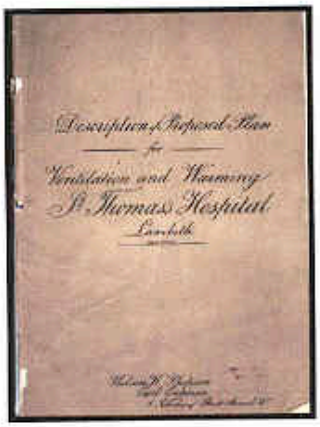
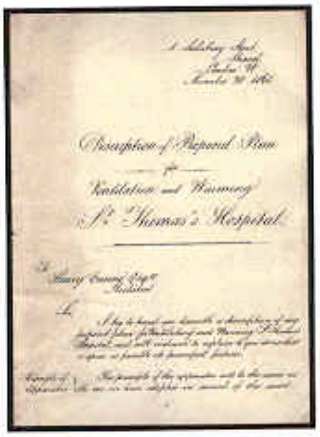

Description of Proposed Plan
for
Ventilation and Warming
St. Thomas's Hospital
Lambeth


Description of Proposed Plan
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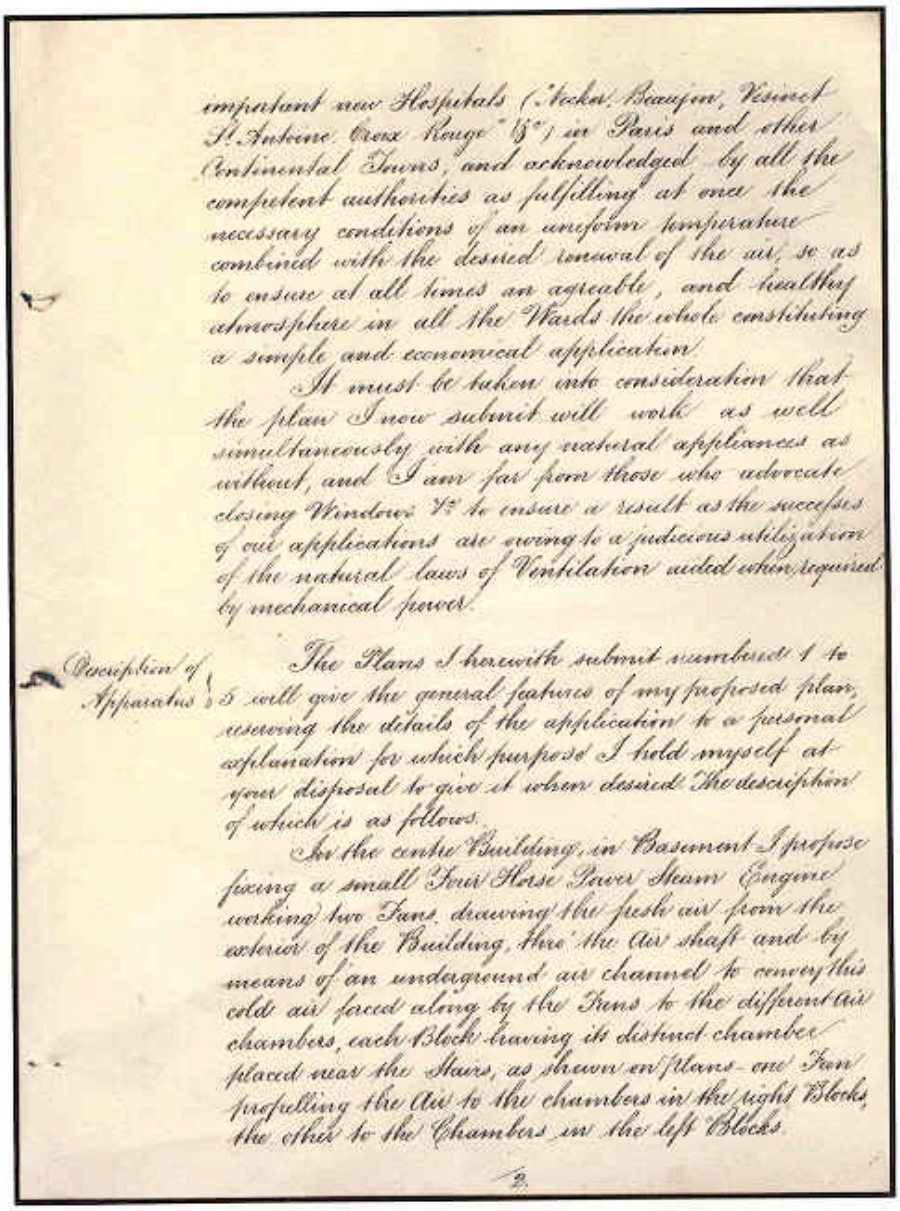

important new Hospitals (Necker, Beaujon, Vincent St. Antoine, Croix Rouge &c) in Paris and other Continental Towns, and acknowledged by all the competent authorities as fulfilling at once the necessary conditions of an uniform temperature combined with the desired renewal of the air, so as to ensure at all times an agreeable, and healthy atmosphere in all the Wards the whole constituting a simple and economical application.

It must be taken into consideration that the plan I now submit will work as well simultaneously with any natural appliances as without, and I am far from those who advocate closing Windows &c to ensure a result as the successes of our applications are owing to a judicious utilization of the natural laws of Ventilation aided when required by mechanical power.

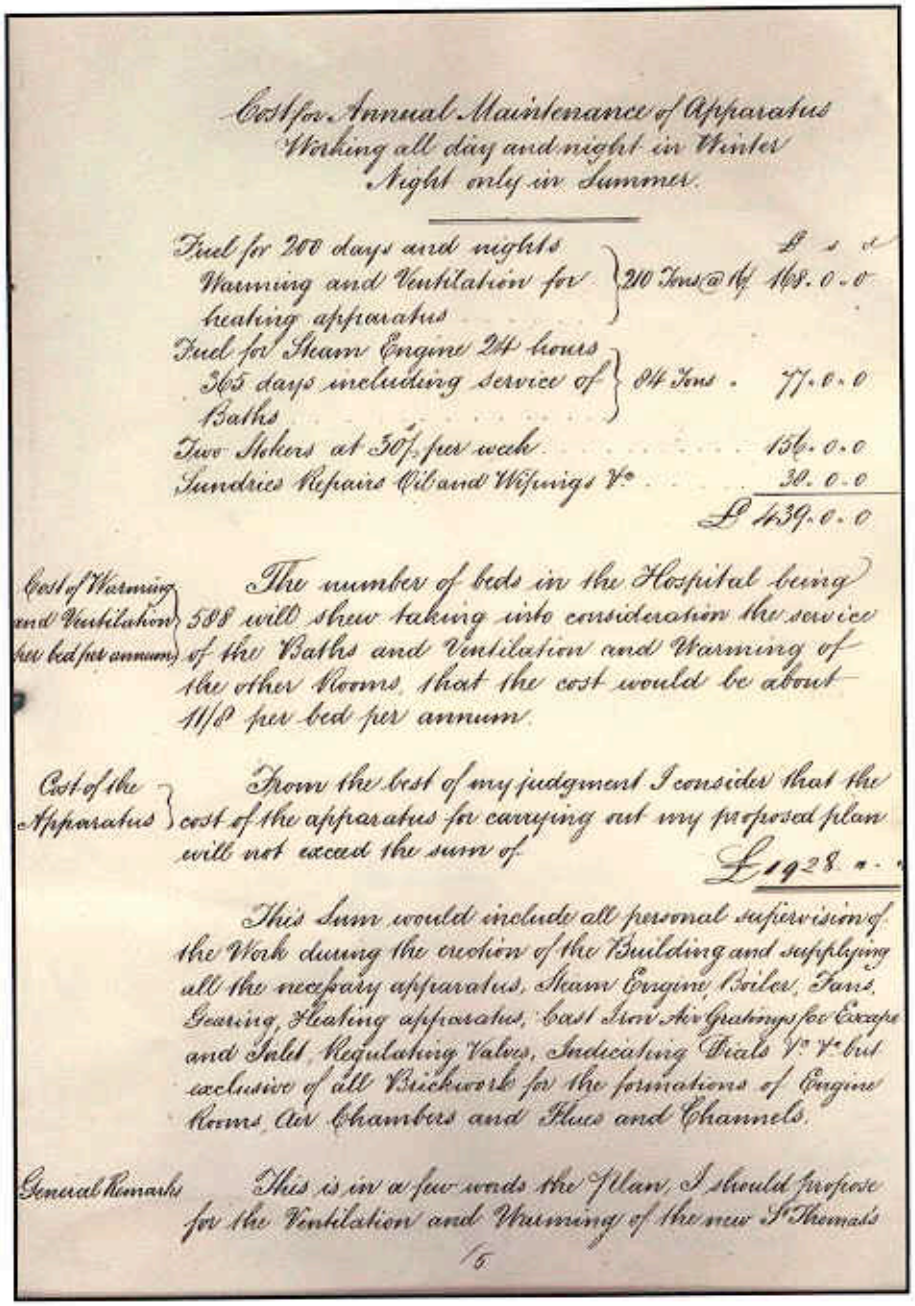
Description of Apparatus

The Plans I herewith submit numbered 1 to 5 will give the general features of my proposed plan, reserving the details of the application to a personal explanation for which purpose I hold myself at your disposal to give it when desired. The description of which is as follows.

In the centre Building, in Basement I propose fixing a small Four Horse Power Steam Engine working two Fans drawing the fresh air from the exterior of the Building, thro' the Air shaft and by means of an undaground air channel to convey this cold air forced along by the Fans to the different Air chambers, each Block having its distinct chamber placed near the Stairs, as shewn on Plans - one Fan propelling the Air to the chambers in the right Blocks, the other to the Chambers in the left Blocks.

2.

Extracts from an unsolicited proposal dated 20 November 1865, penned in immaculate copperplate by a clerk for W Phipson and submitted to the architect Henry Currey for the Warming and Ventilating of St Thomas's Hospital, Lambeth. The proposal was not adopted [PC/50]



Cost for Annual Maintenance of Apparatus
Working all day and night in Winter
Night only in Summer.

		£ s d
Fuel for 200 days and nights Warming and Ventilation for heating apparatus	210 Tons @ 16/	168. 0. 0
Fuel for Steam Engine 24 hours 365 days including service of Baths	84 Tons .	77. 0. 0
Two Stokers at 30/- per week		156. 0. 0
Sundries Repairs Oil and Wipings &c		30. 0. 0
		£ 439. 0. 0

Cost of Warming and Ventilation per bed per annum

The number of beds in the Hospital being 588 will shew taking into consideration the service of the Baths and Ventilation and Warming of the other Rooms, that the cost would be about 11/8 per bed per annum.

Cost of the Apparatus

From the best of my judgment I consider that the cost of the apparatus for carrying out my proposed plan will not exceed the sum of £1928. 0. 0

This Sum would include all personal superviseim of the Work during the erection of the Building and supplying all the necessary apparatus, Steam Engine, Boiler, Fans, Gearing, Heating apparatus, cast Iron Air Gratings for Escape and Inlet, Regulating Valves, Indicating Dials &c &c but exclusive of all Brickwork for the formations of Engine Rooms, Air Chambers and Flues and Channels.

General Remarks

This is in a few words the Plan, I should propose for the Ventilation and Warming of the new St Thomas's

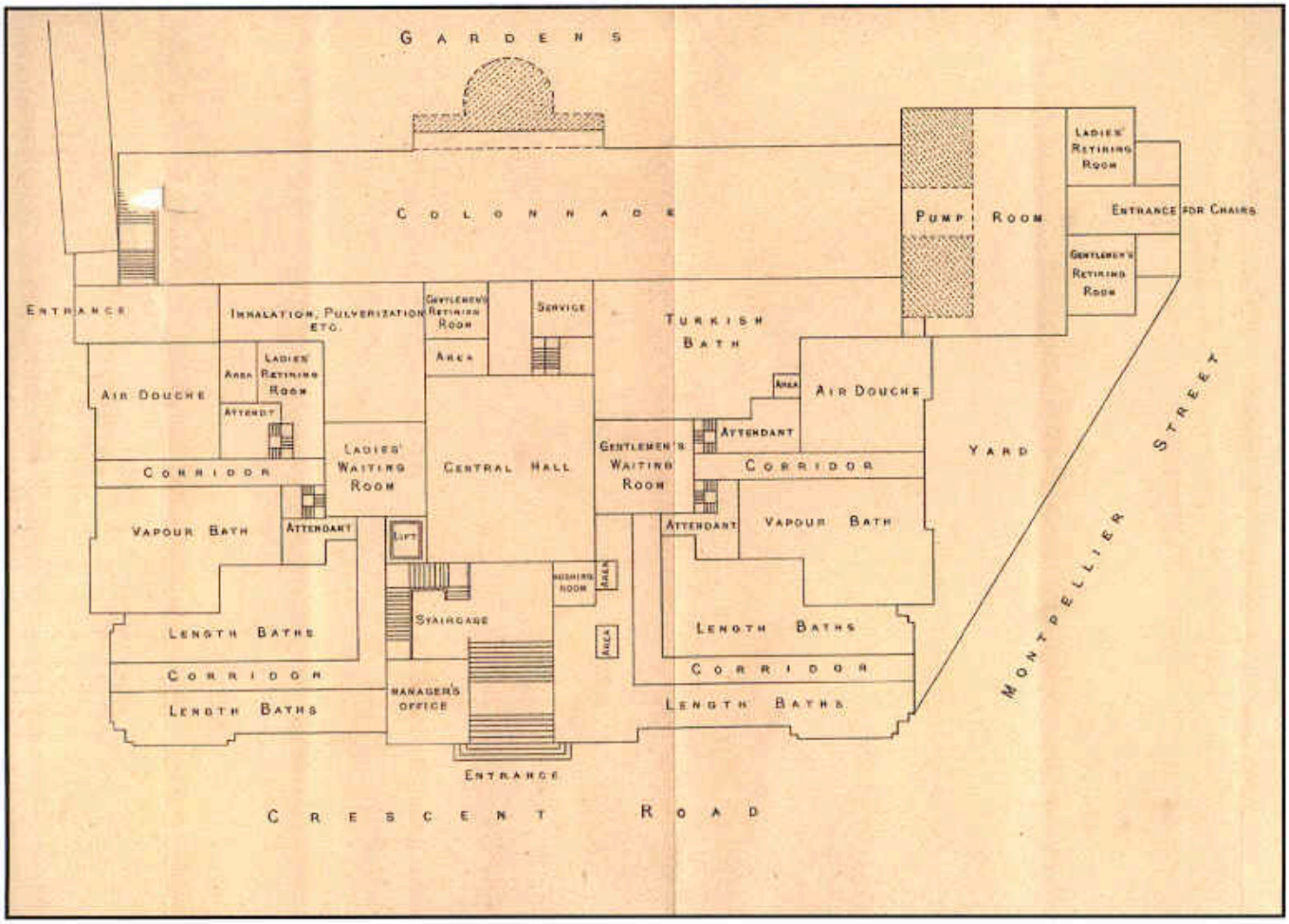
/6

Another extract from the Phipson proposal for St Thomas's Hospital. The complete document decsribes the steam engine-driven fans, the "warming apparatus," and the proposed methods of air distribution and temperature regulation. The proposal indicates that 5 drawings were also submitted, but these have not been found. This particular page estimates the annual cost of maintenance (£439) and the capital cost of the system (£1928), the latter including Phipson's fee but excluding builderswork.

Securing Orders

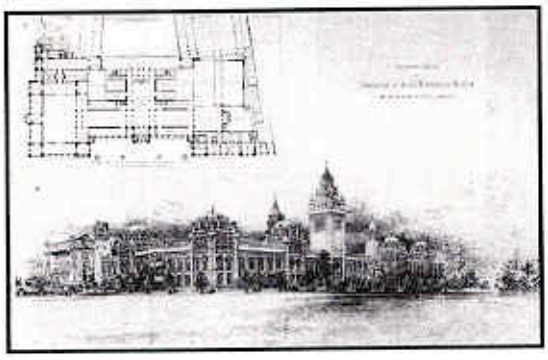
Work could be obtained by competitive tender, through nomination and negotiation, by collaboration in architectural competitions, aided by records of past works and client testimonials.

Old documents indicate there was another way. This was to identify a project of interest and then put an unsolicited proposal to the architect, or directly to the client, in the hope of being considered for the work.

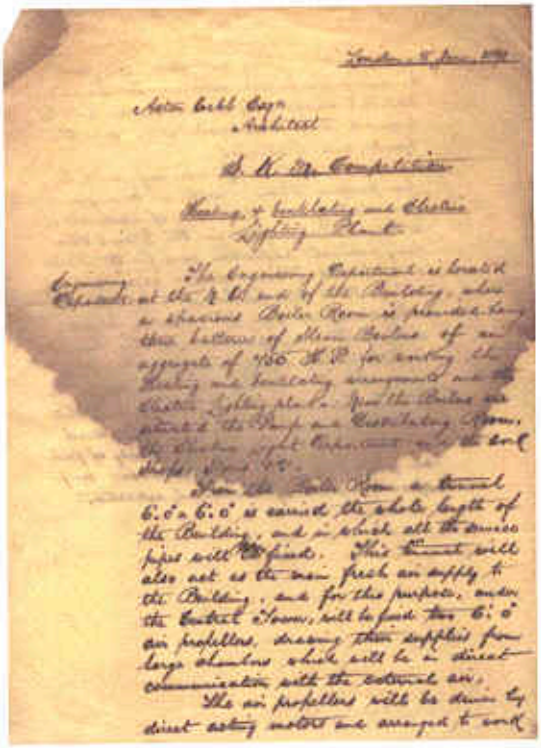


Harrogate Baths, Yorkshire (proposal) 1890. Building plan from the printed booklet FINAL COMPETITION, BOROUGH OF HARROGATE 1890; DESCRIPTION OF DESIGN FOR NEW BATHS, COLONNADE &c, ON THE MONTPELIER ESTATE. [PC/37a]

The design was by W W Phipson. His handwritten draft specification for services covers steam, heating & ventilation, sanitary, plumbing and water supply to Air Douches, Vapour and Turkish Baths and the like. [PC/37b]



The First Prize in the South Kensington Museum (now the Victoria & Albert) architectural competition of 1891 was awarded to Aston Webb for this plan and elevation. [The Builder, LXI, 124]



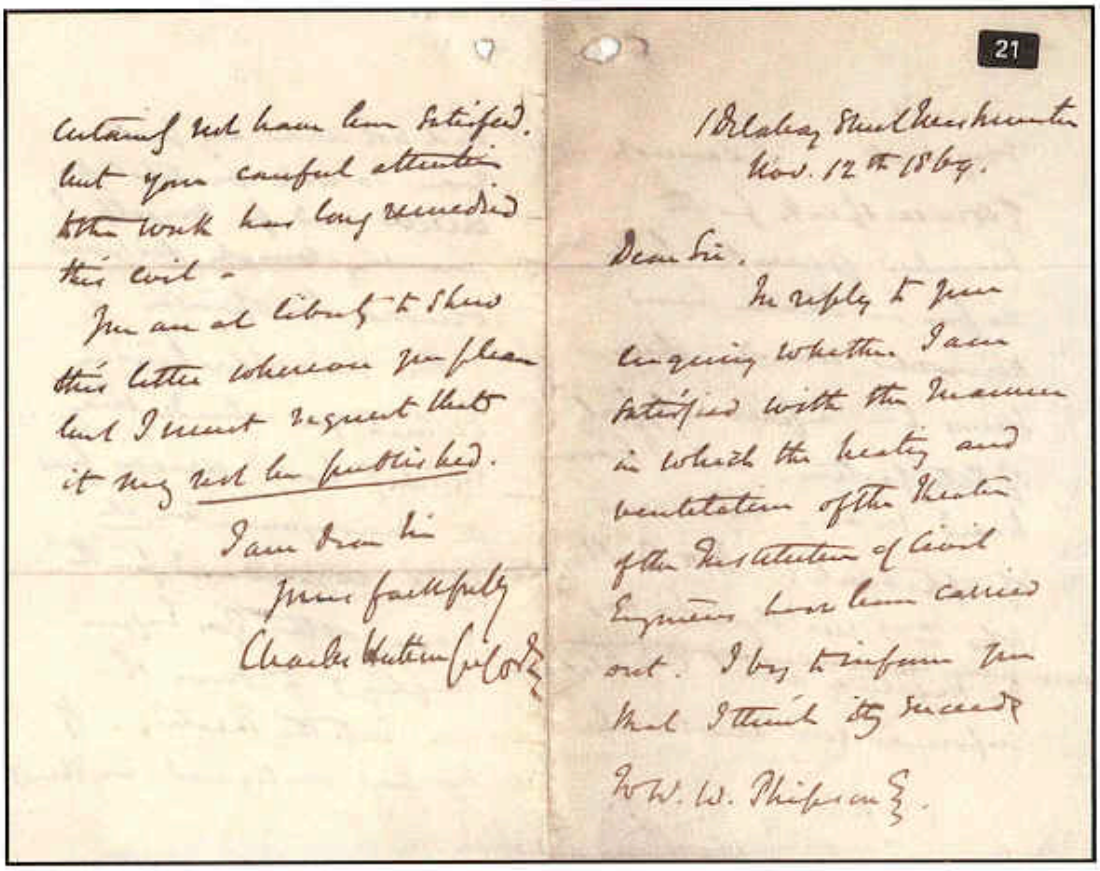
Report dated 8 June 1891 by W W Phipson to Aston Webb on proposed heating & ventilating and lighting plant for the SKM project. [PC/44]

Architectural Competitions

The 19th century was regarded by the Victorians as the Golden Age of Competition and the selection of the architect to carry out major public works was often determined in this way. One judge suggested that the object of the exercise was to select the best man rather than actually to select the design to be carried out.

Many competition drawings and reports still exist and can provide a fascinating insight to the then 'state of the art' building engineering services. Most designs were altered prior to building and the services amended to suit. In many cases it was not even the prizewinner's design that was used.

The SKM design was modified in 1899 and Phipson never developed his services scheme to the working stage. He died in 1891.



21

1 Blakey Street Westminster
Nov. 12th 1869.

Dear Sir.

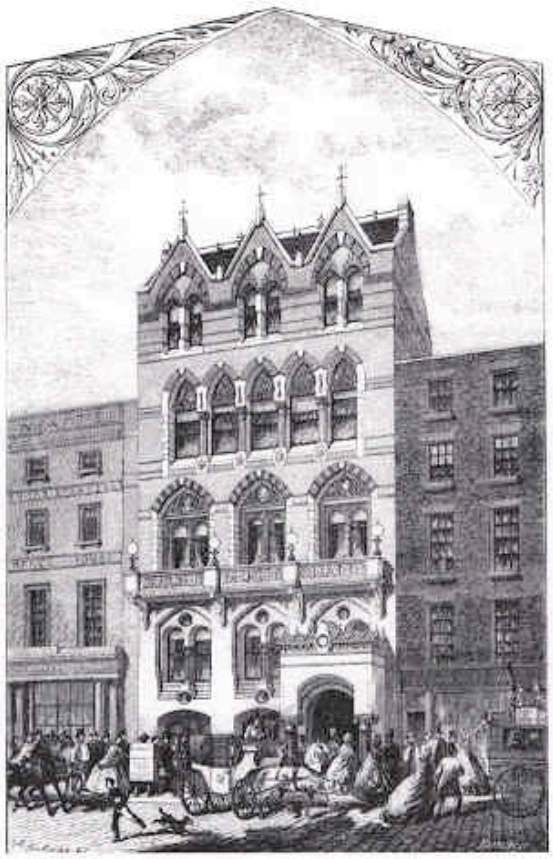
In reply to your enquiry whether I am satisfied with the manner in which the heating and ventilation of the theatre of the Institution of Civil Engineers has been carried out. I beg to inform you that I think it succeeds very well. I cannot speak for the Members...

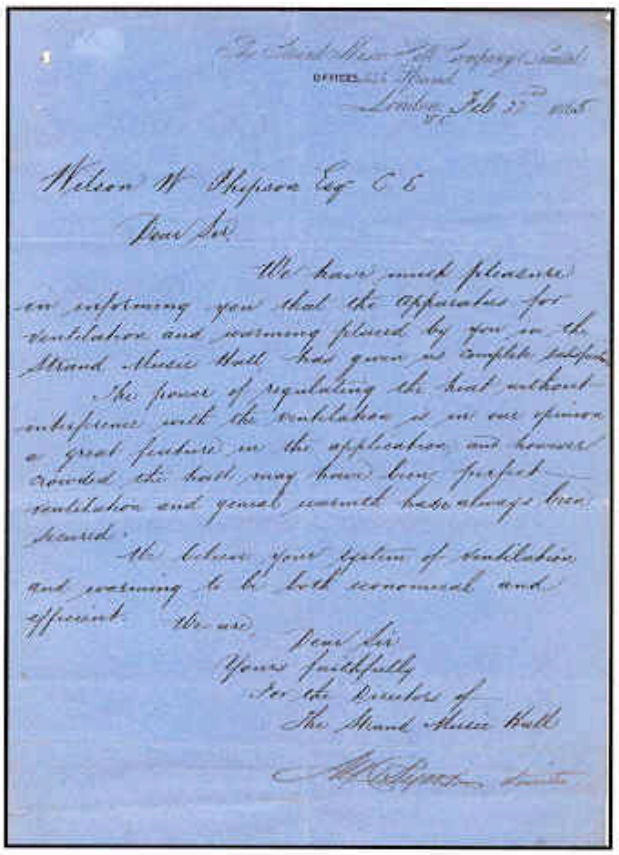
W. W. Phipson Esq.

Extract from letter of 12 November 1869 to Phipson (who had sought a testimonial regarding his heating and ventilating of the ICE Theatre) from the Secretary of the Institution of Civil Engineers in which he says "I beg to inform you that I think it succeeds very well. I cannot speak for the Members..." [PC/21]

Testimonials

It appears that a common practice among professionals and practitioners in the Victorian construction industry was to seek to acquire written testimonials from clients for whom they had recently carried out work. They would then show these hopefully glowing references to potential clients and their architects to try and obtain further work, either a professional appointment, or an order for goods and services. It is a practice that Phipson used regularly and apparently to good effect. The firm of Haden did likewise. Testimonials tell something of the success of early building services installations but, of course, there are no testimonials for those which were not satisfactory.





The Strand Music Hall Company Limited
OFFICES
Strand
London Feb 22nd 1865

Wilson W Phipson Esq C E

Dear Sir

We have much pleasure in informing you that the apparatus for ventilation and warming placed by you in the Strand Music Hall has given us complete satisfaction.

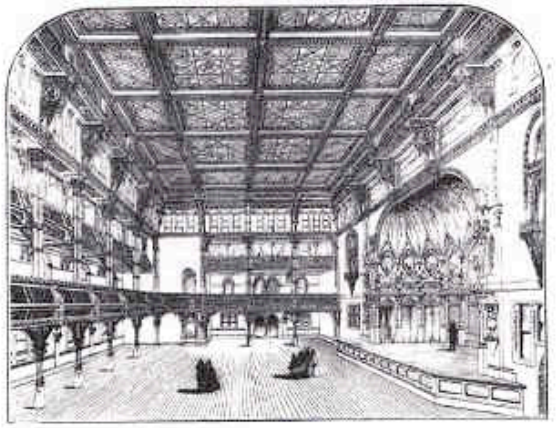
The power of regulating the heat without interference with the ventilation is in our opinion a great feature in the application and however crowded the hall may have been, perfect ventilation and genial warmth have always been secured.

We believe your system of ventilation and warming to be both economical and efficient.

We are
Dear Sir
Yours faithfully
For the Directors of
The Strand Music Hall

Secretary

Testimonial letter dated 22 February 1865 from Mr Syers, Director of The Strand Music Hall Company Limited, to Wilson W Phipson Esq CE in which he states "The power of regulating the heat without interference with the ventilation is in our opinion a great feature of the application, and however crowded the hall may have been, perfect ventilation and genial warmth have always been secured." [PC/24]



External elevation and interior view of The Strand Music Hall by Enoch Bassett Keeling. [Building News, 1864]
However, "this veritable Aladdins' cave of entertainment" failed as a business, was reconstructed by C J Phipps, and reopened in 1868 as the famous Gaiety Theatre. The building was demolished in 1903.

COPY OF TESTIMONIALS

REFERRING PARTICULARLY TO THE

VENTILATION AND WARMING OF PRISONS.

Extracts from 3rd and 4th Reports of the Inspectors of Prisons for the Home District, presented to Parliament in the years 1838, *and* 1839.

VENTILATION OF CELLS.

The objects to be attained under this head are,

1st. The supply of a sufficient quantity of fresh air and when necessary, of temperated air, into each cell without subjecting the occupier of it to any inconvenience from the draft.

2nd. The withdrawal of a like quantity of foul air.

3rd. That no additional facilities of communication between prisoners in adjoining Cells should be afforded by the means made use of.

In the consideration of the means by which these objects could be secured, we have had the advantage of the practical experience of those eminent Engineers, MESSRS. HADEN, of TROWBRIDGE, who on being placed in possession of our views and principles have devoted much time to the details of a system which has been adopted in order to secure the conditions proposed.

Their Report on the subject is annexed in the Appendix of 3rd. Report, November, 1837.

(Signed)

WM. CRAWFORD
WHITWORTH RUSSELL } Inspectors of Prisons.
J. JEBB, Captain Royal Engineers.

Extract from Reports of The Inspectors of Prisons, 1838-9, confirming the assistance received from "those eminent Engineers, MESSRS. HADEN, of TTROWBRIDGE," in connection with the Ventilation and Warming of Prisons.
[Wiltshire Record Office 1325/157]

Copy of a Letter from Major Jebb, Royal Engineers.

45, Parliament Street,
17th February, 1843.

MESSRS. G. AND J. HADEN,

Gentlemen,

I have now had sufficient experience of the new hot water Apparatus you have designed and applied in warming three wings of Pentonville Prison, to be enabled to state to you that it fulfils all the conditions to which I directed your attention. An equable temperature of from 52° to 58° has been maintained in all the Cells under circumstances of great variation in external temperature. The consumption of fuel has not exceeded from 2 to 2½ cwt of coal for sixty-six Cells, and the Ventilation or quantity of fresh air introduced into each Cell has been from 30 to 45 cubic feet per minute. The cost of maintaining this temperature and ventilation has been about ½*d.* per cell for 24 hours.

You have now completed your contract with the Commissioners of Her Majesty's Woods and Forests, for works at Pentonville; and I only do you justice in stating that every thing you have undertaken has been executed in a manner which has proved your practical skill and ability and that all your engagements have been fulfilled with straight-forward integrity.

I am, Gentlemen,

Your Obedt. Servt.

(Signed) J. JEBB.

Testimonial letter dated 17 February 1843, from Major Joshua Jebb RE, Inspector of Prisons, to Messrs G & J Haden regarding the hot water apparatus installed in Pentonville Prison. The client was the Commissioners of Her Majesty's Woods and Forests. Later, Jebb was knighted, promoted to Major General and appointed Surveyor General of Convict Prisons. [Wiltshire Record Office 1325/157].

TABLE No. 3.

Length of 4-inch Pipe *Required for every 1,000 Cubic Feet.*

Description of Building.	Temperature Required	4-inch. Pipes Required
	Degrees.	Feet
Public buildings	55	6 to 7
Workshops, warehouses, &c.	55	6 7
Schools, churches, offices, bedrooms, &c.	60	7 8
Shops, waiting-rooms, &c.	60	10 11
Living-rooms	65	10 11
Drying Stoves (closed-in rooms)	100	100
" "	110	120
" "	120	170
" "	130	240
Conservatories, greenhouses, &c.	45 to 50	35
Ferneries, &c,	50 55	40
Vineries, stoves	55 60	45
" "	60 65	50
Stoves, orchids	65 70	55
" "	70 75	60
Pineries, forcing-houses	75 80	70

Note.—A laundry or other drying-stove giving 120° to 130° when goods are dried, will register only 90° to 100° whilst they are saturated with moisture.

Heating design table from "Heating by Hot Water," Walter Jones, 1890, p.65

Design Calculations

Written design calculations of building engineering systems from the 19th century seem to be virtually non-existent. There are some installation drawings, manufacturers' catalogues and plant operating instructions which may give a guide to system design. A few papers and discussions on design are available in the Proceedings of the Institution of Civil Engineers. It seems designers relied on their own acquired knowledge and experience (and were possibly secretive because of its commercial value). There were a number of published textbooks with guide tables, but these are extremely primitive by todays standards. It seems rule of thumb was often employed and as a result systems were either undersized or grossly oversized. This background should be borne in mind when researching installations of historical interest.

Concert or Assembly-rooms.

104. These require stoves with closed passages until the company meet, and afterwards ventilation by simple openings, or openings with a ventilation-pump above, while warmed air enters below: or there may be ventilation and heating together, by the double-current apparatus. Many of the head-aches, &c. which persons suffer after attending crowded lectures or exhibitions, are consequences of the impure air breathed.

Courts-of-Law.

105. In these the perfect accomplishment of the object should be aimed at, for they are often occupied in the most crowded manner for whole days together. They should be heated first by a large stove on the floor, or rather by warm air sent in through many openings, situated a little above the floor, and afterwards the double-current apparatus should be in constant action. In summer, it would be better to have the ventilating-pump drawing from above, while the inlets below admitted fresh air, than to open windows near which there would be dangerous draughts. The health of many members of the Bar has been destroyed by their spending so much time in badly-ventilated Courts.

Ventilation design recommendations from "On Warming & Ventilating," Neil Arnott, 1838, p.85

Right
Design table showing length of heating pipe required under various conditions, from "A Practical Treatise on Warming Buildings", Charles Hood, 1879.

TABLE IV.

Table showing the Quantity of Pipe, four inches diameter, which will heat 1,000 Cubic Feet of Air per Minute, any required number of Degrees: the Temperature of the Pipe being 200° Fahrenheit.

Temperature of external Air. Fahrenheit's Scale.	Temperature at which the Room is required to be kept.									
	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°
10°	126	150	174	200	229	259	292	328	367	409
12°	119	142	166	192	220	251	283	318	357	399
14°	112	135	159	184	212	242	274	309	347	388
16°	105	127	151	176	204	233	265	300	337	378
18°	98	120	143	168	195	225	256	290	328	368
20°	91	112	135	160	187	216	247	281	318	358
22°	83	105	128	152	179	207	238	271	308	347
24°	76	97	120	144	170	199	229	262	298	337
26°	69	90	112	136	162	190	220	253	288	327
28°	61	82	104	128	154	181	211	243	279	317
30°	54	75	97	120	145	173	202	234	269	307
Freezing Point 32°	47	67	89	112	137	164	193	225	259	296
34°	40	60	81	104	129	155	184	215	249	286
36°	32	52	73	96	120	147	175	206	239	276
38°	25	45	66	88	112	138	166	196	230	266
40°	18	37	58	80	104	129	157	187	220	255
42°	10	30	50	72	95	121	148	178	210	245
44°	3	22	42	64	87	112	139	168	200	235
46°	...	15	34	56	79	103	130	159	190	225
48°	...	7	27	48	70	95	121	150	181	214
50°	...	...	19	40	62	86	112	140	171	204
52°	...	...	11	32	54	77	103	131	161	194

*** To ascertain by the above Table the quantity of Pipe which will heat 1,000 cubit feet of air per minute, find, in the first column, the temperature corresponding to that of the external air; and at the top of one of the other columns find the temperature at which the room is to be maintained; then, in this latter column, and on the line which corresponds with the external temperature, the required number of feet of pipe will be found.