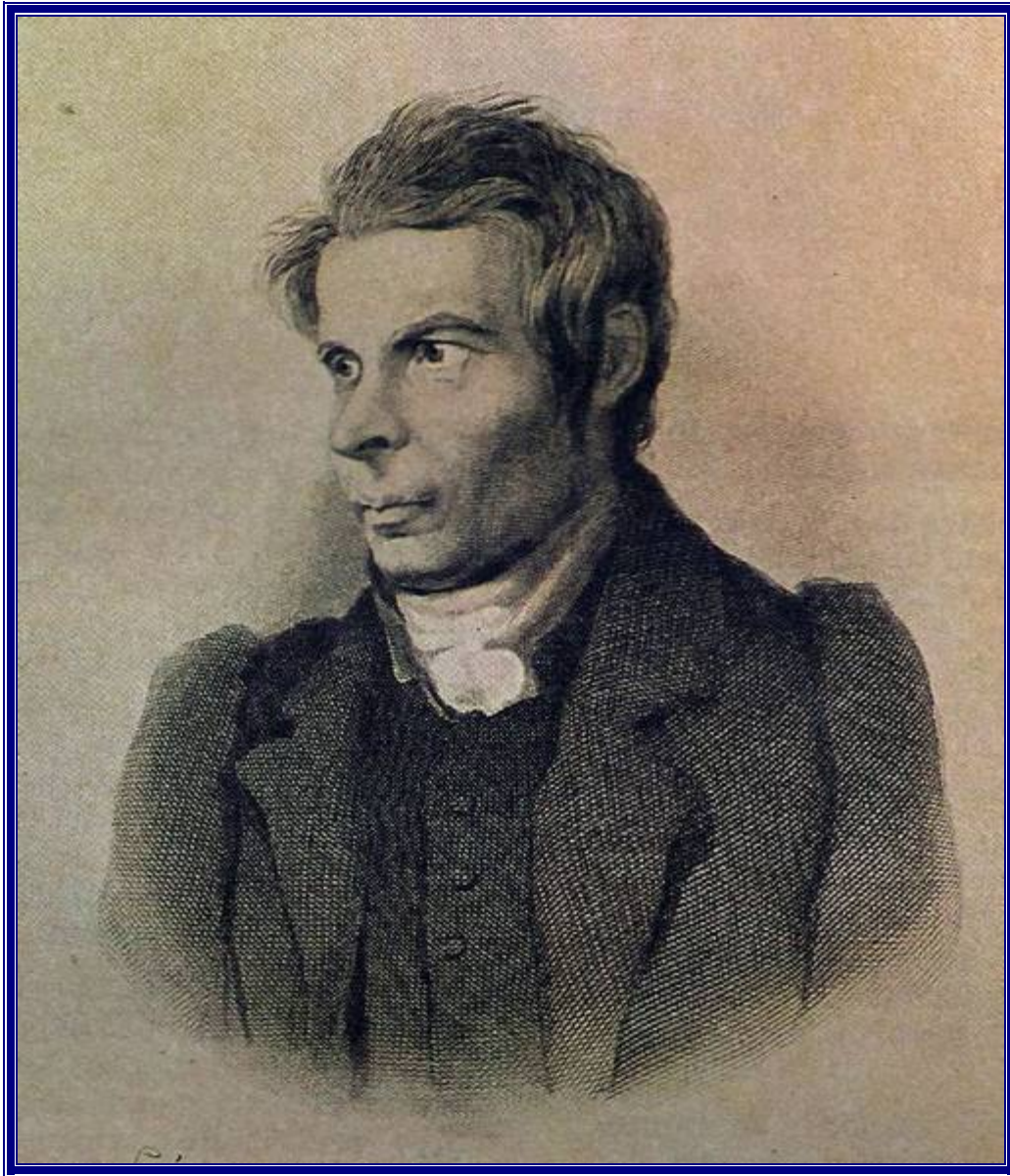


THOMAS TREDGOLD

By EurIng Brian Roberts, CIBSE Heritage Group



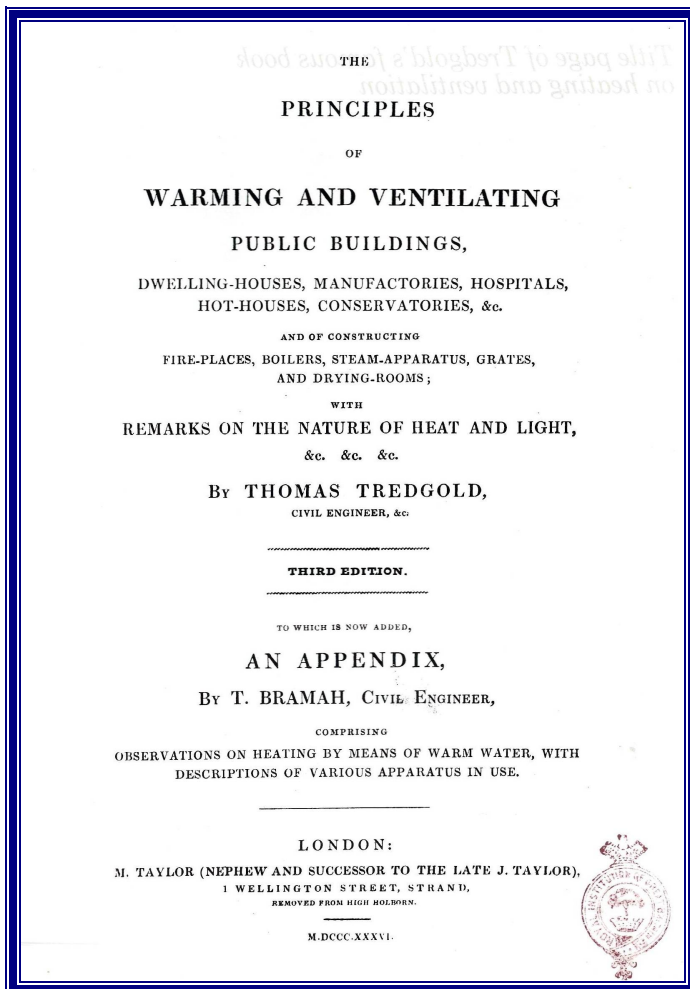
Thomas Tredgold 1788-1929, Honorary Member Institution of Civil Engineers

Thomas Tredgold was born in 1788 in the village of Brandon in County Durham, received an elementary education at the local school and at the age of 14 he was apprenticed to a Durham cabinet maker. For the next six years he spent all his spare time in studying mathematics and architecture. In 1808, he went to Scotland where he worked as a carpenter and journeyman joiner. It has been reported that to pursue his studies, he denied himself sleep and relaxation resulting in permanent damage to his health.

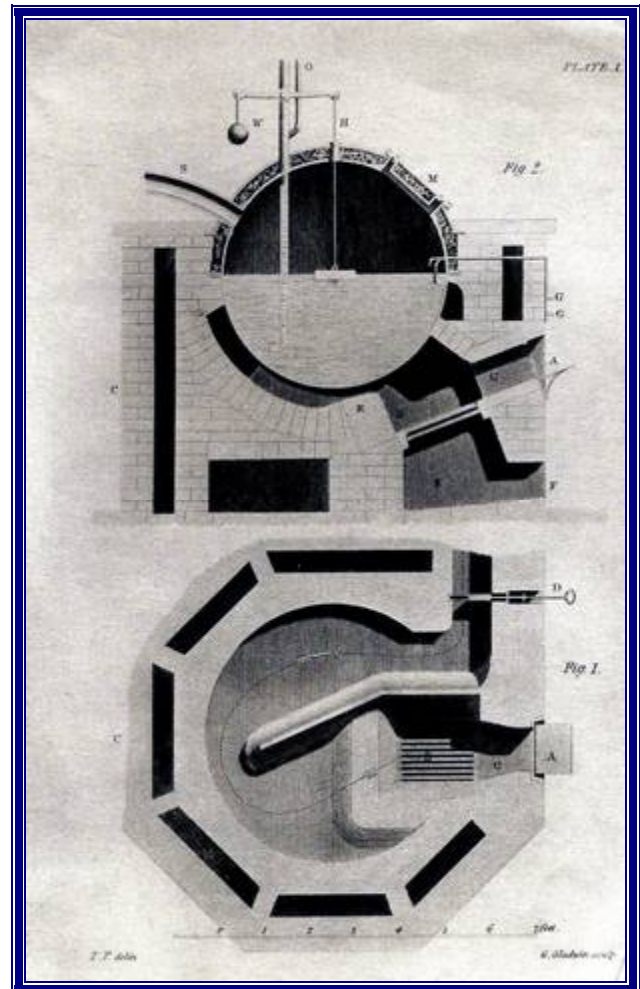
Tredgold's life changed when he went to London to work for a relative, William Atkinson, who was "architect to the ordnance." Having taught himself French and studied higher mathematics, chemistry, geology and mineralogy, he set himself up in business and went on to produce a remarkable list of publications on a wide range of subjects.

His first works were *Elementary Principles of Carpentry* and *A Practical Essay on the Strength of Cast Iron*. In 1824, his most important book was published: *Principles of Warming and Ventilating Public Buildings, Dwelling Houses, Manufactories, Hospitals, Hot Houses, Conservatories, &c.* This was sub-titled: *And of constructing Fire-places, Boilers, Steam-Apparatus, Grates and Drying Rooms with Remarks on the Nature of Heat and Light.* This book was unique, setting out the current knowledge of thermodynamics and associated engineering practices. In the preface, Tredgold wrote "I found so little of this branch of knowledge reduced to a state fitted for use in practice."

Tredgold's book covered steam and heat distribution, fuel consumption, heat losses, ventilation, and boilers. It dealt with the heating and ventilation requirements of a wide range of buildings –from dwellings and greenhouses to factories, hospitals and prisons.



Title page of the 3rd edition of Tredgold's 1824 textbook, republished in 1836, seven years after his death, with an Appendix added by Timothy Bramah



Tredgold's design for a spherical steam boiler with a double surrounding wall to a fireplace having a restricted throat

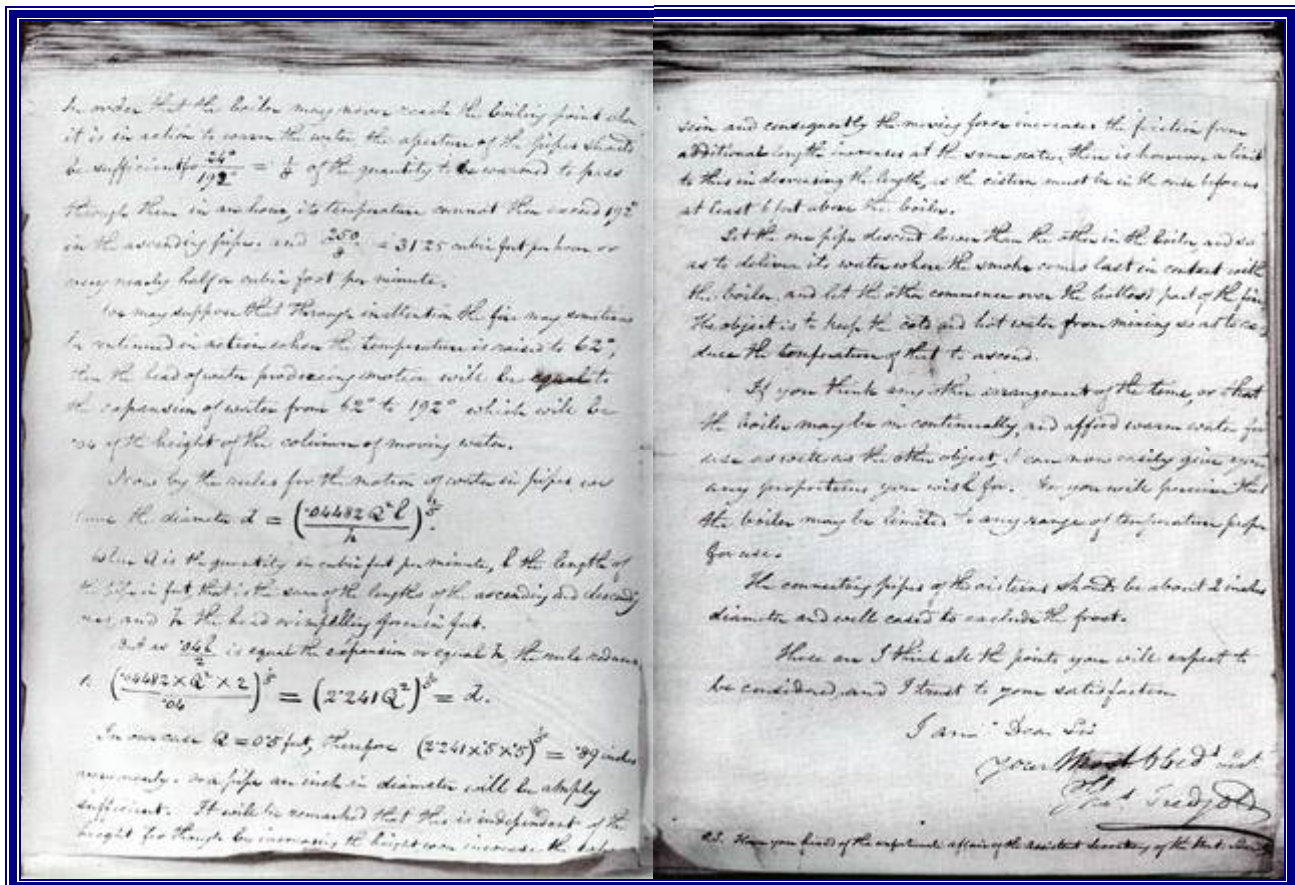
Tredgold made experiments on the cooling of cylinders and deduced figures for the heat given off by steam and water pipes and for the heat loss through a window. He made estimates of the quantity of fresh air needed to support life and remove exhaled moisture (4 cubic feet per person per minute) and to support combustion. His work on fluid flow enabled him to estimate air flow through doors and windows due to temperature difference and to determine steam flow in pipes and understand chimney draught. He devised a method of attenuating noise from air blowers, making use of resilient and massive materials.

Tredgold went on to oppose the idea that room heat requirements were proportional to room volume instead using figures for heat loss through glass plus ventilation loss, thinking that heat losses through solid structural elements were negligible.

A few years before this, in 1818, a meeting of young engineers at the Kendal Coffee House in Fleet Street founded the Institution of Civil Engineers. During the first two years of its existence the membership grew from the original six to only thirteen but when Thomas Telford accepted the Presidency its importance and future growth was assured. It was natural that Tredgold would wish to join the ICE and the support for his application of 27 March 1821 reads:

“T. Tredgold Esq, 20 Bentinck Street, being desirous of admission....
 We the undersigned in consequence of his being engaged in the profession,
 and from our personal knowledge, propose and recommend him as a proper
 person to become a resident member thereof.”

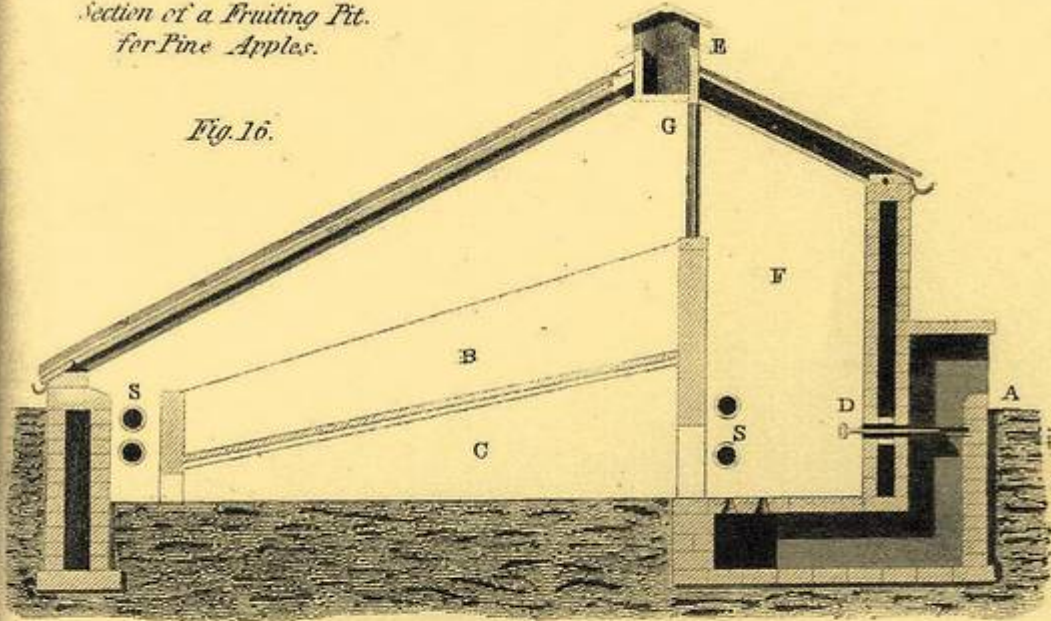
Tredgold duly signed his Membership Certificate on 7 May 1821 and became the 47th member of the Institution.



Tredgold's letter of 23 October 1826 to Francis Bramah on fluid flow in pipes

Section of a Fruiting Pit.
for Pine Apples.

Fig. 16.



Section of a House for
Forcing Peaches.

Fig. 17.

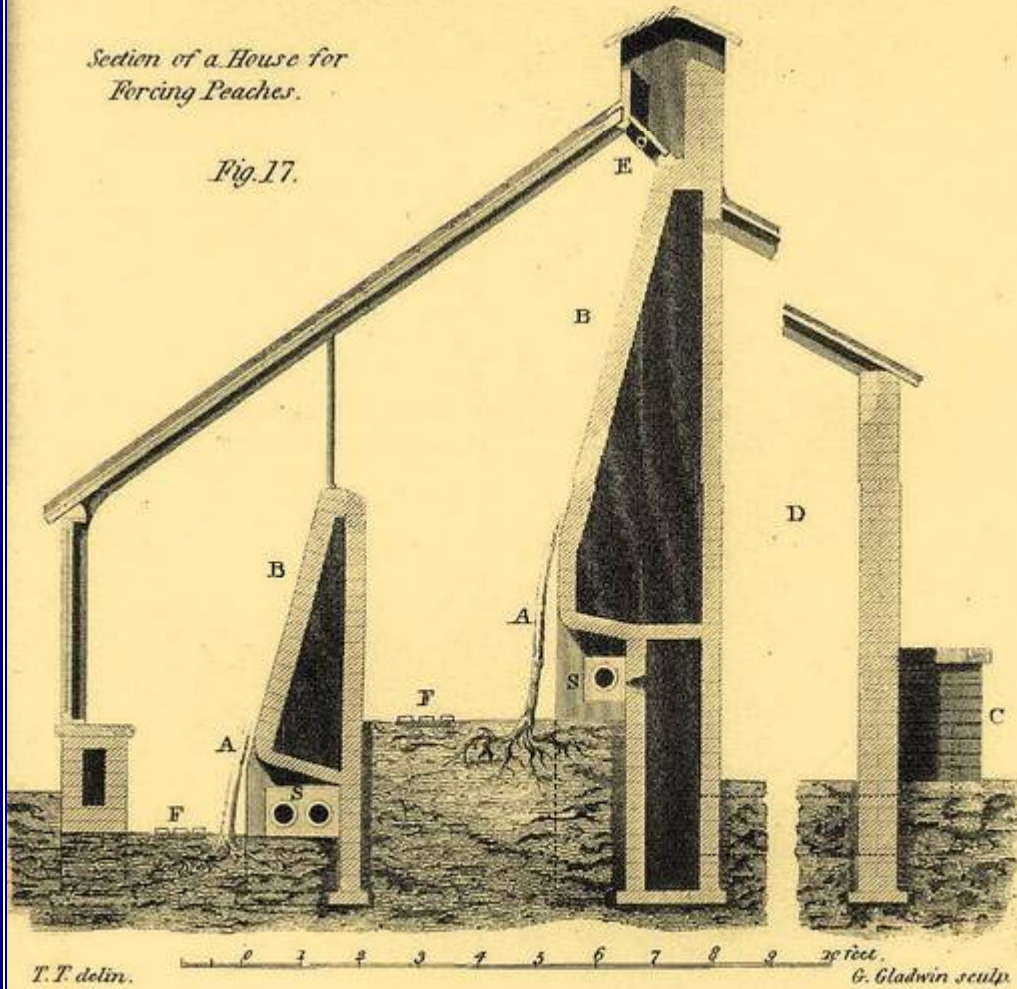


Plate V from Tredgold's textbook illustrating heating systems for a Pineapple Fruiting Pit and for a House for Forcing Peaches. Both buildings are heated by low-level steam pipes marked S.

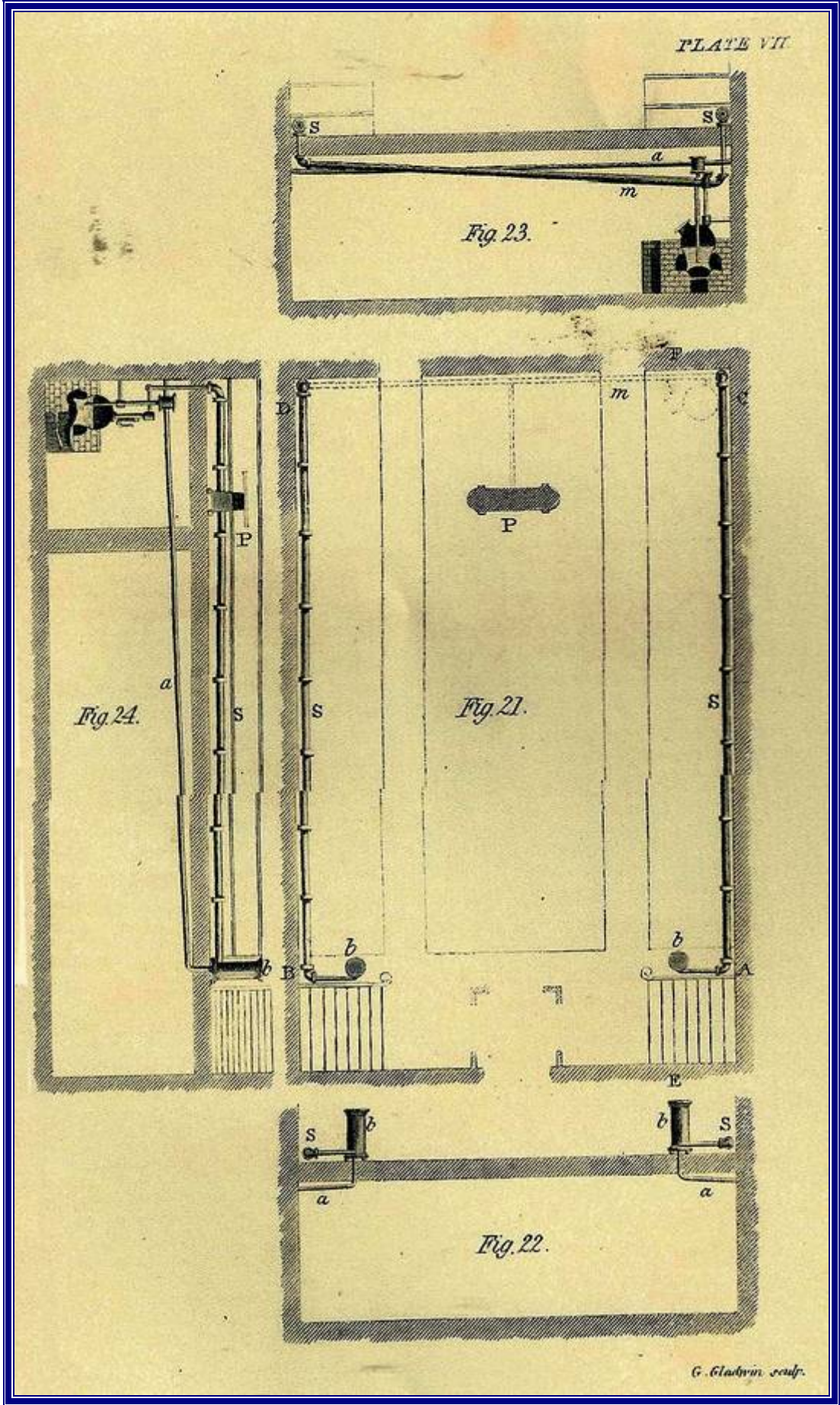


Plate VII from Tredgold's textbook showing his steam heating system for the Portland Chapel in Cheltenham. The steam apparatus was erected by Messrs. Bailey of High Holborn in 1821

During the next eight years Tredgold became the author of more *Original Communications* than any other member but was a spasmodic attender at weekly meetings. However, Tredgold's eminence within the ICE and the profession was recognised when in June 1824 he was elected an Honorary Member, "having by his writings on various subjects connected with the Profession of a Civil Engineer conferred benefit on that science."

It seems that on account of ill health he was often not present when his papers were read. In a post script to his letter of 23 October 1826 to Francis Bramah he wrote:

"If I thought I should see you at the Engineers on Tuesday evening I should be there, but I am fearful the attendance is very thin, and that little is stirring there. I do not like to go much because I cannot go there without a great risk of cold from the indifferent state of my health."

The installations shown in his book are ones designed by Tredgold and installed under his supervision. For dwelling houses, he recommended the use of open fires, warm air and steam heating for the various spaces. For factories steam heating was preferred. Both St Thomas's Hospital and the Guildhall incorporated systems designed by Tredgold. He influenced the heating work of others; for example, Bramah installed a hot water heating systems in the Windsor Palace Orangery (1829) and one "with recognisable radiators" in the Westminster Hospital (1830).

Tredgold "worn out by study" died at the early age of 40, leaving his widow, three daughters and a son in very poor circumstances. He was buried St Johns Wood chapel cemetery. To use his own words, he had devoted his life to "The art of directing the great sources of power in nature for the use and convenience of man." This statement was immortalised by inclusion in the Charter of the Institution of Civil Engineers, of which he was made an Honorary Member.

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