and Tydesley Ironworks, Manchester (Grundy was the first President of the Institution of Heating & Ventilating Engineers in 1898). Grundy products included the *Helios* and *Sirius* smoke consuming grates and the *Hestia* warming and ventilating stove. But the increasing use of hot water heating systems and the introduction of the radiator soon caused a marked decline in the use of warm air stoves.



*A Gurney warm-air stove in Tewkesbury Abbey, installed c.1875, converted to gas-firing in 1987.*



*Grundy warm-air stove, St Paul's Church, Deptford, London.*

## Radiators

The term “radiator” is a misnomer since for column radiators some 70% of the heat output is by convection. The development and mass production of radiators was an American phenomenon, the first patents dating from around 1841. Early radiators were variously shaped “heat distributors,” a mixture of pipes and metal plates. Next saw the introduction of vertical wrought-iron welded tubes fixed between horizontal top and bottom headers. These were followed by “looped tube” type, an inverted-U, fixed to a base plate, used for both steam and hot water. Tasker in Philadelphia patented a primitive sectional radiator in 1858. It is the factory mass production of radiator sections that could be connected together that distinguishes them from pipe coils.

Another pioneer was Joseph Nason who had spent time working in England with A M Perkins who devised a high-pressure system of hot-water heating in 1831. This used a solid-fuel-fired brick furnace or metal chamber containing a sinuous coil of small-bore seam-welded wrought iron pipe with a 6 mm thick pipe wall capable of operating at temperatures approaching 170 degC and pressures close to 15 times atmospheric pressure. The system gained rapid acceptance and was installed in many important buildings but the concerns of Insurance Companies led to the system being operated at lower temperatures and pressures and later largely discontinued. However, modified systems, converted to oil firing can still be found in a number of churches and chapels. The small bore piping was distributed around the space to be heated being formed into banks of multiple coils .

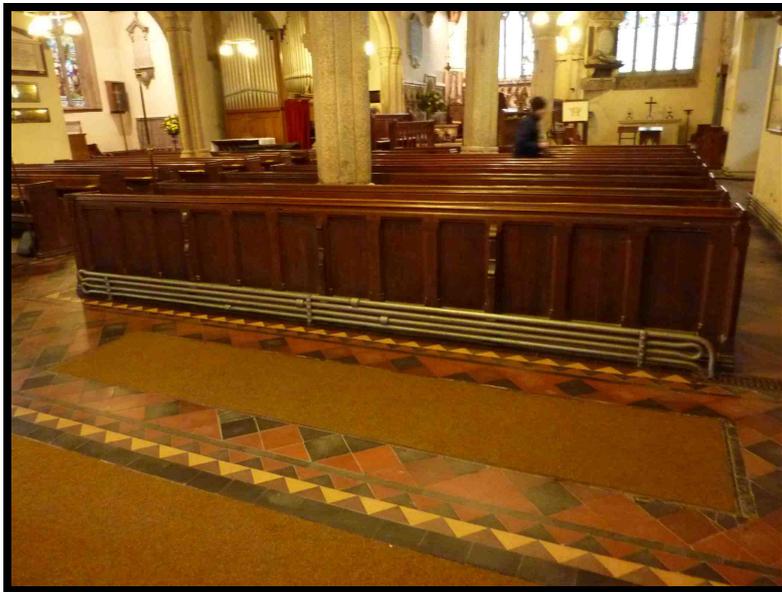
Until 1892 numerous American manufacturers produced a variety of designs, many highly ornamental, but in that year the three principal manufacturers merged to form the American Radiator Company. This firm, trading as the National Radiator Company, opened a factory in Hull in the early 1900s where they manufactured Ideal radiators. During the 1890s, radiators of American manufacture were imported into Britain, but from the turn of the century the home radiator manufacturing industry became predominant. Radiators were often housed in decorative casings.

Early British patents for hot water radiators include those of Keith (1882 & 1884), Waters (1882), Cannon (1887) and Heap (1887). At the end of the 19<sup>th</sup> century, one expert claimed that British radiator design had fallen behind the current American offerings. However, this opinion was based on external appearance and not on the technical performance. British designs were generally plain, though there were exceptions. American ones were ornate. Gradually, improvements in foundry technology enabled more elaborate castings to be made. Radiators having 1, 2 and then 3-columns became available. By 1917, radiators with 4-columns were being used.

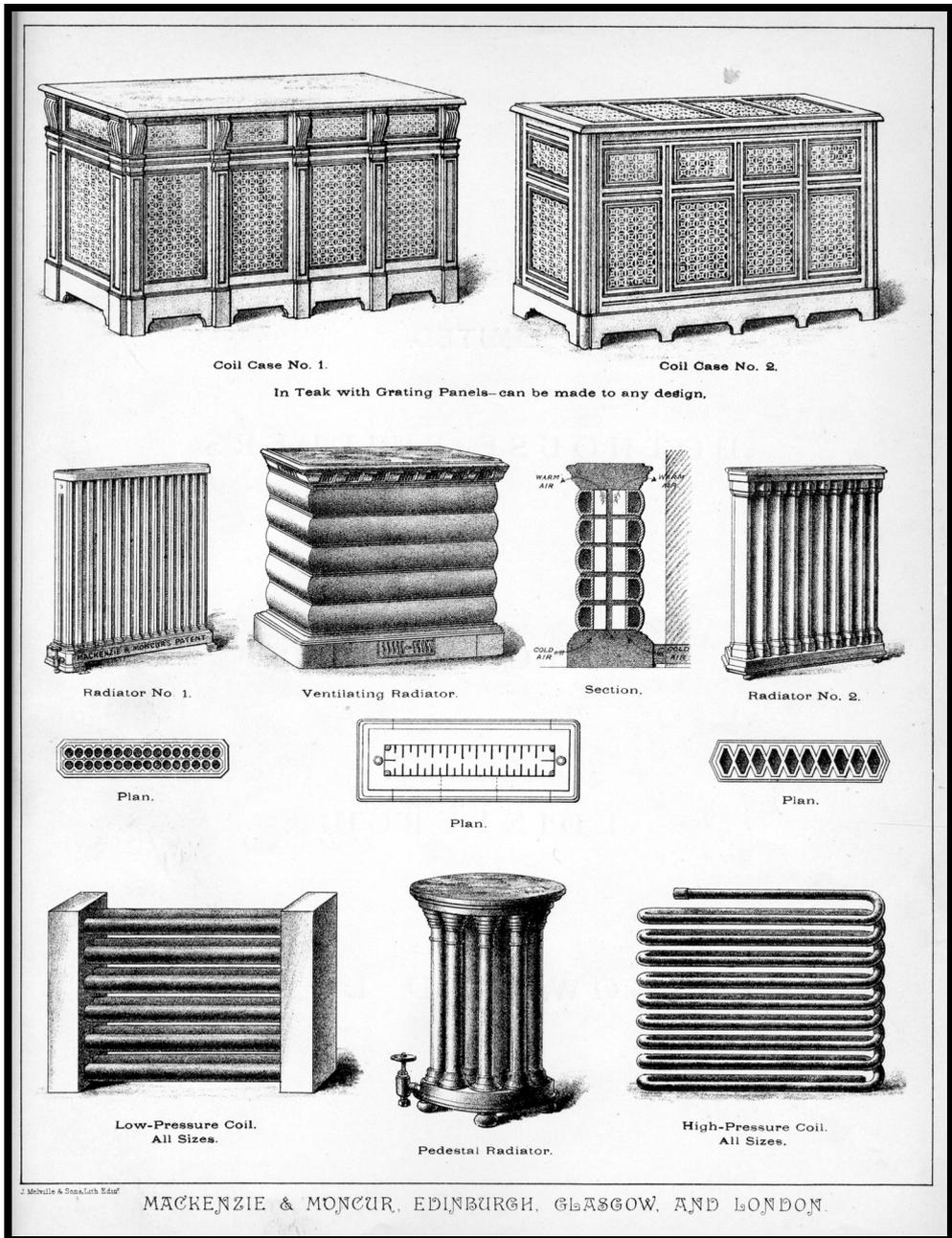
At the beginning of the 20<sup>th</sup> century, the *Ventilating* radiator was gaining acceptance. The idea was to remedy the lack of ventilation afforded by the ordinary “direct” radiator. Essentially, the lower part of the radiator was blanked off against the entry of room air, and fresh air was led to the base of the radiator by a channel in the wall behind it. These were sometimes termed “indirect” radiators when located outside the room being warmed. But it is believed this type was first introduced about 1850.



*Cast-iron radiator enclosure with marble top, Lanhydrock House, Cornwall.*



*Perkins system heating coils in Cornwood Church, Devon.*



Radiators, coils & coil-cases from the 1900 catalogue of Mackenzie & Moncur, Edinburgh.



*A hot-water heater with decorative vertical tubes by Vincent Skinner found in a Bristol Church.*

In 1904, claims and counterclaims relating to the introduction of radiators into Britain abounded. Acknowledging that steam radiators were of American origin the firm of Longden in Sheffield claimed to have played a major part in introducing hot water radiators to the British market. Rosser & Russell of London claimed to be the original inventors of the ventilating radiator, but did not give a date. Other claimants include The Thames Bank Iron Company, and Weekes & Company. The case remains unproven, but one of the earliest is the ventilating radiator introduced by Walter Jones in 1881 and awarded a silver medal in the same year.

The number and variety of radiator styles and pattern names available as the Victorian era came to a close is overwhelming. In 1891, Keith was advertising both the *Universal* and the *Ornamental*, while the Coalbrookdale Co listed their *Hydro-Caloric* (Heap's Patent). By 1897, the American Radiator Co was promoting in London their *National Single Column* and *Rococo* designs. H Munzing in London was importing a variety of American radiators including *Royal Union*, *Coronet*, *Union*, and *Walworth Patent*. Longden of Sheffield featured the *Sunbeam* (Leed's Patent). Wontner-Smith Gray of London had the *Finsbury*, while the Meadow Foundry of Mansfield made the *Count* and the *Peer* Other British companies merely advertised their radiators as "ornamental" or "special," including firms like Haden of Trowbridge, Williams of Reading, and Thames Bank Iron and W G Cannon, both in London. Other early British manufacturers include Beeston, Crane, Hartley & Sugden, Lumbys, National Radiator (later Ideal Standard), Vincent Skinner [9] and Wm Graham.

In 1906, the London catalogue for the American Radiator Company listed: *Astro Hospital Swinging*, *Circular*, *Colonial Wall*, *Corner*, *Curved*, *Detroit*, *Excelsior*, *Italian*, *National*, *Peerless*, *Perfection*, *Primus*, *Rococo*, and *Sanitary Pin*; many of these came in a choice of heights, widths, number of columns and arrangement, and in so-called flue, ventilating and non-ventilating designs.

## **Safety**

***Heating equipment should only be operated, opened up or dismantled by competent engineers familiar with Health & Safety procedures and having appropriate tools and equipment. Rotating equipment, high-pressure pipelines, fuel systems, steam and electrical systems may be hazardous.***

The make and style of many Victorian and Edwardian radiators and stoves may be established by consulting the CIBSE Heritage Group website: [www.hevac-heritage.org](http://www.hevac-heritage.org)