JOHN GRUNDY
1844-1913

First President IHVE 1898

A detailed biography is available elsewhere on this web site under
Victorian Heating Engineers

Grundy's premises in City Road, London

Advertisement from 1891

JOHN GRUNDY,

HEATING APPARATUS MANUFACTURER.

ESTIMATES FREE. SUCCESS GUARANTEED.

HEAD OFFICE:
30 DUNCAN TERRACE, CITY ROAD, LONDON, N.
SHOW ROOMS:
TORRENS STREET (Close to the Angel), ISLINGTON, N.
WEST END BRANCH:
57 WIGMORE STREET, CAVENDISH SQUARE, W.
FOUNDRY:
THE TYLDESLEY IRONWORKS, near MANCHESTER.
Telegrams: "JOHN GRUNDY, LONDON."

Proprietor and Manufacturer of
PATENT "HELIOS" and "SIRIUS" ACTUAL

SMOKE CONSUMING GRATES

WITH VISIBLE FIRES.

Patent "HESTIA" Slow and Quick Combustion.

WARMING & VENTILATING STOVES.

Winter, Warmth and Comfort.

HEATING & VENTILATING APPARATUS. GRUNDY'S SPECIALITY. PURE WARM AIR.

Upwards of One Thousand Testimonials received.

PURE WARM AIR AS SUPPLIED TO

Truro Cathedral; Londonderry Cathedral; Sherborne Abbey; Kilmore Cathedral; Stanley Cathedral, Falkland Islands; Cardiff Catholic Cathedral; the Queen's School Chapel, Eton; Cork Asylum; Leicester Asylum; and to upwards of three thousand Places of Worship; and a great number of Mansions, Houses, Hotels, Hospitals, Schools, Warehouses, Factories, Workhouses; Cork Law Courts, &c. &c.

84 BROOK STREET, GROSVENOR SQUARE, W.; *December* 8, 1893.

SIR WILLIAM BROADBENT encloses cheque for the "GRUNDY" HEATING APPARATUS supplied to his house, and is glad to say that it has proved very satisfactory for warming and ventilating as required. The principle of the apparatus is most excellent.
To Mr. Grundy.

October 24, 1893; HIND HEAD HOUSE, HASLEMERE.

PROFESSOR TYNDALL writes:—DEAR SIR,—My house being so well provided with grates and flues for the generation and distribution of pure warm air, I have been thus enabled to spend my winters in England instead of on a foreign shore.—Yours very truly, JOHN TYNDALL.

Advertisement from 1897

Open Fires And Stoves. Part 3

The Grundy Grate is somewhat similar to the Galton grate, and is shown in Plate XVII. The fresh-air opening through the outer wall is shown at a, or, if more convenient, it can be put lower down as at b, or carried as a channel along the skirting-board or below the floor-boards in either direction. The cold air, entering this flue, passes under the cast-iron base-plate c. If the inlet is at B, the air reaches the warm-air chamber D round the back of the fire-grate, and passes into the room through the warm-air duct H, which has a regulating valve K. The grating itself is lettered f, and the bars g, while the whole of the back of the fire consists of firebrick, marked E. This grate is made in various sizes with various heating capacities. It is obvious that the condition of the warm air entering the room will be, so far as purity is concerned, exactly the same as the external air, and if this is charged with soot, dust, or fog, these matters will be delivered into the room. In the grates described no arrangement is made to purify the incoming air, and while such fireplaces may be suitable for country-houses, they may not be satisfactory for town-houses. Another point is that, in order to obtain economy in the use of the fuel, it is desirable to block up the space between the grate and the hearth, but this point will be specially brought out in dealing with the following type of grate.

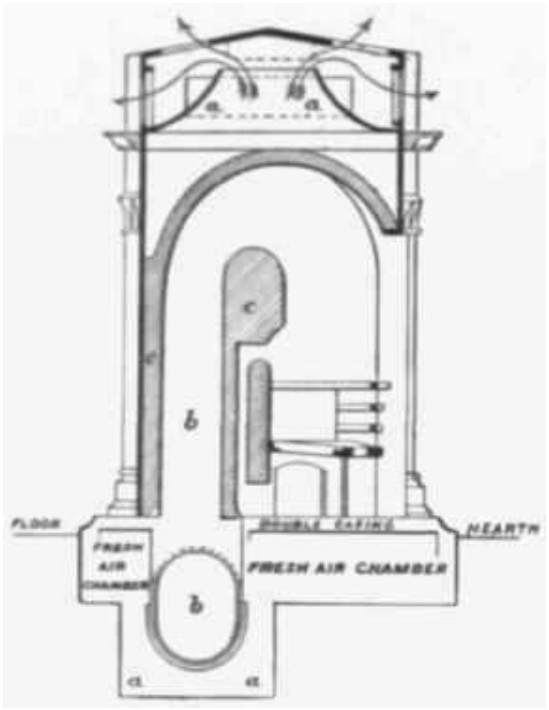
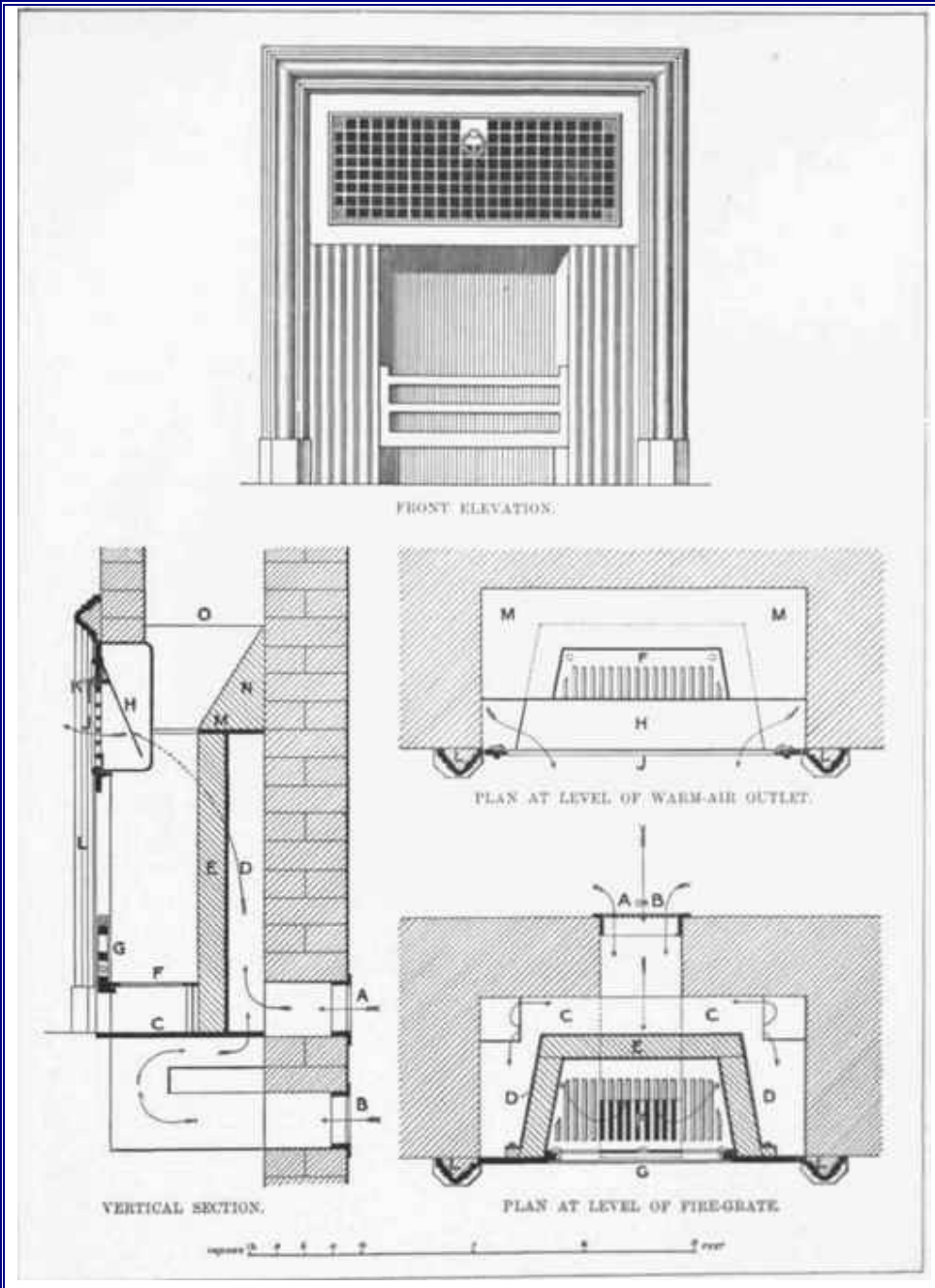


Fig 458 section of the Galton Independent More a a. fresh-air flues b b, smoke-flue. c c, fire-clay.

1 The fire-clay, however, will more easily crack and to admit the smoke into the air-flues.- 1 ED.

PLATE XVII.



Grundy's Warm-Air Ventilating Fire-Grate

A. Fresh Cold-air Inlet Grating.

B. Fresh Cold-air Inlet Grating

(alternative position).

C. Cast-iron Base Plate.

D. Warm-air Chamber.

E. Firebrick Back.

F. Bottom (irate.

G. Front Bars.

H. Warm air Duct.

J. Warm-air Outlet Grating.

K. Regulating Valve. L. Cast iron Mantel. M. Cast iron Sealing Plate. N. Brickwork Slope. O. Smoke Flue.

(Above text and diagrams from **chestofbooks.com***)*

JOHN GRUNDY'S

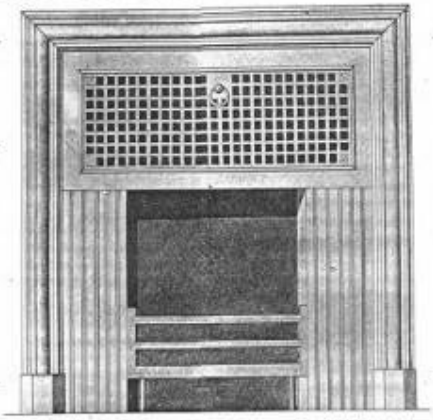
Patent M.B. Warm Air Ventilating Fire Grate.

SHOWING METHOD OF FIXING.

REFERENCES.

A. Fresh Cold Air Inlet Grating.
B. Do. do. Alternative Position.
C. Cast Iron Base Plate.
D. Warm Air Chamber.
E. Firebrick Back.
F. Bottom Grate.
G. Front Bars.

Scale 1½ inches to 1 foot.

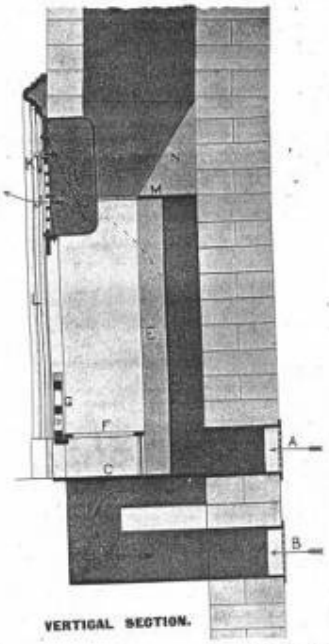


FRONT ELEVATION, with Cast Iron Moulded Mantel.

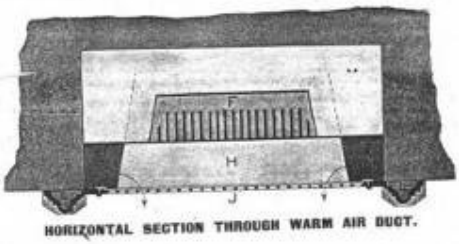
REFERENCES.

H. Warm Air Duct.
J. Warm Air Outlet Grating.
K. Regulating Valve.
L. Cast Iron Mantel.
M. Cast Iron Sealing Plate.
N. Brickwork Slope.
O. Smoke Flue.

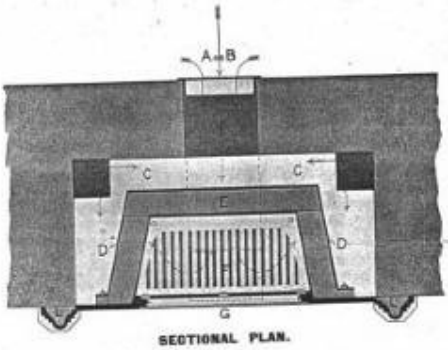
Scale 1½ inches to 1 foot.



VERTICAL SECTION.



HORIZONTAL SECTION THROUGH WARM AIR DUCT.



SECTIONAL PLAN.

PRICES ON APPLICATION.

This Grate is made in various sizes and heating capacities, and is especially suitable for Schools, Class Rooms, Hospitals, Infirmaries, Dormitories, Offices, and Dwelling Houses.

PRICES AND ILLUSTRATIONS OF OTHER PATENT HEATING AND VENTILATING APPARATUS POST FREE ON APPLICATION TO—

JOHN GRUNDY, Heating Specialist & Ventilating Engineer, 30, Duncan Terrace, City Road, LONDON, N.

West End Branch:—57, WIGMORE STREET, CAVENDISH SQUARE, W. Manufactory:—TYLDESLEY, near MANCHESTER.

Perhaps the most complete appliance for warming air in a central chamber (for distribution by gravity and not mechanically) is Grundy's "Calorifer" smoke-consuming central heating apparatus.* Figs. 270 to 273 illustrate this heater in plan and sections, and the principal parts of the structure are as follows:—A, ashbox; B, firebox with filling neck C; D and E, air channels; F, G, combustion chamber; H, radiators; I, flue division in radiators; K, smoke flues; L, M, N, feeding and ash doors; O, doors for cleaning out radiators; P, evaporating vessel (with indicator).

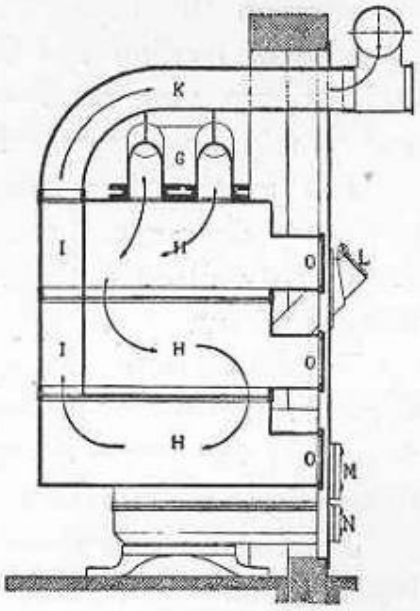


Fig. 273.

The channel D surrounds the grate and is connected with the outer air which is admitted and regulated by means of an adjustable valve. This channel introduces heated air under the grate to ensure perfect combustion. The parts of the filling and combustion chambers most

* John Grundy, heating engineer, London and Tyldesley, specialist in this work.

(Text extract from "A Practical Treatise: Warming Buildings by Hot Water," Chas Hood, rewritten by Frederick Dye, 1897)

exposed to the fire are lined with fire-bricks, which are cone shaped towards the centre at F so as to form, together with the cast-iron outer partitions, one channel, which is connected with the outer air by E similarly to the channel D. The action of this channel is likewise regulated by means of an adjustable valve. Through this channel highly heated air is brought in contact with the products of combustion to effect ignition of the smoke. Those parts of the combustion chamber which are not lined with fire-bricks have smooth, ribbed or fluted sides according to the heating surface required. On the uppermost casting of the combustion chamber there are four nozzles from which the radiators H are suspended freely (to allow for expansion and contraction). Through these radiators, which are also made smooth or ribbed according to heating surface required, the products of combustion are taken first downwards at H and then upwards again through I to the smoke flues K which are situated on the top. The doors L, M, and N, serve the purpose of feeding the Calorifer, for cleaning out the grate and for removing the ashes. They are made to fit air-tight, and remain closed whilst the apparatus is in action.

The evaporating trough P is provided to furnish the necessary degree of humidity to the air (see p. 389), and is ingeniously fitted with an indicator, also a means of filling from the front.

The illustrations Figs. 274, 275 and 276 are introduced to show the method of fixing, and the work shown embodies the desirable, and some essential, features requisite when fixing these stoves of any kind.

The illustrations show the heater in an ordinary bricked-in heating chamber located in the basement of a building. The air enters from the outside by the screened window *i* into the fresh air chamber *k*, where any dust carried in with the air can settle down. It is then admitted by a sliding door or throttle valve *m* to the inner fresh air passage *k*, and thence to the heating chamber. These fresh air passages can be entered by an attendant through the door *n*, for the purpose

of cleaning out whatever may have been carried in from the outside. Access to the heating chamber proper is by the door *o* to clean the apparatus itself and the heating chamber. This should be done at the beginning of each heating season.

The warm air passes along the ceiling of the heating

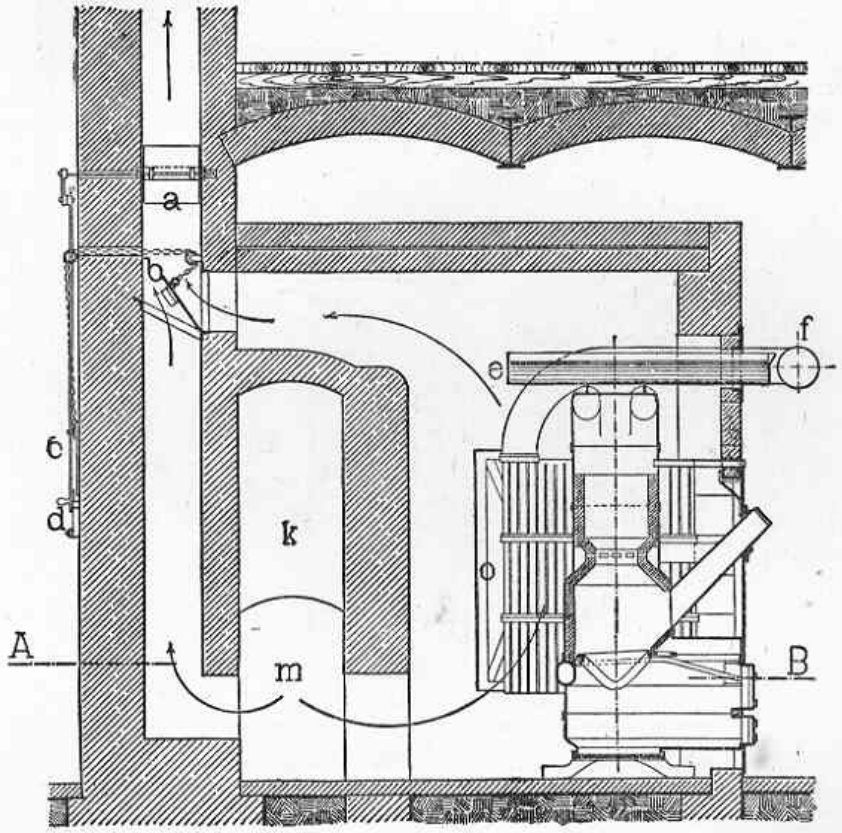


Fig. 274.

chamber entering at *b* into the vertical flues leading to the rooms to be heated. Each room has a separate flue, with a warm air inlet, about 6 feet above the floor. The vitiated air is taken off by a separate flue leading above the roof, and having exhaust valves—one a little above the floor for winter

ventilation, and another immediately below the ceiling for summer ventilation.*

Although it is possible to regulate the total heat produced in each heating chamber by the quantity of fresh air admitted, yet it is impossible to warm all the rooms equally and ven-

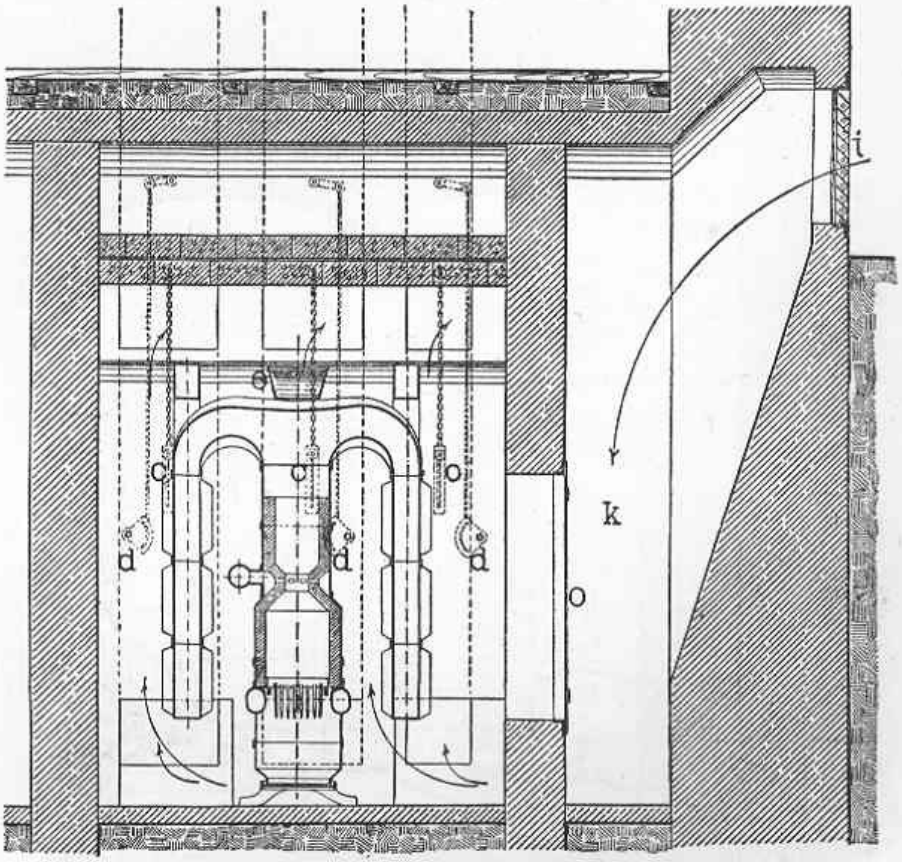


Fig. 275.

tilate them properly as well, for some rooms being less exposed naturally attain the desired temperature sooner than others. In some rooms the temperature may rise rapidly on account of gas flames or a number of people being assembled, and it is therefore of importance to give each room warm or cold air just as may be required to attain this.

In each fresh air passage there is a mixing valve *b*, regulated from outside, by which cold and warmed air can be

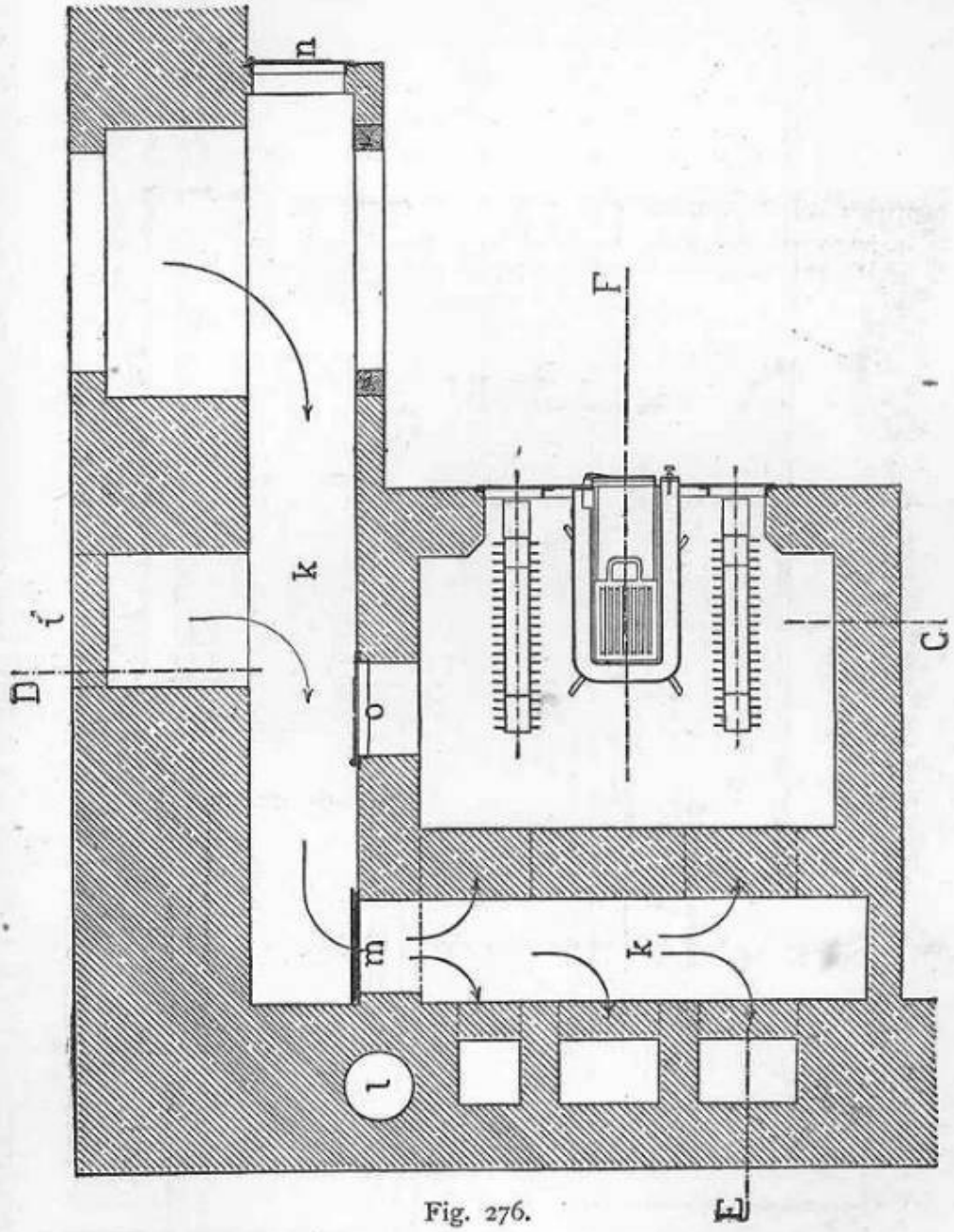


Fig. 276.

mixed in any proportion, and when the heating begins these mixing valves occupy the position shown in Fig. 274. As

No 1 Works at Hadleigh Suffolk
Heating Apparatus
Jan 26 1891

To R. St. Cook Esq

We Hereby Certify that in our opinion
Mr. J. Grundy is entitled to
receive the sum of Fifty Pounds
being payment to settle enclosed a/c for
Heating Apparatus -

£ 50. Eade & Johns.

NOTE—IT IS RECOMMENDED THAT THE RECEIPT BE GIVEN ON THE BACK OF CERTIFICATE.

Works at Hadleigh

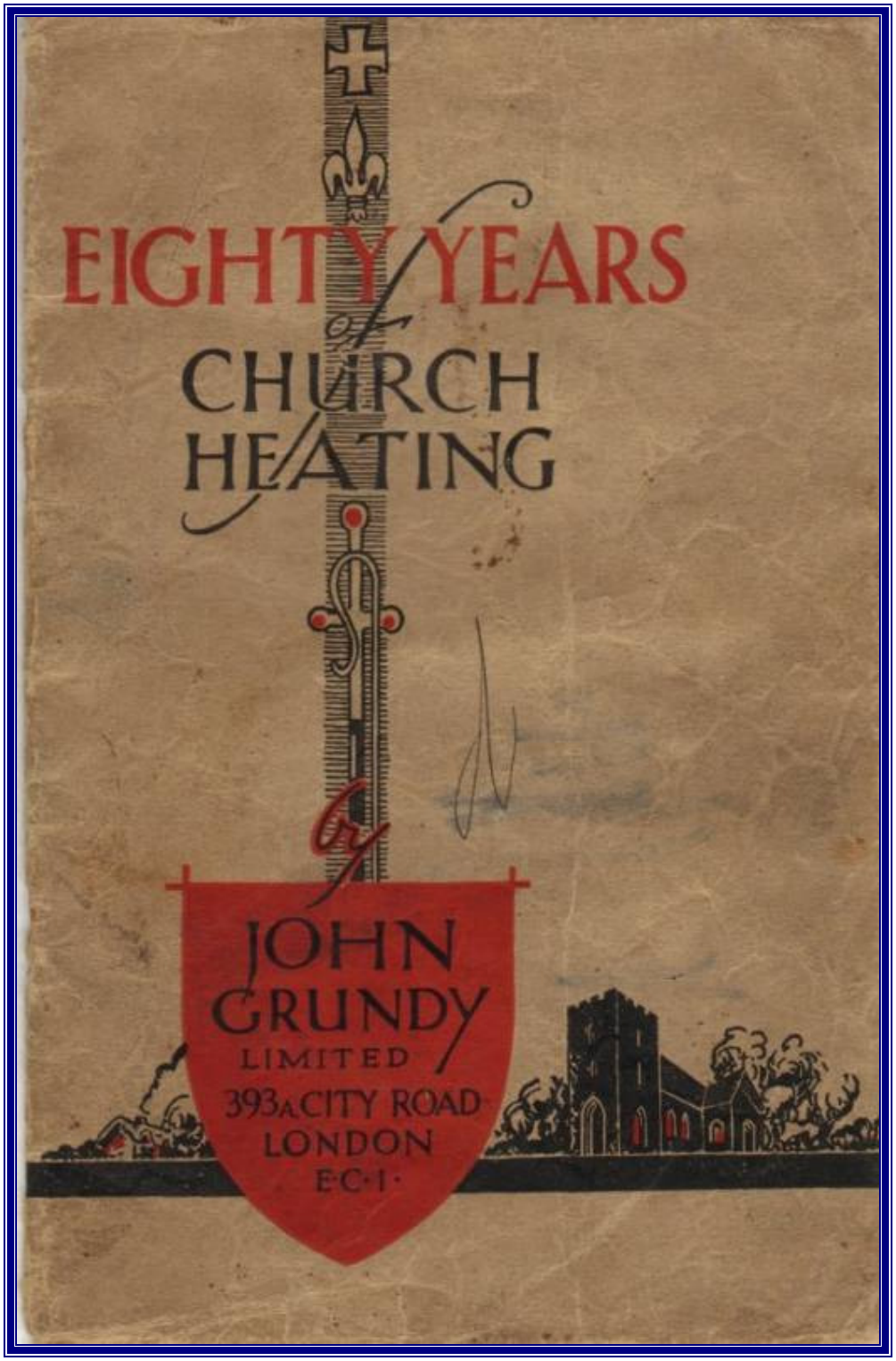
January 28th 1891

Received from R. St. Cook
the Sum of Fifty Pounds
— Shillings & — Pence
as per Certificate at back

Received before £ 50
" as above With very genuine thanks
Total £ in Settlement

J. Mc Grundy

Grundy receipt from 1891



(CIBSE Heritage Group Collection)

Grundy stove, St Paul's Church, Deptford, London

Oil-fired Grundy heater St Barnabas Church, Epsom (now destroyed)

FOOTNOTE

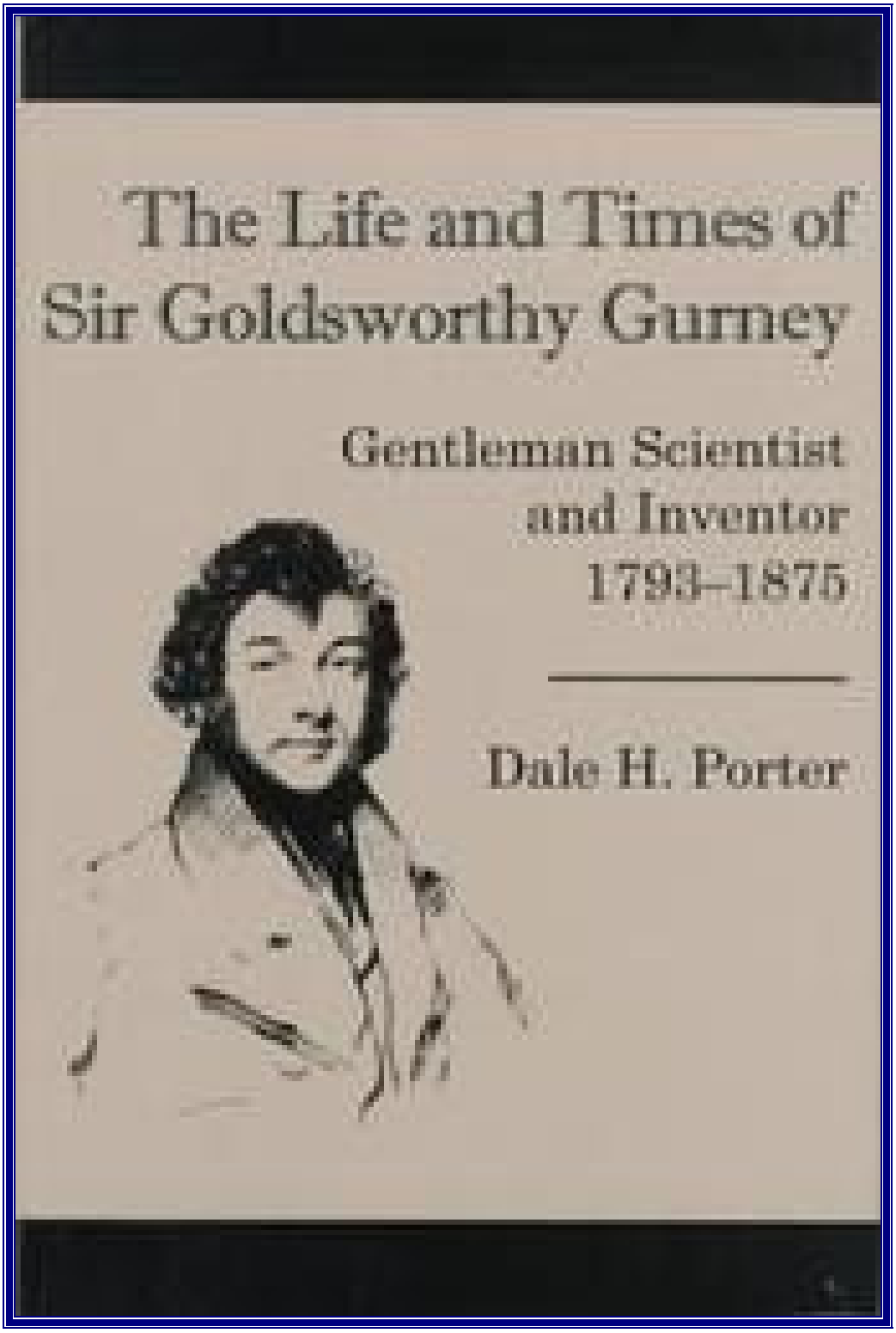
GRUNDY

John Grundy, ## 30 Duncan Terrace, City Rd, London, N. From at least 1875. Listed as being the heating engineer for the New Wesleyan Chapel, Rotherhithe [TB, 1874/768]; Congregational Church, Enfield [TB,1875/1128]; New Wesleyan Sunday School, Tottenham [TB,1880ii/326]; St Peter's Church, Upper Holloway [TB,1880ii/359]; St Matthew's Church, Bayswater [TB,1883i/455]; Church of St Matthew, Kemp Town, Brighton [TB,1883ii/288]; St James's Congregational Church, Newcastle-upon-Tyne [TB,1883ii/424-5] and Wesleyan Church, Addiscombe, Croydon [TB,1883ii/622]. Advertised as both "Heating and Ventilating Engineer" and as "Heating Apparatus Manufacturer". Products listed include "Helios" and "Sirius" smoke consuming grates, "Hestia" stoves and "Calorifier" and the well-known "Grundy" warmed air heating apparatus. Warm air installations included cathedrals at Truro, Londonderry, Sherborne, Stanley (Falkland Islands) and Cardiff plus "upwards of three thousand places of worship". *John Grundy, 1st President IHVE 1898: Herbert H Grundy, 17th President IHVE, 1915.*

(Entry from CIBSE Heritage Group Records:
Items marked TB indicate references from "The Builder,"
giving year and page numbers over the period 1843-1883)

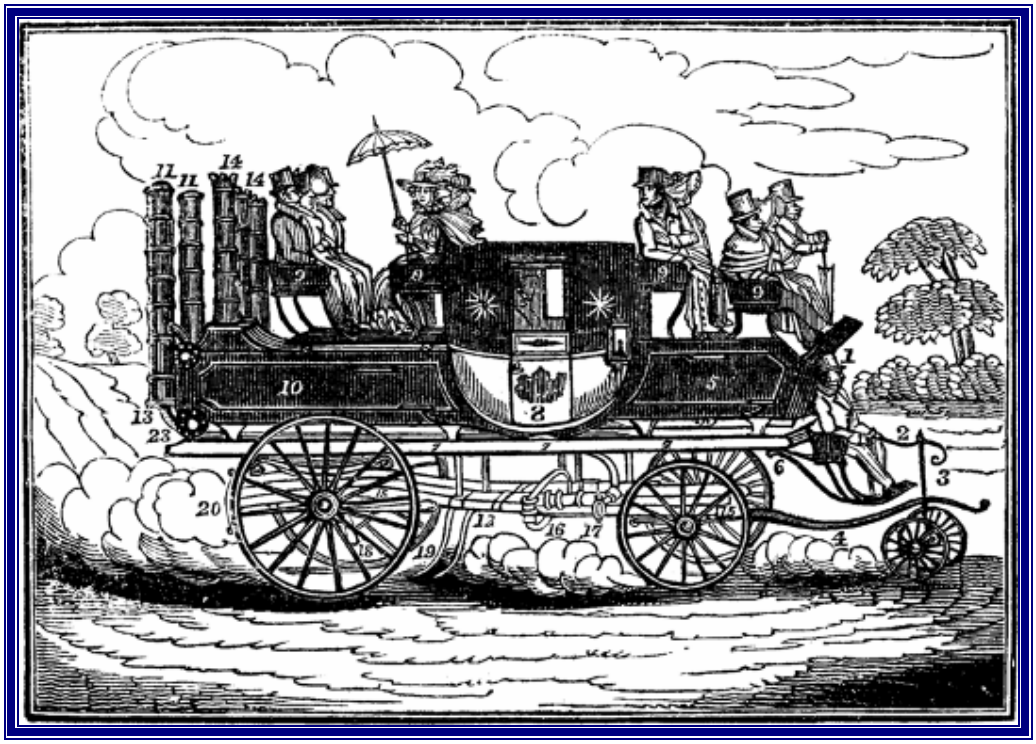
Sir GOLDSWORTHY GURNEY
1793-1875

Inventor of the steam carriage and the Gurney stove



A biography

A detailed biography is available elsewhere on this web site under
Victorian Heating Engineers



Gurney steam carriage

Gurney stove, Salisbury Cathedral

THE LONDON WARMING AND VENTILATING COMPANY, LTD.

105 Regent Street (The Quadrant), London, W.

ESTABLISHED 1854.

Contractors to H.M. War Office, Admiralty, Home Office, &c. &c.

A. P. FLORENCE, MANAGER.

Proprietors of the

PATENT "JACKSON" AND "REVERTIVE" OPEN GRATES.

Sole Agents for

CHOUBERSKY," "SALAMANDRE" & OTHER CONTINUOUS BURNING STOVES,

Suitable for Entrance Halls, Corridors, Billiard Rooms, Studios, &c., and specially adapted for burning most successfully

ANTHRACITE (Smokeless) COAL,

Effecting a saving in fuel of more than 30 per cent., with increased heat, and warmth under perfect control.

ILLUSTRATED CATALOGUE ON APPLICATION.

Proprietors of **"GURNEY"** Stoves for Warming Churches, &c., as specified by leading Architects, and as used in St. Paul's, Salisbury, Exeter, Gloucester, Lincoln, Llandaff Cathedrals, York Minster, St. George's Chapel, Windsor, &c. Twenty-two Cathedrals, and over 10,000 Churches, Schools, Government and other public and private buildings successfully warmed by our system.

ECONOMICAL, EFFICIENT, CHEAP, DURABLE, SAFE.

MANY PRIZE MEDALS AWARDED.

PARTICULARS AND ESTIMATES FREE.

1897 advertisement

Gurney found the atmosphere of the House to be dessicated, oppressive and subject to constant disturbance from initial and retrograde currents passing in all directions, as if at random, and apparently without control. He also found that from the same want of proper control, offensive vapours and effluvia (emanating from contaminated sources) were drawn into the House.

Although he believed that most of the evils could be corrected by a simple arrangement, it was difficult to demonstrate on paper. Furthermore, on former occasions an unfair advantage had been taken of statements which he had made and parts of his plan had been adopted without consulting him.

He called in aid his recommendation which had satisfactorily ventilated the Chamber of Deputies in Paris and also in the Courts of Exchequer and Common Pleas at Westminster Hall. He believed that if the House were to be placed under the control of the Office of Works for a short time, he could, with their assistance, remove all the material evils.

The committee reported that "In consideration of the urgency of the case, they have since the commencement of their sittings, sat four days every week and have made a personal inspection of the Works connected with the Ventilation of the entire building.

The back of the south wing towers and ventilating shaft, by J. Johnson (1849).

They regret to state that they are not at present in a condition to suggest any specific alterations either in the Ventilation or Lighting, calculated permanently to remedy the defects complained of. They, however, recommend that during the recess, Dr. Reid should be allowed to effect the alterations described in his Report, under the supervision, and subject to the approbation of the First Commissioner of Works, and two members of the committee, Mr. Stephenson and Mr. Locke.

The evidence received up to the present moment being incomplete, the committee do not think it desirable to Report it to the House; but when Parliament reassembles, they will resume their labours."[5]

As a result of the foregoing Reid left the scene with Goldsworthy Gurney hovering in the background. Both Houses were for a time handled by the engineer, Alfred Meeson, whom Barry had employed, but he was placed under the control of the Office of Works. He made a number of alterations.

(Text extract from "The Palace of Westminster," Sir Robert Cooke, 1987)

Appendix D: Mr. Goldsworthy Gurney's Report on the ventilation of the House of Commons (1852)

In obedience to the Order of your Honourable House, dated the 12th day of March 1852, I beg to Report, That I am investigating the arrangements for the warming, ventilating, and lighting the New House of Commons; and, having been given to understand by several Members that it would be acceptable to The House that I should make a First Report on the state of the Ventilation as early as possible, I beg further to Report as follows:

That, although I have been interrupted in my investigations, and thereby prevented from making them as full and complete as I could have wished, I have seen sufficient to satisfy myself of the causes of the great inconvenience experienced at this moment.

That I find the atmosphere of the House in a dessicated and oppressive state, and subject to constant disturbance from initial and retrograde currents passing in all directions, as if at random, and apparently without control, producing direct draughts in particular parts of the House, and oppression in others. I also find that from the same want of proper control, offensive vapours and effluvia (emanating from contaminated sources) are drawn into the House.

That most of these evils can be corrected by a simple arrangement, and at an expense comparatively trivial, and although this is a common-sense question, yet it would be difficult to demonstrate it on paper unaccompanied by actual experiment, or to explain the facts and conditions on which this conclusion is arrived at. And inasmuch as on former occasions an unfair advantage has, I think, been taken of the statements and evidence which I have given from time to time, and portions of my plans have been adopted without consulting me, I am induced to ask permission to refrain from entering into details at present.

The principles of ventilation which have been recommended by me, and, to the best of my belief, acted upon in the Chamber of Deputies at Paris, and now in operation in the Courts of Exchequer and Commons Pleas in Westminster Hall (which courts were previously unsatisfactorily ventilated by a similar arrangement to that now applied to this House), and their success in every Court of Judicature, and other places in the provinces to which they have been extended, afford sufficient evidence (in addition to what I have seen in this House) to justify me in saying, that if the House be placed under the control of the Office of Works for a short time, I would pledge myself, with their assistance, to remove all the material evils that at present exist, at a very trifling expense; and at the expiration of such control, to restore the ventilation, if required, to its present state, within the space of a few hours.

Of course it will be understood that this Report applies only to the House itself, and not to the entire building.

GOLDSWORTHY GURNEY

5 April 1852

(From "The Palace of Westminster")

September 1852, Dr David Boswell Reid, was sacked as Ventilator to the House of Commons.

It was time to invite Goldsworthy Gurney, a Cornish inventor and one of Reid's rivals, to have a go. This Gurney did with such gusto that he very nearly took the place of poor, mad, deluded, tortured Guy Fawkes as the man who came nearest to blowing up Parliament. Gurney apparently had a predilection for gunpowder; he set off 60 pounds of it in the House of Lords to test their air supply – 'by flashing small portions in rapid succession . . . I watched the first appearance of the smoke in various parts, its apparent quantity, and noted the time it took in coming and going out'.

Naturally, Gurney turned the whole system round, and instead of drawing in air through the Clock Tower and the Victoria Tower, he drew it in from ground level, and expelled it through the Towers. Both Towers had large furnaces at the bottom to provide the up-draught, and small turrets that had three fish-tail gas jets burning inside to help the upward flow of air. The scheme did not do much good; the Commons was still uncomfortable – Sir Henry Verney kept a pair of worsted stockings and gaiters in the House to try to keep his feet warm – and, above all, the Thames still stank.

One earnest seeker after pure air suggested that fountains of fresh water should play in all the corridors and rooms of the Palace, on the peculiar assumption that the water would absorb the smells. Not surprisingly, no one took up the idea. Gurney suggested dredging deep channels parallel to both shores of the Thames into which the sewage was supposed to drift, but MPs doubted if it would work, and insisted that the old remedy should be continued – pouring ton after ton of lime into the water to try to purify it. Gurney busied himself being scientific; he hung pieces of paper soaked in acetate of lead in the Chambers of the Lords and Commons, in their Libraries, in the corridors and on the Terrace. They proved that there was sulphurated hydrogen in the air, which probably impressed the committee no end as they sat in their room behind curtains soaked in disinfectant. Yet somehow the smell had to be kept in check. Goldsworthy Gurney had an idea.

Gurney believed that vitiated air could be burnt off in flares, rather on the lines of a modern North Sea gas flare. He wanted to close off all the open sewers in London, and erect a series of flares to get rid of the gases. So why not have one on top of the Clock Tower at Westminster? MPs were willing to give almost anything a try at this stage and Gurney went ahead. He arranged for the main Victoria Sewer to be connected to the flues in the Clock Tower which carried the vitiated air from the Palace, on the theory that the gases could then be flared off from high above the building. Unfortunately the flares would not light. Next, Gurney put a coal fire at the base of the Clock Tower and tried again; this time, the gases burned. One day, though, when Mr Joseph Bazalgette, the Chief Engineer of the Metropolitan Board of Works, was examining the pipe

that led from the main sewer to the Clock Tower, he discovered that there was a leak from a fractured coal-gas pipe into the sewer, and only a trap-door in the sewer was stopping the coal-gas from reaching the furnace at the bottom of the Clock Tower. There had already been one small explosion, although no one was hurt and no damage done. If the full blast of coal-gas and sewer gas had reached the furnace, then the chances are that the Clock Tower would have taken off for the moon, and the rest of the Palace would have been destroyed with it.

Gurney, who so nearly blew up the Palace of Westminster, died knighted and respected in his bed. Guy Fawkes, a bumbling plotter of ludicrous incompetence, died in excruciating agony on the scaffold not far away, in Old Palace Yard. The furnace that Goldsworthy Gurney built remained there for many years, and the Tower itself retained its function as the world's most famous, if most unknown, chimney.

(Text extract from "The Great Palace," Christopher Jones, 1983)

Gurney stove in St Nicholas Church, Grosmont, Monmouthshire

As the principal rival expert, Goldsworthy Gurney (1793–1875) (Pl. 147) was in March 1852 asked to investigate Reid's system. He had given evidence in the inquiry of 1846, arguing that Reid's upcast shaft method must fail as being 'too limited in its range of power'; he preferred the 'vis-a-tergo' arising from the escape of high-pressure steam as more manageable. The committee had then pointed out that 'no evidence of the application of his system to any public building has been adduced in its favor'; and *The Times* warned against replacing one deluded fanatic by another.[28] Now he seized his opportunity, and within a month submitted the first of three reports, pledging himself 'to remove all the material evils that at present exist, at a very trifling expense'.[29] He undertook extensive temperature and hygrometric measurements. Questioned about draughts, he pointed out that: 'It is a very difficult thing to manage a feather balance of the atmosphere by artificial means; . . . You may manage a railway train, a heavy weight, but you cannot manage a train of subtle, light, and practically imponderable air, without much difficulty.'[30]

In 1854 a Lords' committee entrusted Gurney with the ventilation of their House.[31] As already stated, the Lords' air supply was taken from the Victoria Tower and passed along the main air duct in the basement. Gurney's experiments were similar to earlier trials by Reid:[32]

> I had the air in it, as it passed along, charged with gunpowder smoke in sufficient quantities to render it visible . . . by flashing small portions in rapid succession . . . I watched the first appearance of the smoke in various parts, its apparent quantity, and noted the time it took in coming in and going out . . . upwards of 60 lbs. of gunpowder and composition were burnt. The volume of smoke . . . would be sufficient to render the whole of the incoming air visible.

During 1854 Gurney completely reversed the air supply system, converting both the Victoria and Clock Towers into upcast shafts. The air, drawn in at ground level at various places, was expelled at the tower-tops. Gurney did not give a reason for this change; at first thought an improvement, it soon proved a disaster.[33] Despite frequent modifications, complaints continued. The Thames, having become the general sewer of the metropolis, 'stank unbearably in hot weather'. About 1857, bone-boilers in Lambeth began to work at night, so that the stench was wafted over to the sitting Houses. The following year, Disraeli (having been driven out of committee by 'the pestilential odour') introduced a bill for the main drainage of London, which eventually deodorized the river.[34] Meanwhile, palliatives were tried, not always with much success: when the House was very warm, complained A. S. Ayrton,[35]

> Cold air was pumped in at the foot of the Hon. Members, the effect of which was to drive the blood to their heads, and to produce those injurious effects which were so constantly complained of and which had often compelled him and others to leave the House. Then, recently, the most abominable odours had been pumped in through the House and slits at their feet. The smell of the chloride of lime which was used was pleasant enough; but at other times the uncorrected atmosphere of the Thames was wafted through the floor, and then the effect was dreadful indeed.

Gurney's experiments in Parliament (reference unknown)

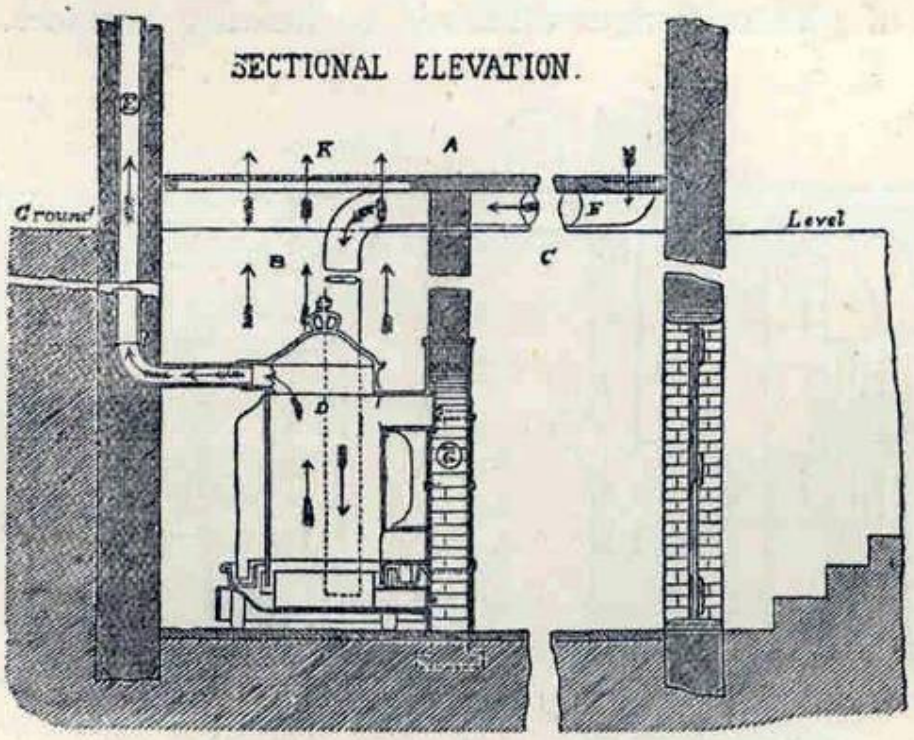


Fig. 269.

Fig. 269* represents the "Gurney" stove, placed in a vault to warm the air supply of a building. The Gurney stove embraces in a most successful and practical manner the utility of gills or flanges attached to heating surfaces. The stove is circular in form with gills standing out all round its circumference. A very unique feature is in the lower ends of these gills which terminate in a water trough running round the stove to receive them. The object of the water trough is to provide the necessary degree of humidity to the warmed air as already explained, and a more successful plan could hardly be conceived. The stove is here shown discharging warm air through a grating above it.

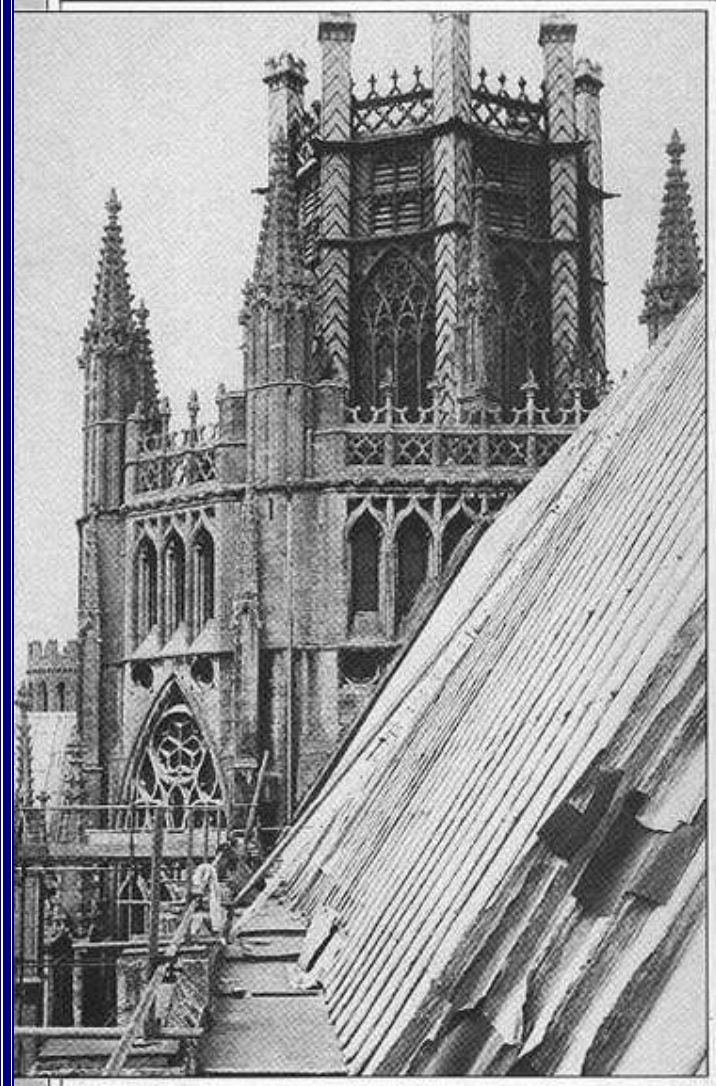
* Made by the London Warming and Ventilating Company, 105 Regent Street, London.

This stove (a battery of them) has the reputation of sucessfully warming St. Paul's Cathedral when all other attempts had failed. The Gurney stove is made for use in exposed positions for ordinary warming purposes, as well as in stove chambers for heated air works. Its sizes vary from 5000 to 120,000 cubic feet, these figures denoting the area a single stove is capable of heating.

(Text extract from "Warming Buildings," Frederick Dye, 1897)

Gurney stove in Chester Cathedral

Gurney stove in Bude



GURNEY BY GAS

Cathedrals and churches have long been heated by Gurney Stoves but they don't meet today's need for energy economy. *Neville Billington* describes how the Gurney Stoves at Ely Cathedral have been converted to gas firing.

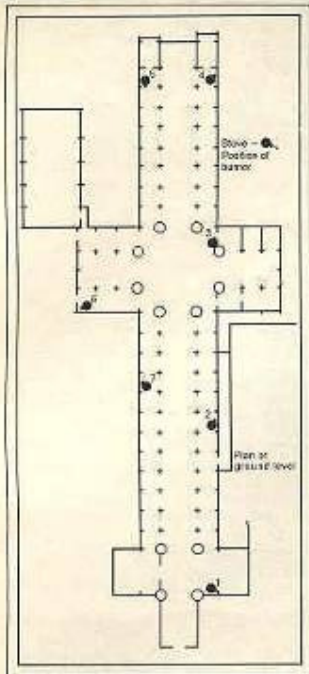
About 120 years ago, seven Gurney stoves were installed to heat Ely Cathedral at a total cost of some £450. Each stove was 5 ft 9 in (1750 mm) high overall; the barrel of the stove was 24 in (600 mm) in diameter, and 3 ft 8 in (1110 mm) high; over the fins, the diameter of the stove was 38 in (965 mm). According to the manufacturer's leaflet, the stove would burn 7 lb/h (3·2 kg/h) of anthracite, and would heat 120 000 ft^3 (3360 m^3) of space (though to what temperature was not stated). A toroidal water tray surrounded the base of each stove: some 4 gall/day (18·2 litre/day) could be evaporated, and it was claimed that the evaporation aided heat distribution as well as keeping up the humidity.

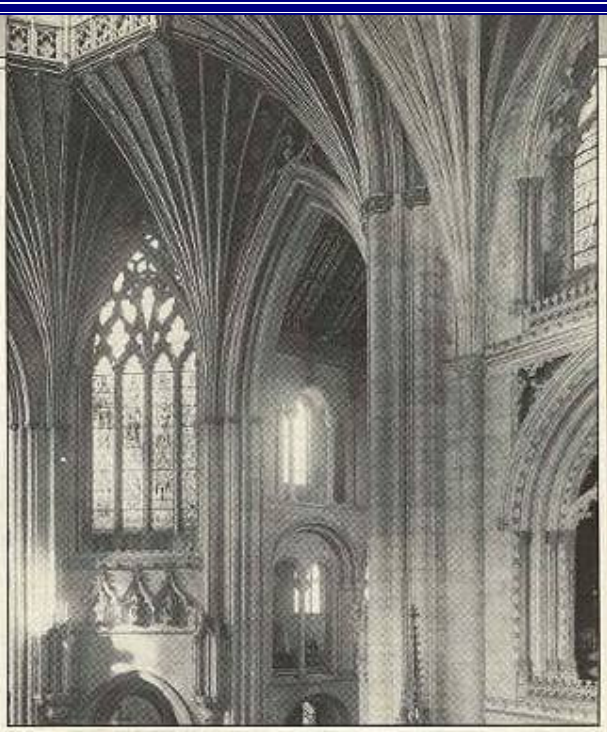
The stoves were continuously alight, being fuelled twice daily. Immediately after charging, the output would be relatively low, rising to a high figure over a period of some hours, and then declining until the next charge. At maximum output, it was reported that the stove body, at the fin roots, was a dull red heat, though in spite of the high surface temperature, there have been no recorded burns. It has been estimated that the maximum output was about 400 000 BThU/h (117 kW), the minimum about 60 000 (17·6 kW) and the mean 100 000 BThU/h (30 kW).

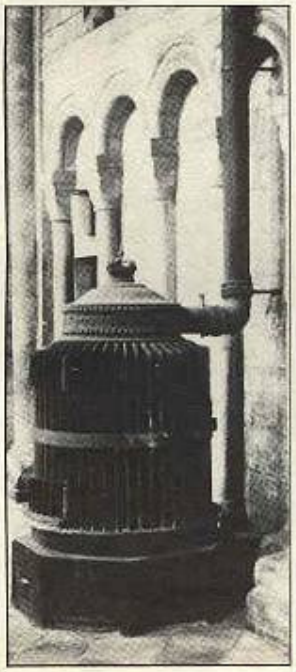
With the imminent retirement of the stoker, the Cathedral authorities decided to investigate a new heating system which would require little or no labour. McLellan & Partners were appointed as consultants, and they prepared a report with several options, ranging from full heating to 60°F by means of radiators or warm air to background warming using the existing stoves converted to gas firing. The last option was the cheapest in both capital and running cost — the estimated conversion cost was £41 000 and the estimated fuel cost about £6900 per annum. (In the event, the conversion cost was something over £50 000.)

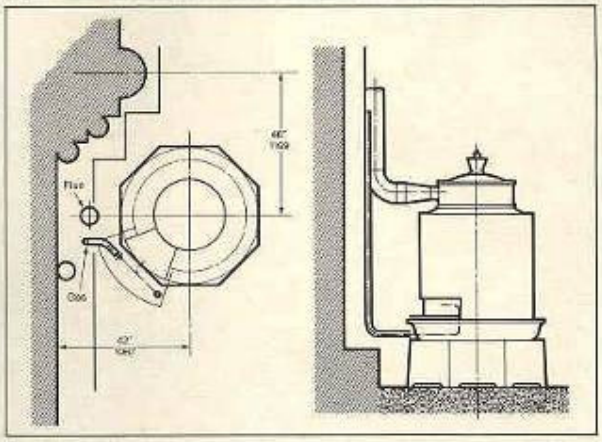
Heat loss calculations gave a total loss of 45 kW/K (including an allowed quarter air change for the total volume of 128 662 m^3). With an estimated mean output from the seven stoves of about 200 kW, a temperature rise of about 5 K would be expected. The output from the converted stoves was to be similar. It was felt desirable, too, to reproduce the cyclic output of the anthracite firing. Each burner was therefore designed to have high/low inputs of 202 000 and 60 000 BThU/h (60 and 17·6 kW) respectively, with an efficiency of 75% (outputs of 44 and 13 kW).* The body of the stove was almost filled with a core of refractory "cheeses". A large aerated fish-tail burner equipped with a flame safeguard device was fitted to one side of the body, so that the flame fired into a combustion chamber formed by the refractory. The combustion products traverse the annular space between the refractory and the body shell before passing to the flue. The flue itself was about 20 cm dia; it was double-walled and insulated. There was no provision for humidifying.

On test at Eastern Gas Board laboratories, surface temperatures were measured. They ranged from 400-500°C opposite the









flame at the base of the barrel to 150-200°C near the top, when fired at the high rate. At the fin extremity, temperatures were less than 180°C. All temperatures were lower at the low rate of firing. In view of past experience, and of the fact that compliance with British Standards and other regulations was not required in ecclesiastical premises, these temperatures were considered acceptable.

In practice, the burners are operated at high or low input in accordance with demand, and the flexibility this affords enables the system to be worked within the financial constraints.

No observations of the conditions within the Cathedral have as yet been made, but its performance during its first winter seems to have been satisfactory.

The assistance given by Mr Borgars of McLellan & Partners is gratefully acknowledged, as is the permission of the Dean of Ely Cathedral and the Eastern Gas Board to publish this account.

*This gives a mean output per stove of 20½ kW, or 200 kW for the seven stoves.

("Building Services," February 1985)

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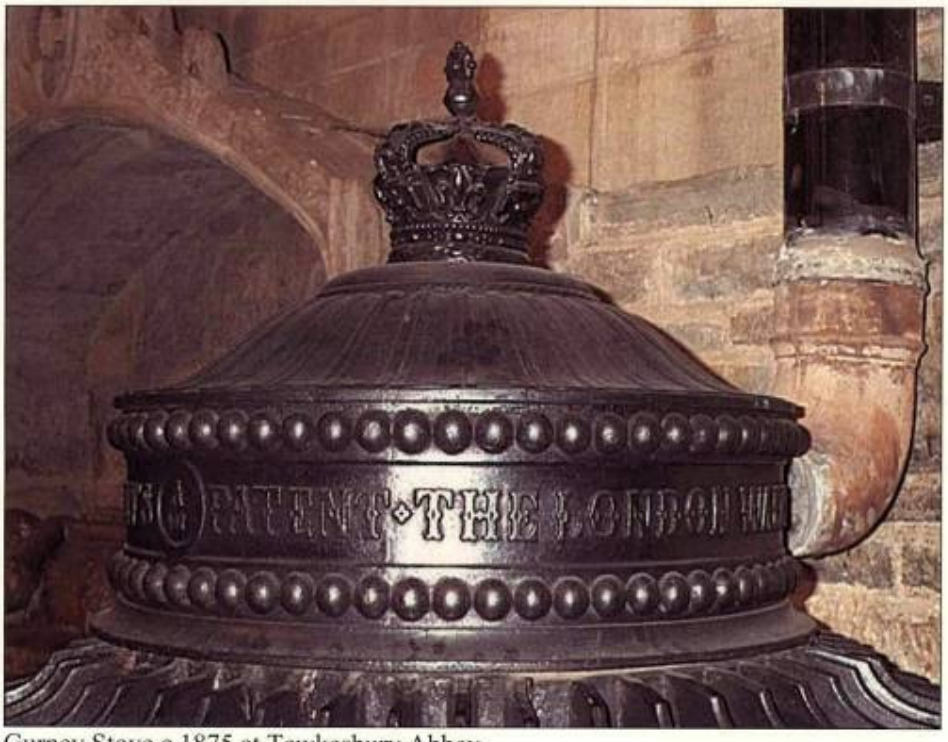

Gurney Stove c.1875 at Tewkesbury Abbey

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FOOTNOTE

GURNEY

(Sir) Goldsworthy Gurney, London. Active from around 1852. Investigated the heating and ventilating of the House of Commons following compliants about the scheme provided by Dr David Boswell Reid. His alterations were unsuccessful [BSER,204: PW, appendix D]. He heated the Royal Panopticon in Leicester Square [TB,1854/143] and Bedfordbury Mission House at St Martin's-in-the-Fields [TB,1861/806-7]. Later, his Gurney stove was used extensively in churches and elsewhere by the **London Warming & Ventilating Co Ltd.** He used steam heating with gilled-tube calorifiers (Gurney's batteries) in the House of Commons in about 1866 [BSER,103]; also provided heating apparatus to Her Majesty's Theatre, Haymarket [TB,1869/507,526]. Gurney stoves were used at St Jude's Church, Kensington [TB,1870/547] and the Royal Engineers' Institute, Chatham [TB,1873/706-7]. His "apparatus" was also used to heat St Peter's Church, Upper Holloway [TB,1880ii/359].

(Entry from CIBSE Heritage Group Records:
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