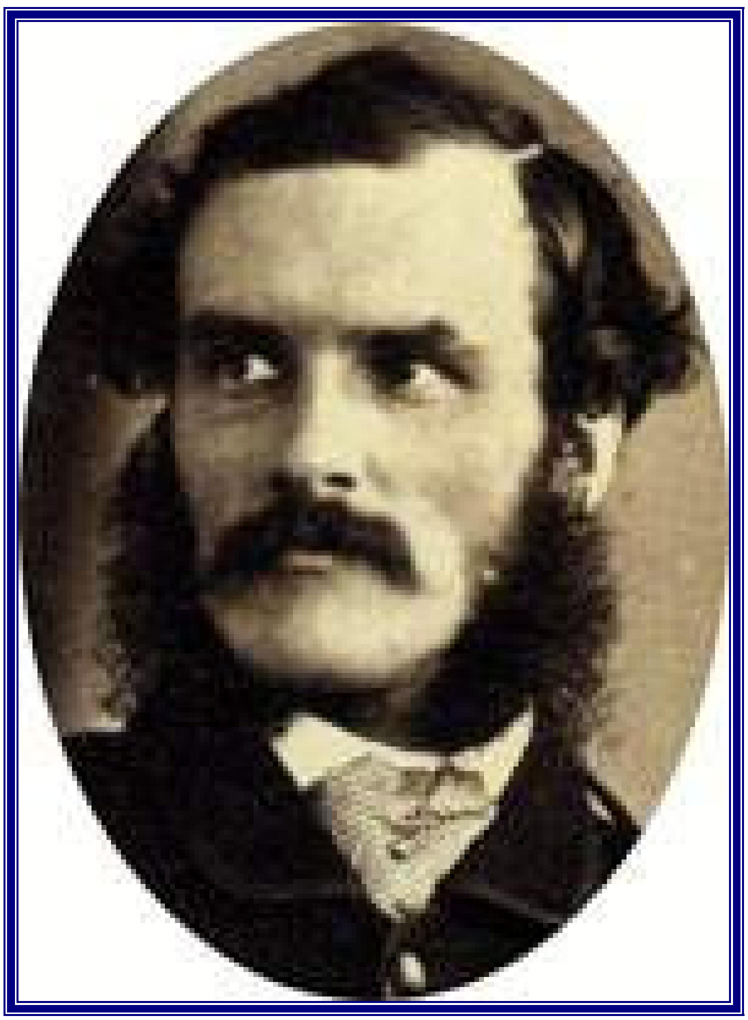
Sir EDMUND FREDERICK DU CANE RE 1830-1903

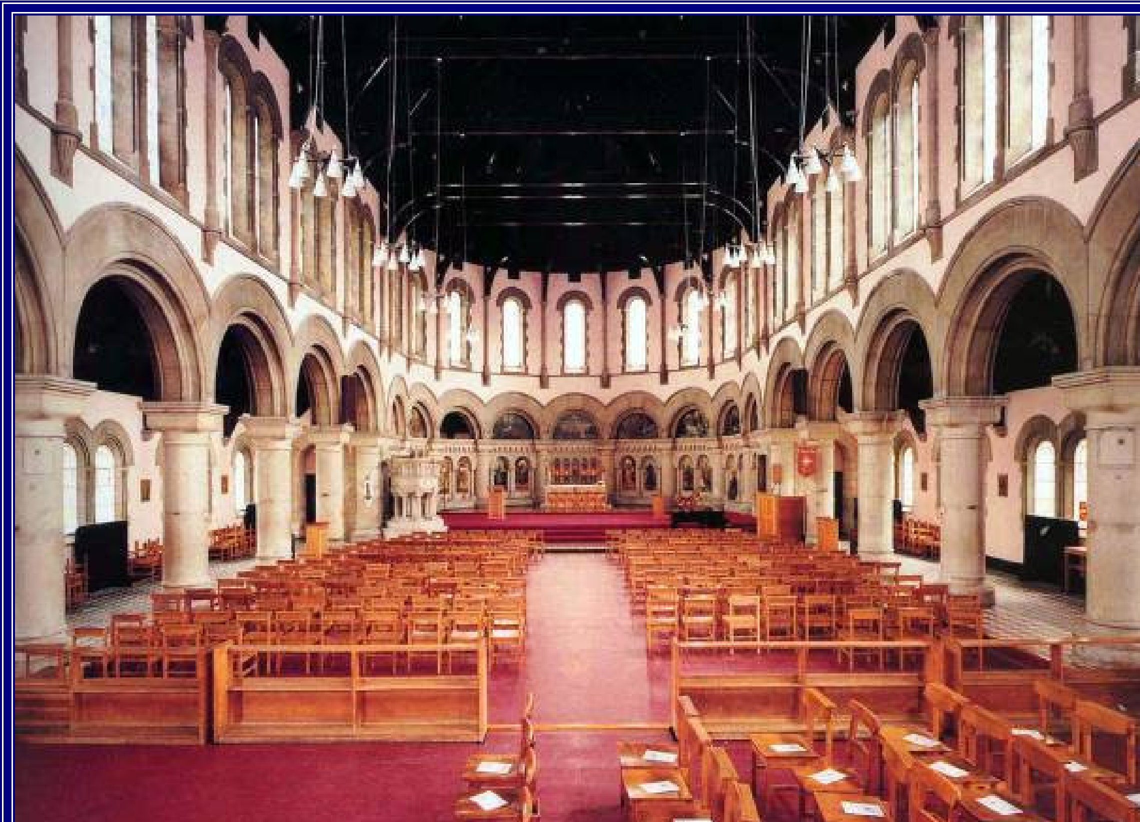


Surveyor of Prisons

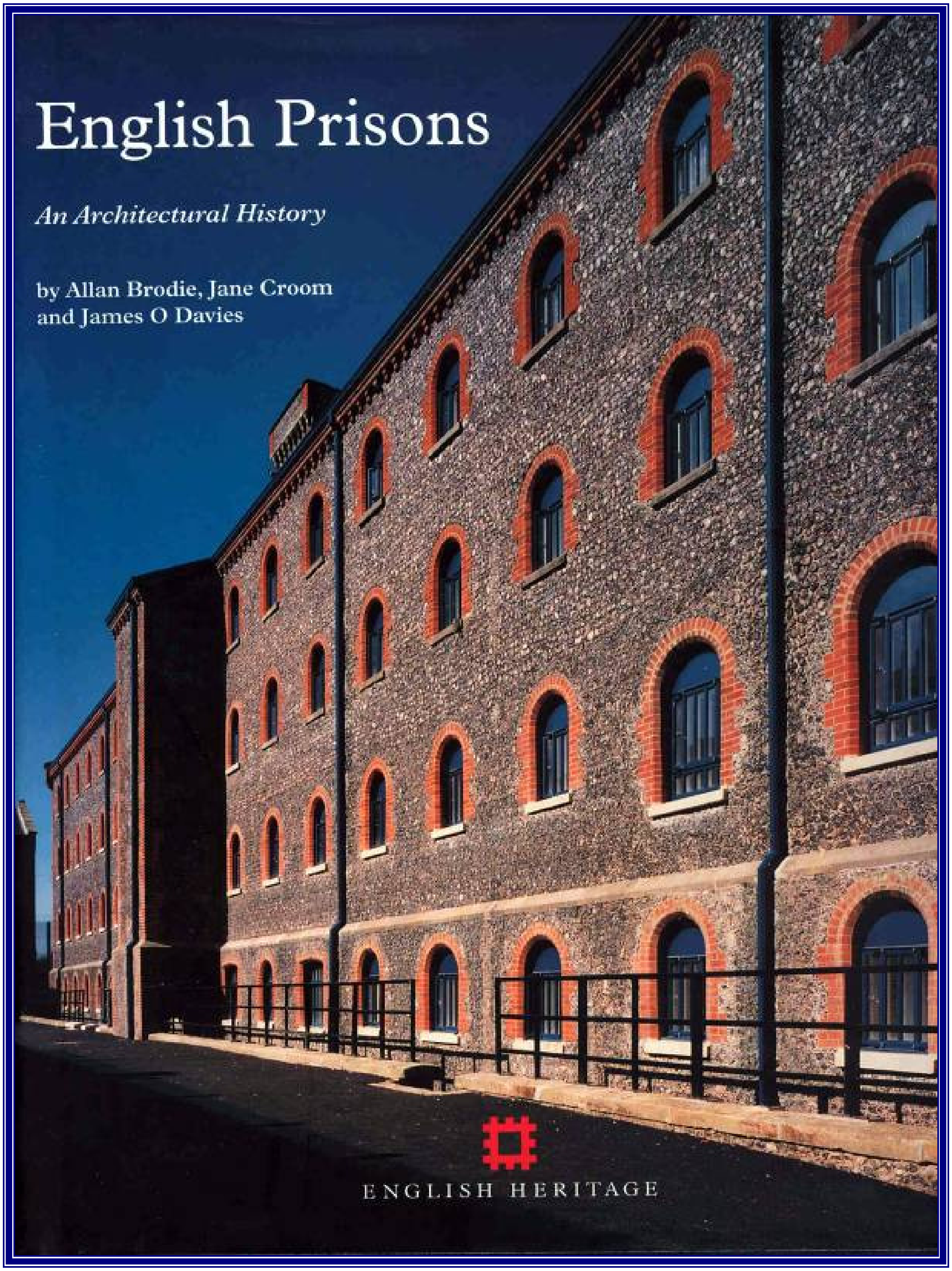
[196] Sir Edmund Frederick DU CANE **1830-1903**

Major-General in the Royal Engineers. He was an assistant superintendent at the Great Exhibition, London (1851). After a period of supervising convict labor in Australia, he was appointed (1869) Chairman of the Board of Directors of Convict Prisons, Surveyor-General of Prisons, and Inspector-General of Military Prisons. He was responsible for the provision of extra prisons and his greatest work was Wormwood Scrubs in London. "Du Cane's scheme is remarkable for its clean, logical plans, and for the heating and ventilating system which served each cell. Staircases, vents and sanitary stacks were expressed in the building...(his) model plan for Wormwood Scrubs influenced the design of prisons for many generations afterwards."

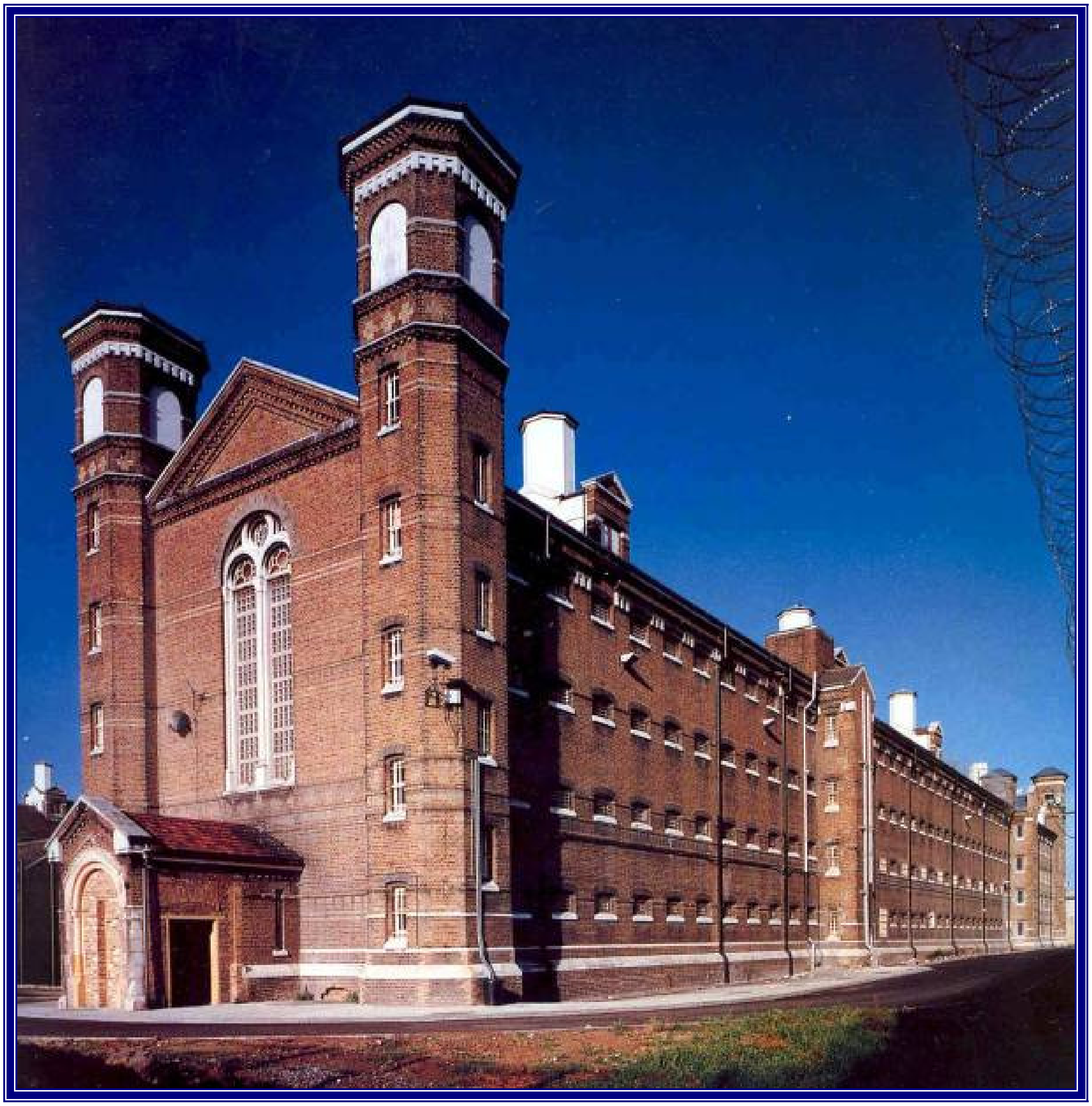
(Min-biography from "The Comfort Makers," Brian Roberts, ASHRAE, 2000)



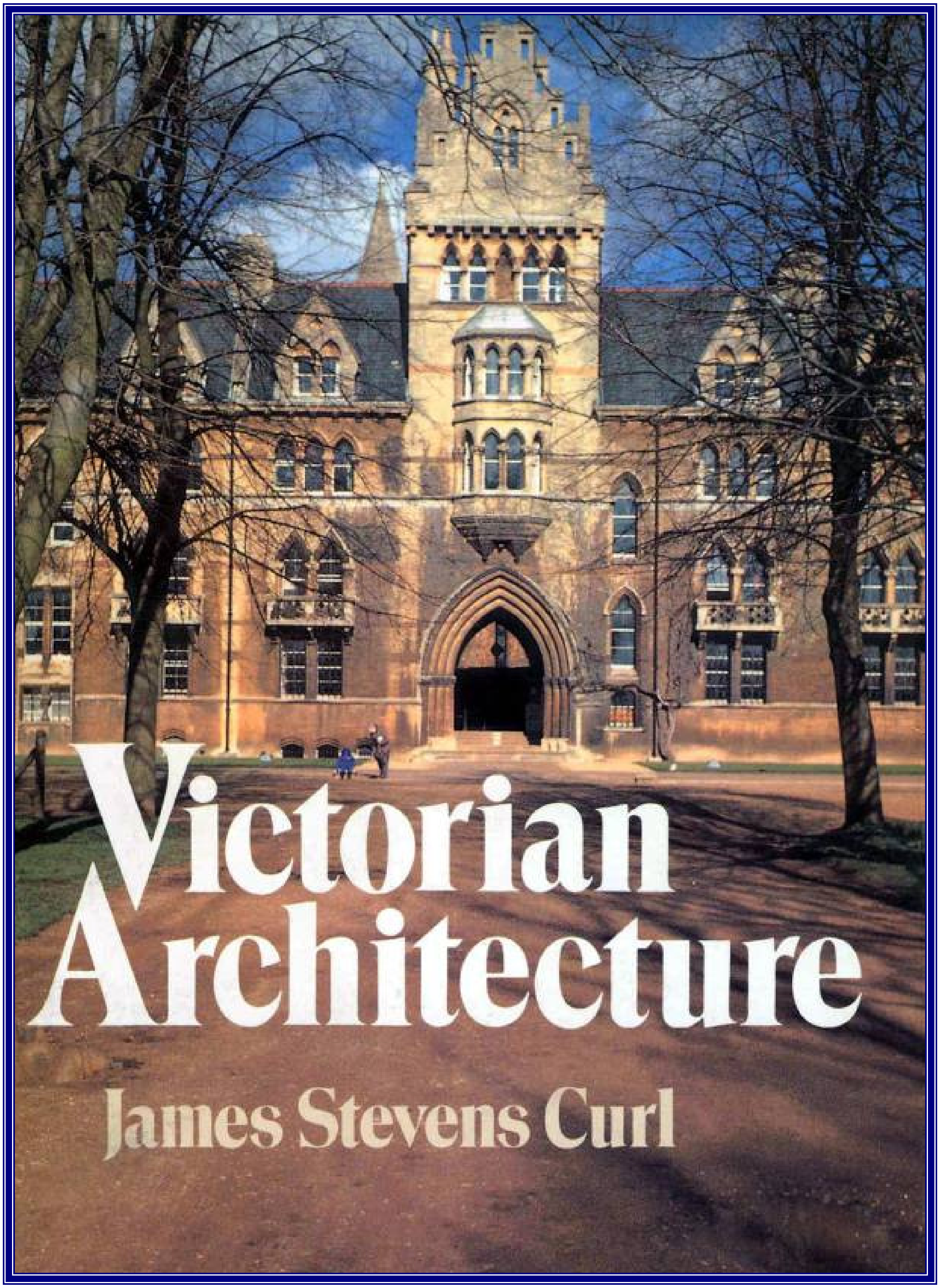
Chapel at Wormwood Scrubs, the largest in any prison (from "English Prisons")



2002 (CIBSE Heritage Group Collection)



Wormwood Scrubs Prison (From "English Prisons")



1990 (CIBSE Heritage Group Collection)

Among the most interesting of the new generation of prison designs is Wormwood Scrubs Prison, west London, of 1873–85, designed by Sir Edmund Frederick Du Cane (1830–1903). Du Cane had been an officer in the Royal Engineers, rose to the rank of major-general, and had a long and distinguished career. He was assistant superintendent of the foreign side of the Great Exhibition of 1851, and until 1856 organised convict labour in Swan River colony in Australia where he promoted public works and general improvements.

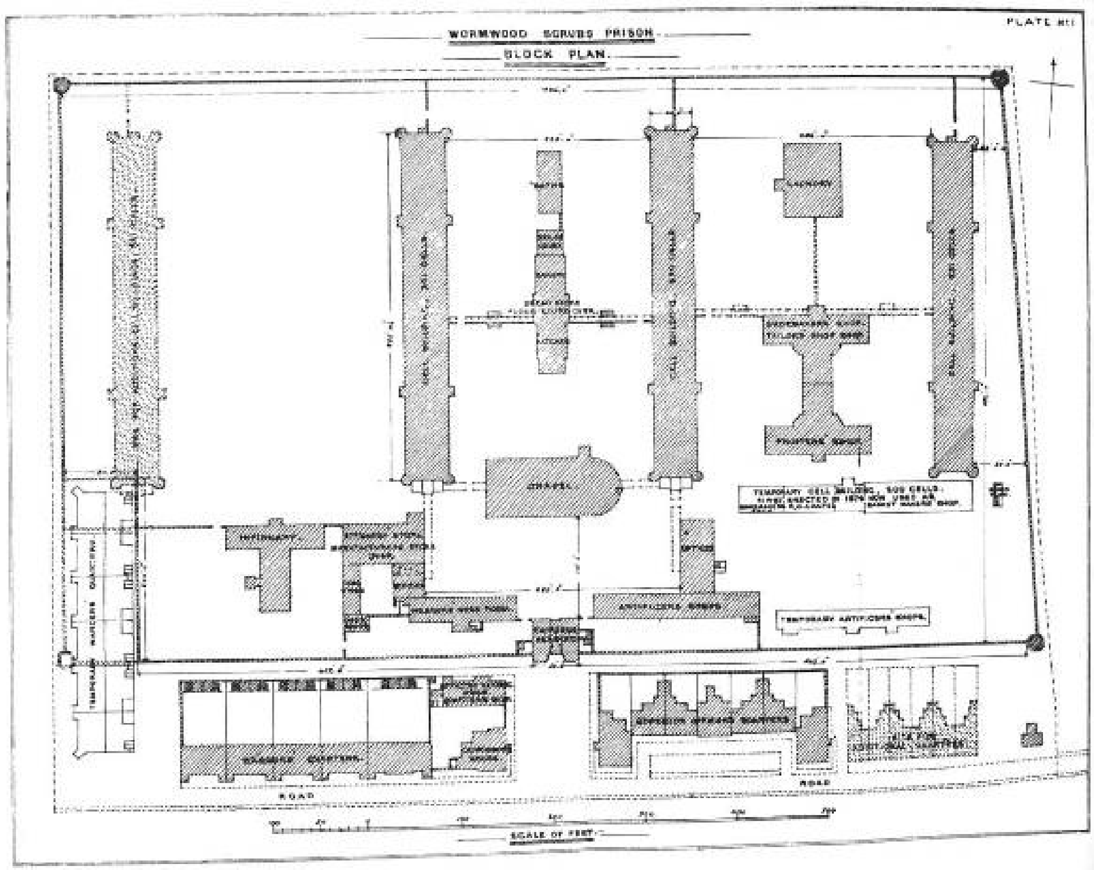
In 1863 Du Cane was appointed director of convict prisons as well as an inspector of military prisons, administered the system of penal servitude following the Prisons Act of 1865, and was responsible for the provision of extra prisons after the abolition of the punishment of Transportation in 1867. In 1869 he became Chairman of the Board of Directors of Convict Prisons, Surveyor-General of Prisons, and Inspector-General of Military Prisons. He advocated the use of convict labour for works of national utility and gave a paper on the subject in 1871: using convict labour he improved the defences of Portland, the docks at Portsmouth and Chatham, and prison accommodation.

Du Cane's great monument, as far as the present study is concerned, is Wormwood Scrubs Prison. The new site was obtained from the Ecclesiastical Commissioners, and the whole new building at Wormwood Scrubs was erected using convict labour on lines developed from Du Cane's Australian experiences. Bricks were made on site, the boundary wall was completed in 1883, and there were cells for 1,381 convicts, with a cookhouse, bakery, laundry, workshops, chapel, infirmary and baths. Cell blocks were built parallel to each other, orientated north-south, and each block contained 351 cells. The blocks were linked by covered ways. Du Cane's scheme is remarkable for its clean, logical plans, and for the heating and ventilating system which served each cell. Staircases, vents and sanitary stacks were expressed in the building, and the completed prison combined that direct

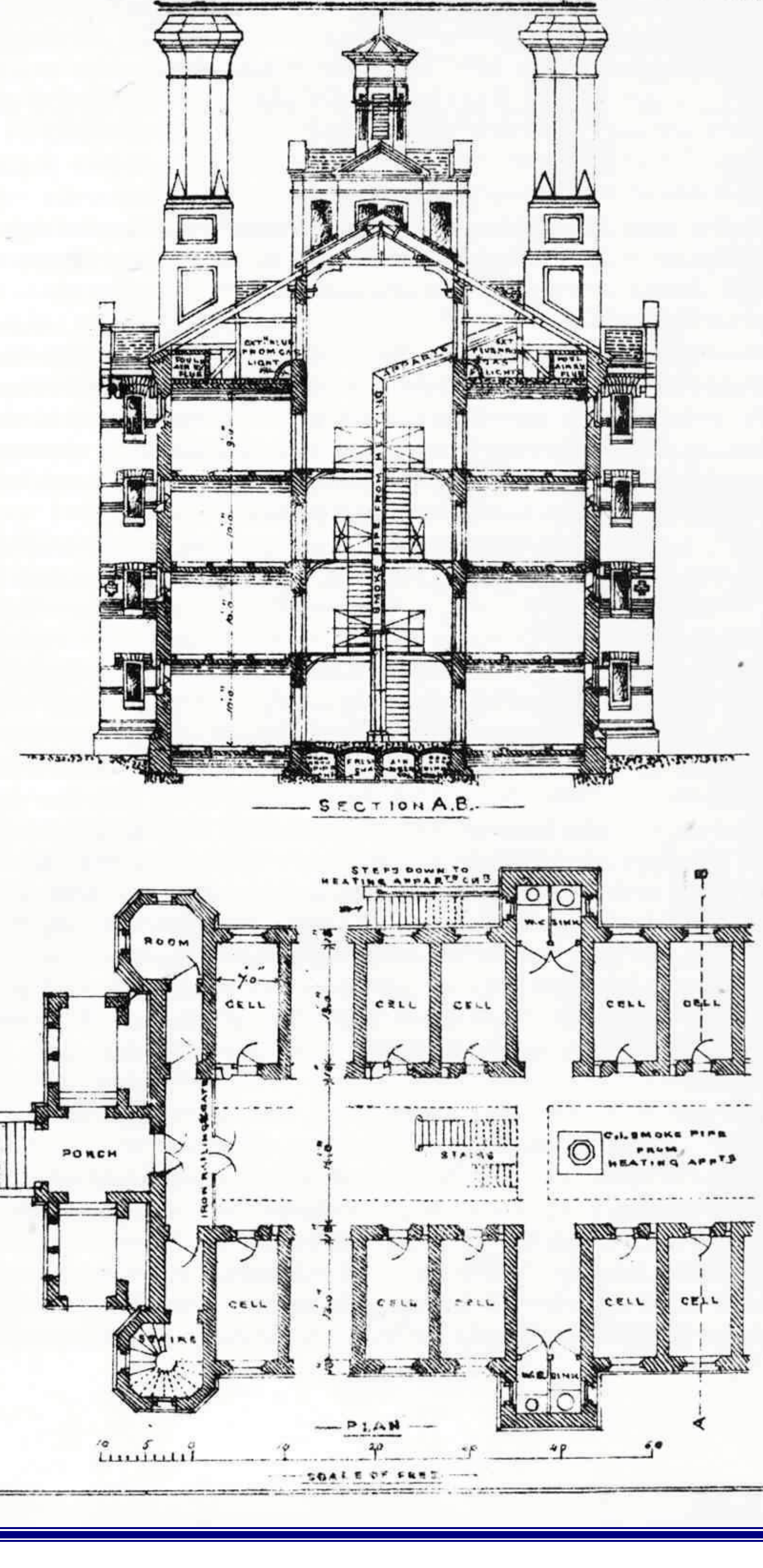
(Text and Drawings from "Curl")

integrity familiar from early warehouse and industrial buildings with an Italian Romanesque concession to some fenestration and other features including the towers. Du Cane supervised the building of Wormwood Scrubs himself, charging a guinea a day, pointing out that by employing convict labour and personally supervising construction, he was avoiding architects' and surveyors' fees, and therefore saving public money. His methods caused unease in certain quarters, and he got into hot water for expressing his ideas in print in 1894: he was attacked as an autocrat in *The Daily Chronicle*,[9] but there is no doubt that his achievements and methods deserve respect and study. Du Cane also inaugurated the registration of criminals, suggested the development of composite portraiture of criminals, and encouraged the use of Sir Francis Galton's finger-print system for the identification of suspects. He was an *uomo universale* of his day, with wide interests including archaeology, architecture, literature and painting. Du Cane's model plan for Wormwood Scrubs influenced the design of prisons for many generations afterwards (*Figs 51 and 52 and Plate 146*).

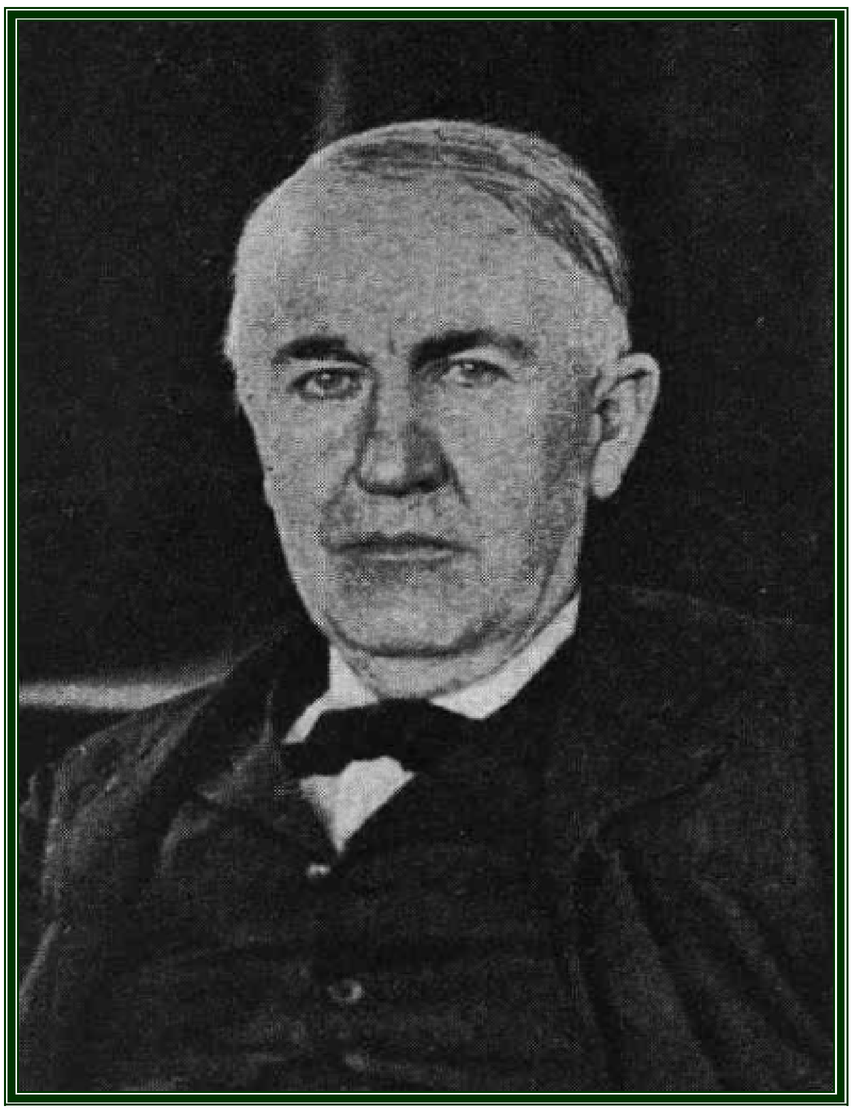
Fig 51 Plan of Wormwood Scrubs Prison. (*Papers of the late Mr A. W. Pullan*)
Fig 52 Section and Plan of Cell Building at Wormwood Scrubs Prison. (*Papers of the late Mr A. W. Pullan*)



PORTION OF A CELL BUILDING — PLATE No 2



THOMAS ALVA EDISON
1847-1931



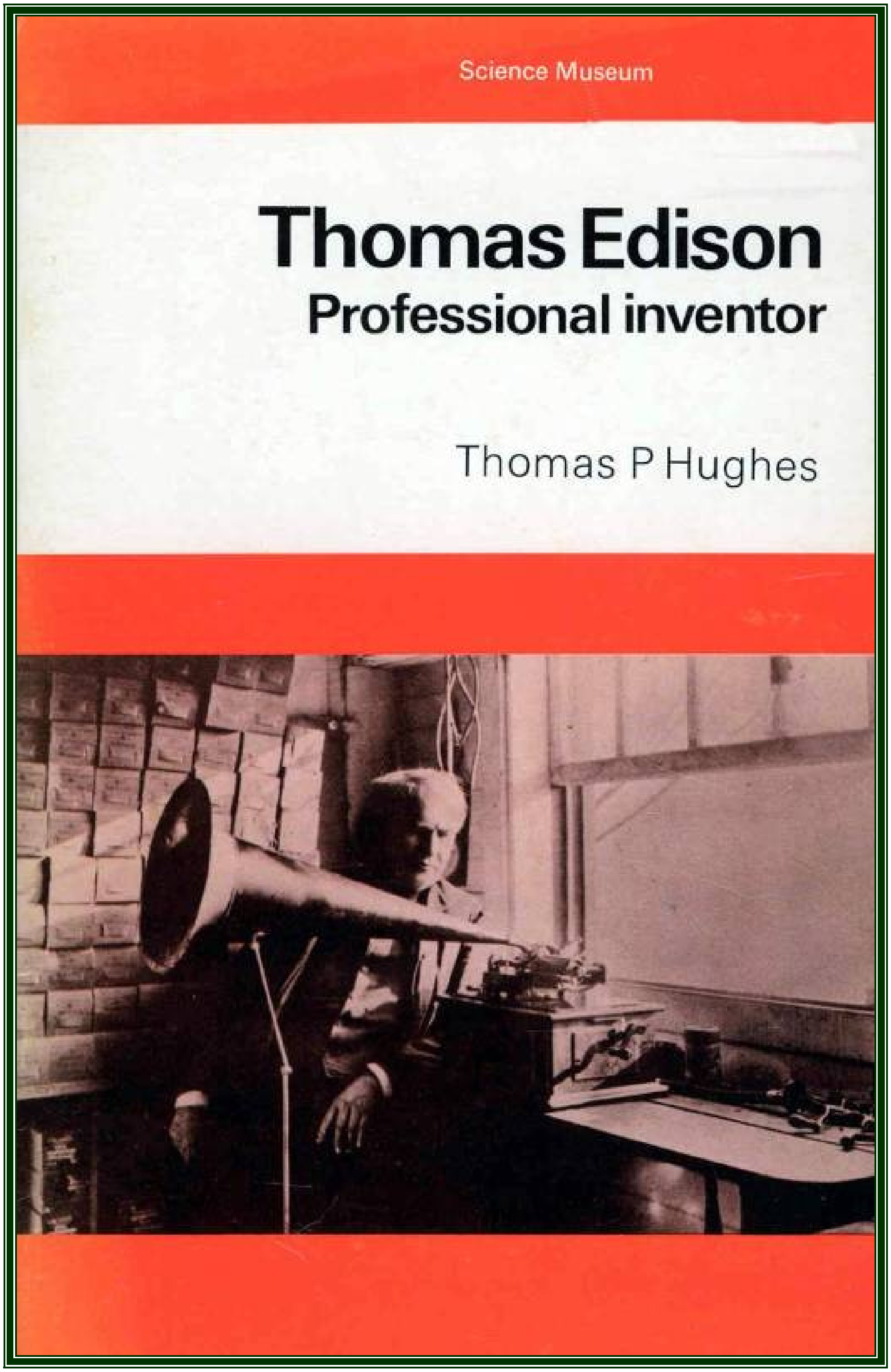
"The Wizard of Menlo Park"

Thomas Alva EDISON **1847-1931**

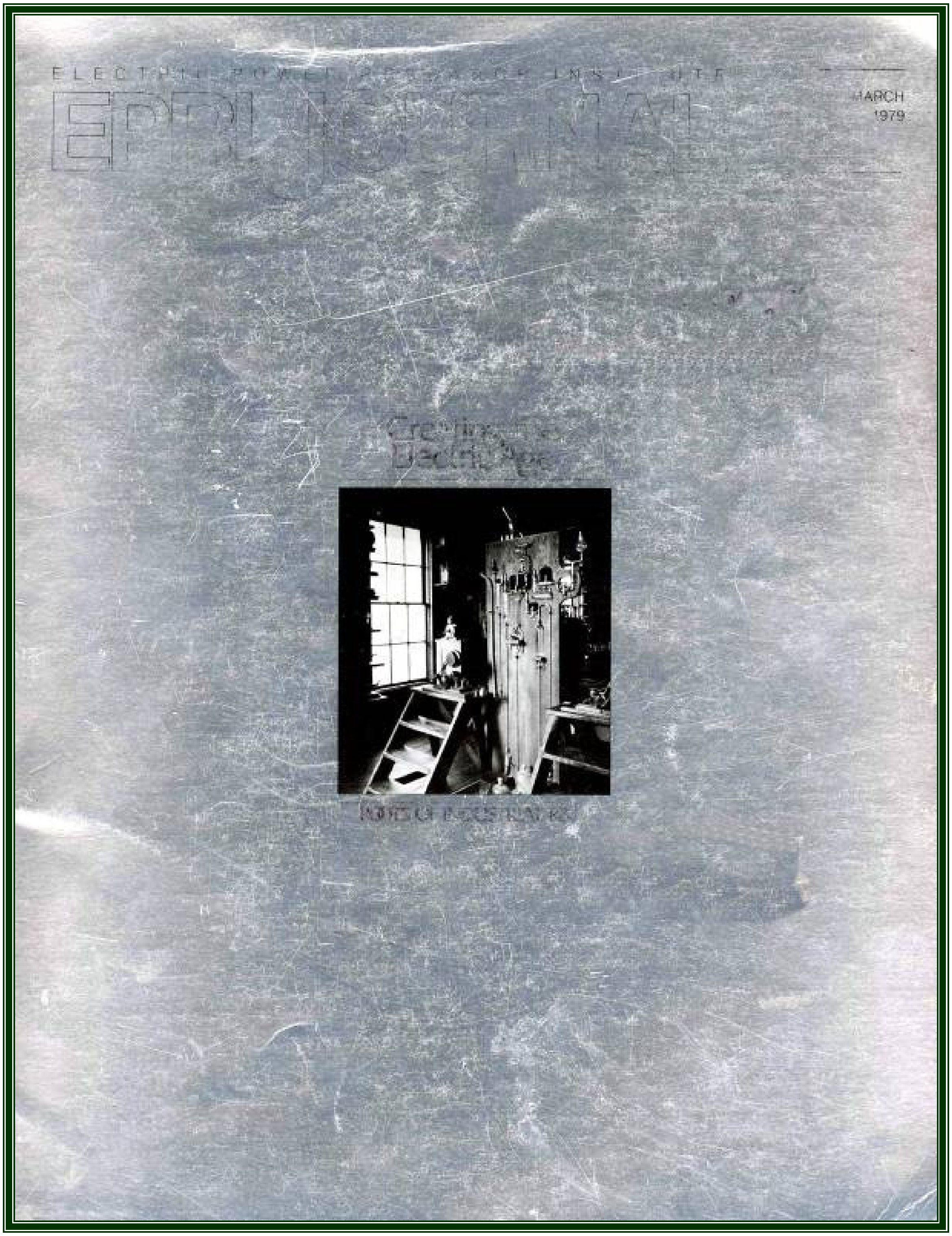
American inventor and businessman. A poor boy who, without a proper education or influence, “made his way to fame and fortune, by hard work and intelligence.” Worked as a telegraph operator. Impressed by the writings of Faraday [158] he became interested in electrical technology. At the age of 23, he started a firm of consulting engineers and produced a variety of inventions. Set up a laboratory (1876) in Menlo Park, New Jersey. He eventually had some 80 scientists and technicians working for him and before he died he patented some 1300 inventions. These include improvements to the telephone and the development of a practical incandescent electric light bulb* (1879). He is credited with producing the first miniature electric motors (1880) which he used to drive an electric pen in a copying stencil device. To make the electric light widely available, Edison developed a complete system of direct-current generation, transmission and consumer apparatus (this was possibly his greatest achievement). However, this work brought him into conflict with Tesla [280] and Westinghouse [279] who favoured alternating current systems, and Edison eventually lost “the battle of the currents.” Known as “The Wizard of Menlo Park”, his achievements were recognised when (in 1960) he was elected to the Hall of Fame for Great Americans.

**In England, Joseph Wilson Swan, independently produced a practical incandescent bulb at about the same time.*

(Mini-biography from CIBSE Heritage Group Records)



1976 (CIBSE Heritage Group Collection)



"Creating the Electric Age," EPRI Journal, March 1979
A Special Edition from the Electric Power Research Institute, USA
(CIBSE Heritage Group Collection)
The silver cover is badly worn but fortunately the content are in good condition

SEIZING THE MOMENT

Age of the Inventor-Entrepreneur

Edison, age 30

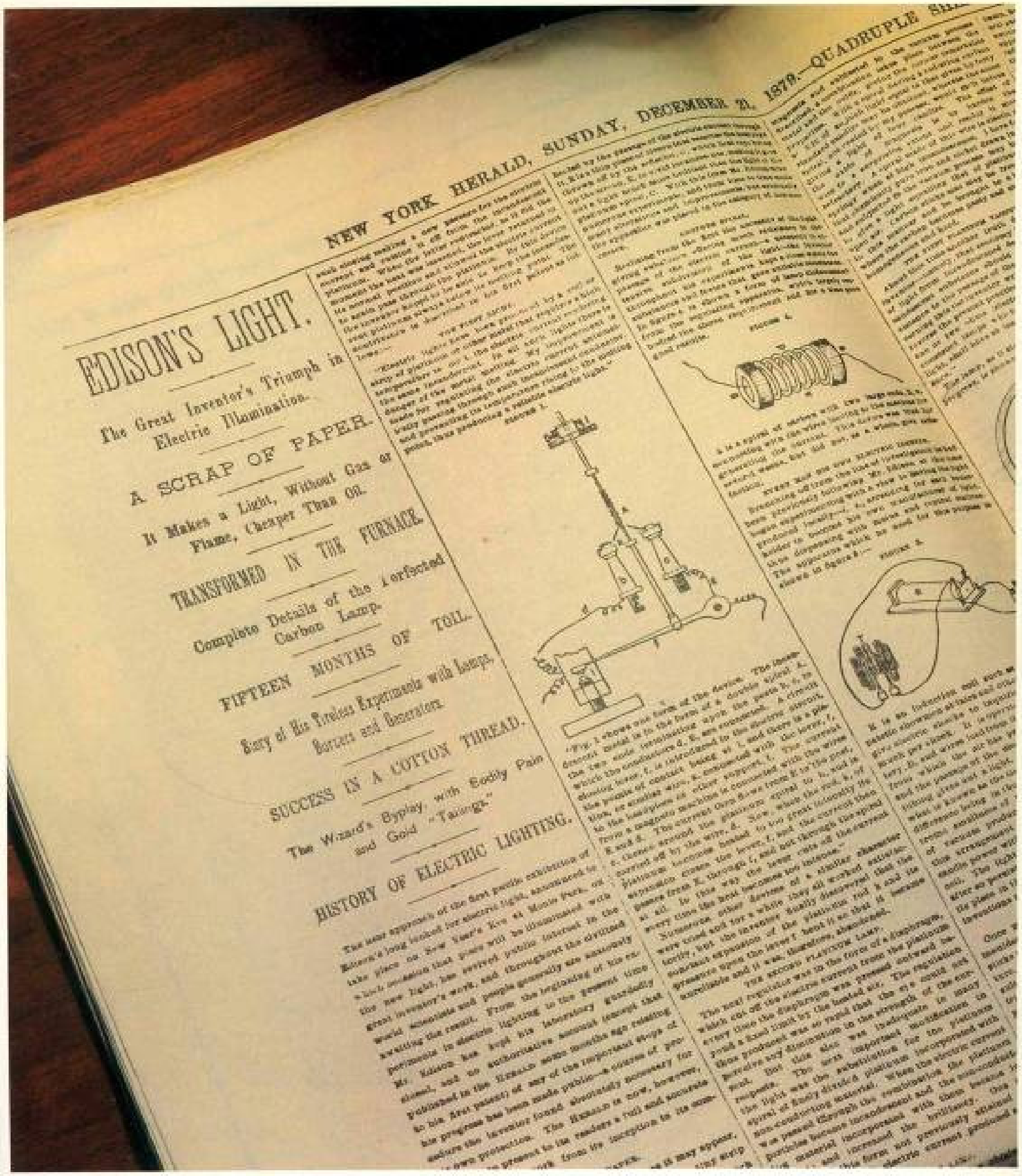
The breakthrough came late in 1879 in Edison's laboratory in Menlo Park, New Jersey. Sometime between the evening of October 21st and the evening of October 22d, Edison and a small group of his associates maintained a watch over a thread that burned undiminished hour after hour in a glass bulb from which most of the air had been removed. Although the records are conflicting, that long watch came to be known as the 40-hour vigil, during which the researchers of Menlo Park realized that after more than a year of agonizing efforts, of seemingly endless trials, and of a near-blind process of elimination they had crossed over the threshold to success in their cooperative quest.

The dim reddish light of the incandescent filament, as Edison had named it, seemed to them one of the most beautiful sights in the world. As it became clear that the fragile carbonized thread could survive, Edison concluded the experiment by turning the voltage higher and higher so that the light grew brighter and brighter until suddenly it burned out. As Matthew Josephson depicts the scene in his classic biography of Edison, the men broke into cheers, and Edison announced, "If it can burn that number of hours, I know I can make it burn a hundred."

It was a mere nothing, a fragile glass bulb, a carbonized piece of ordinary sewing thread, two pieces of platinum, and

Edison wasn't the first to be working on incandescent lighting; work began as early as 1802. However, by Edison's period, the time was ripe, and Edison seized the opportunity. What made the crucial difference in his success—as he boasted—was the fact that he had an organized group, an organized laboratory, better resources, and a powerful methodology. His practical orientation also made a real difference. He analyzed the gas lighting industry, studied its strengths and weaknesses, its method of distribution, its customers, economics—everything. Only after this study did he begin bending electricity to the solution of the problem. From then on, the road to success was certain—at least in Edison's vision.

Facsimile of the famous New York *Herald*'s exclusive story announcing Edison's success.


NEW YORK HERALD, SUNDAY, DECEMBER 21, 1879.—QUADRUPLE SHEET.

EDISON'S LIGHT.

The Great Inventor's Triumph in Electric Illumination.

A SCRAP OF PAPER.

It Makes a Light, Without Gas or Flame, Cheaper Than Oil.

TRANSFORMED IN THE FURNACE.

Complete Details of the Perfected Carbon Lamp.

FIFTEEN MONTHS OF TOIL.

Story of His Tireless Experiments with Lamps, Burners and Generators.

SUCCESS IN A COTTON THREAD.

The Wizard's Byplay, with Bodily Pain and Gold "Tailings."

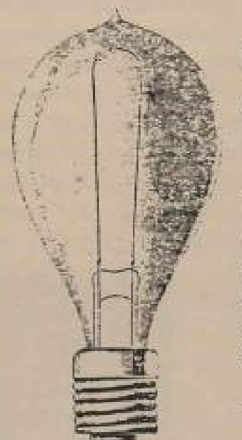
HISTORY OF ELECTRIC LIGHTING.

GENERAL ELECTRIC COMPANY,

44 BROAD ST., NEW YORK CITY. 620 ATLANTIC AVE., BOSTON, MASS.

THE EDISON INCANDESCENT LAMP

IS THE ONLY LAWFULLY INCANDESCENT LAMP MADE.



The right of the Edison Company to an injunction against infringers has been determined by the U. S. Circuit Court of Appeals.

ALL OTHERS INFRINGE THE EDISON PATENTS AND ARE COUNTERFEITS.

See decision of U. S. Court of Appeals in case of Edison Electric Light Company vs. United States Electric Light Company, decided October 4th, 1892.

See decision U. S. Circuit Court of Appeals, December 15, 1892, in case of Edison Electric Light Co. and Edison General Electric Co. against Sawyer-Mann Electric Co.

Copies of these decisions will be sent on application.

BRANCH OFFICES.

630 Atlantic Ave., Boston, Mass.
173 and 175 Adams Street, Chicago, Ill.
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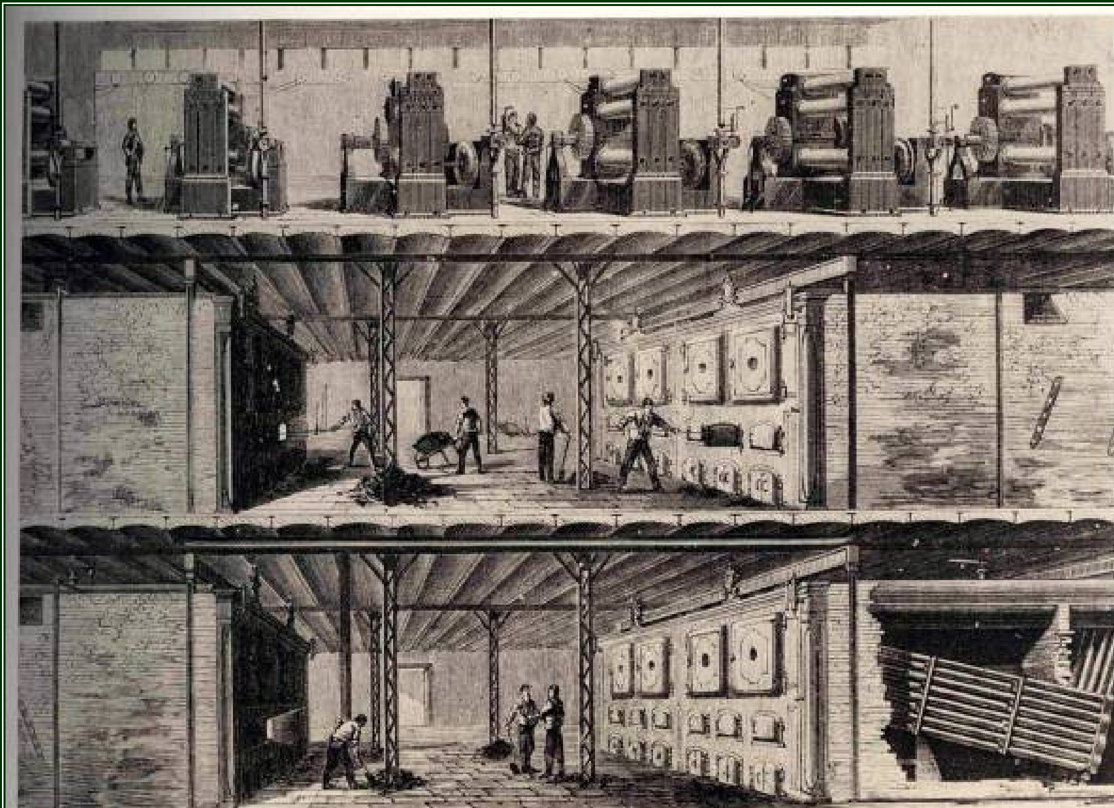
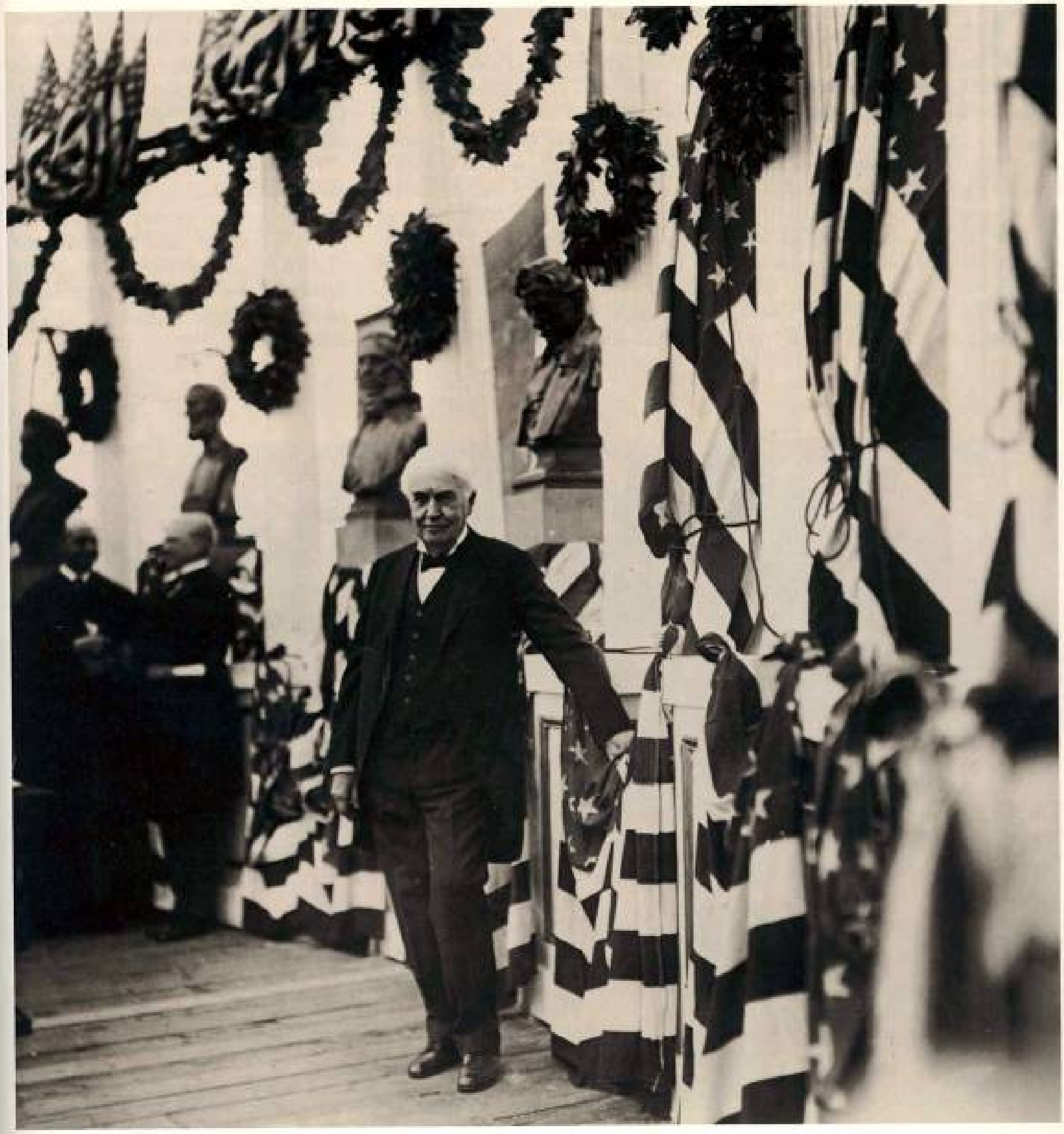
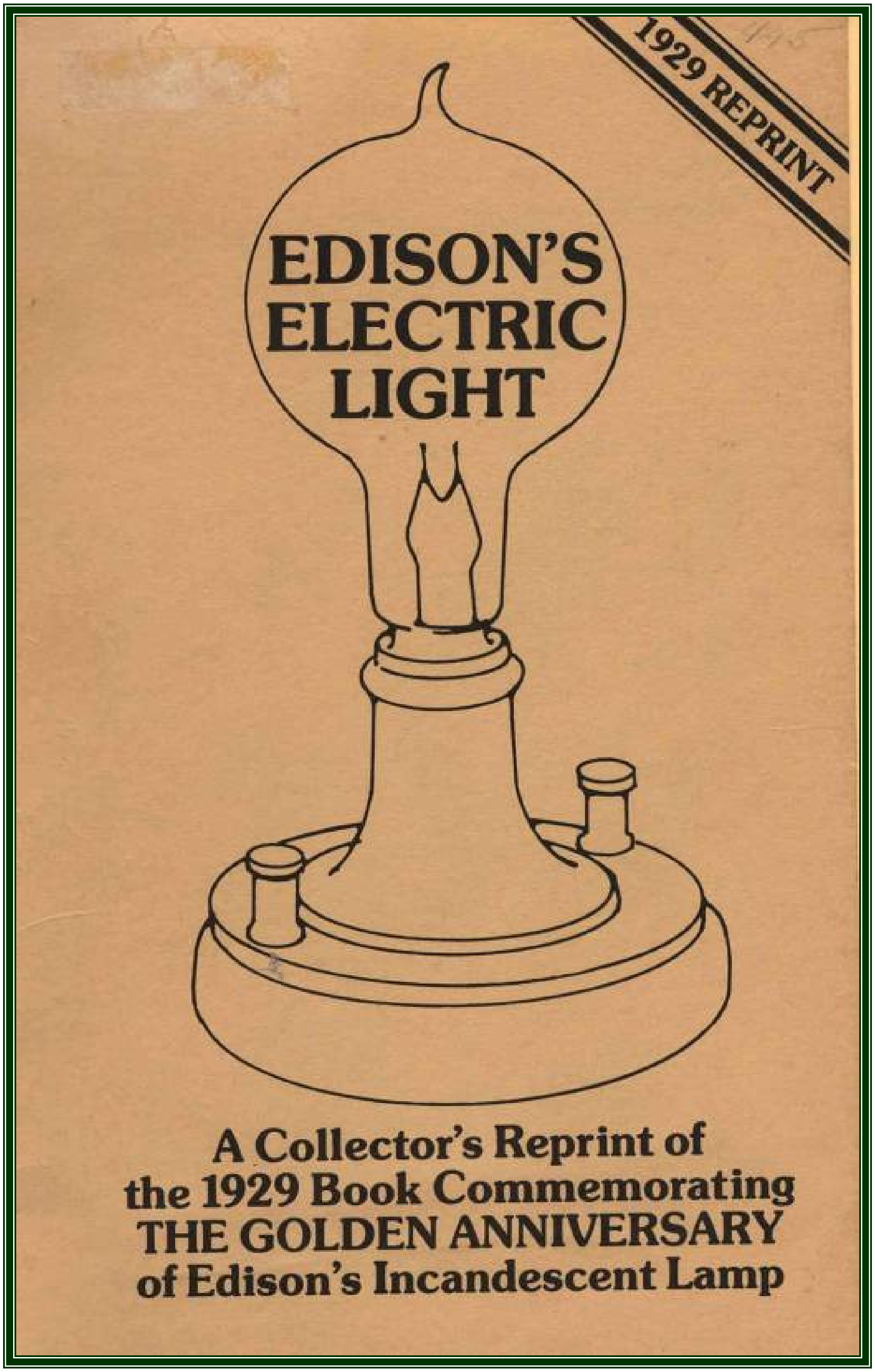
15 First Street, San Francisco, Cal.
44 Broad Street, New York.
509 Arch Street, Philadelphia, Pa.
1333 F Street, N. W., Washington, D. C.
401-407 Sibley Street, St. Paul, Minn.
Masonic Temple, Denver, Colo.



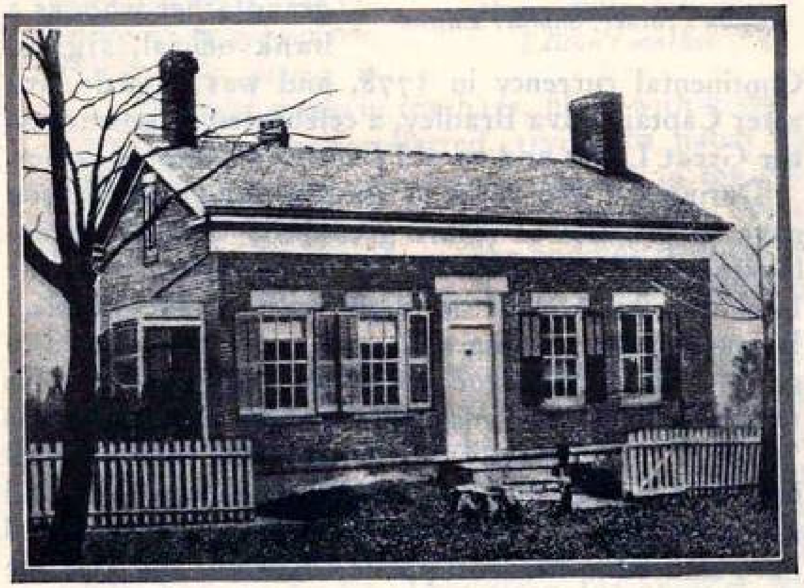
Thomas Edison's first practical central station, located in two buildings at 255–257 Pearl Street in lower Manhattan, was put into operation on September 4, 1882. The "jumbo" dynamos shown on the upper floor supplied electricity for customers in New York's First District.



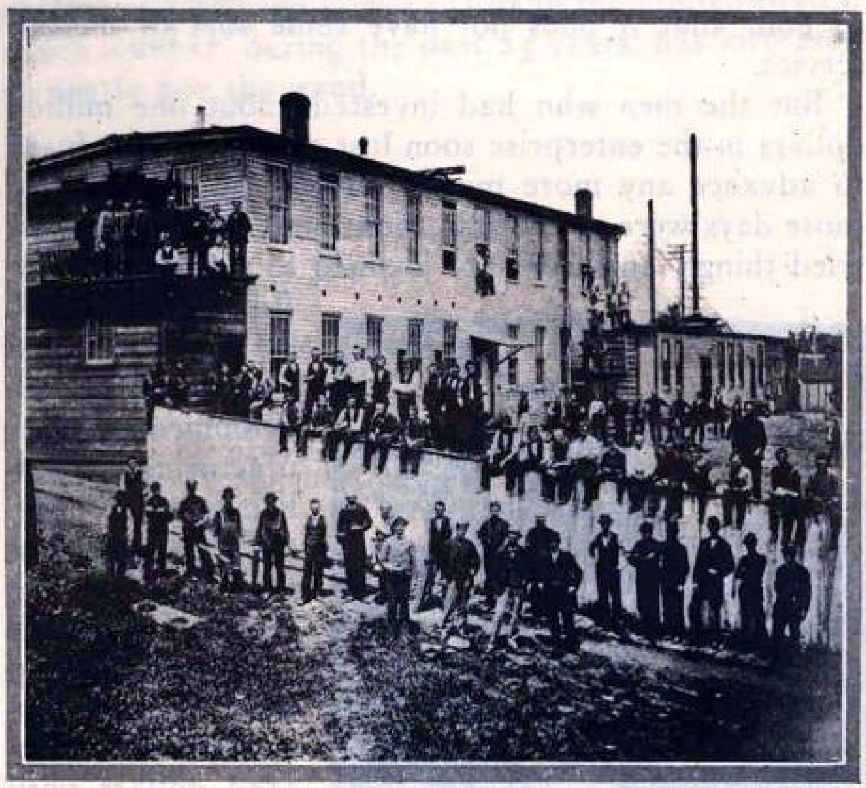
From the beginning, Edison symbolized the electric age to the American people, no matter how many other ingenious inventors, scientists, and engineers made significant contributions. But the passing of Edison and the coming world crisis of World War II would finally close that great age of individual inventors.



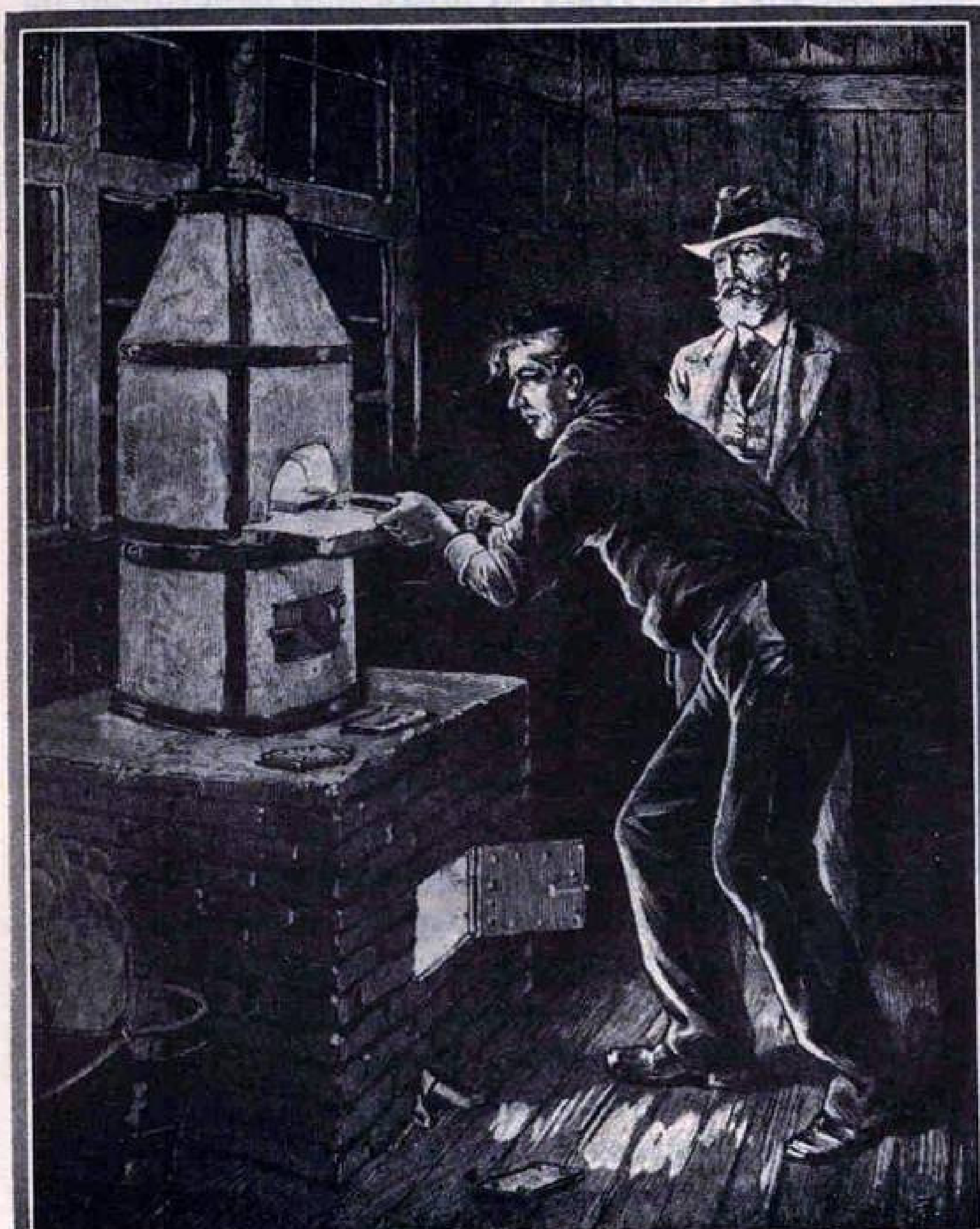
(CIBSE Heritage Group Collection)



Edison's birthplace at Milan, Ohio

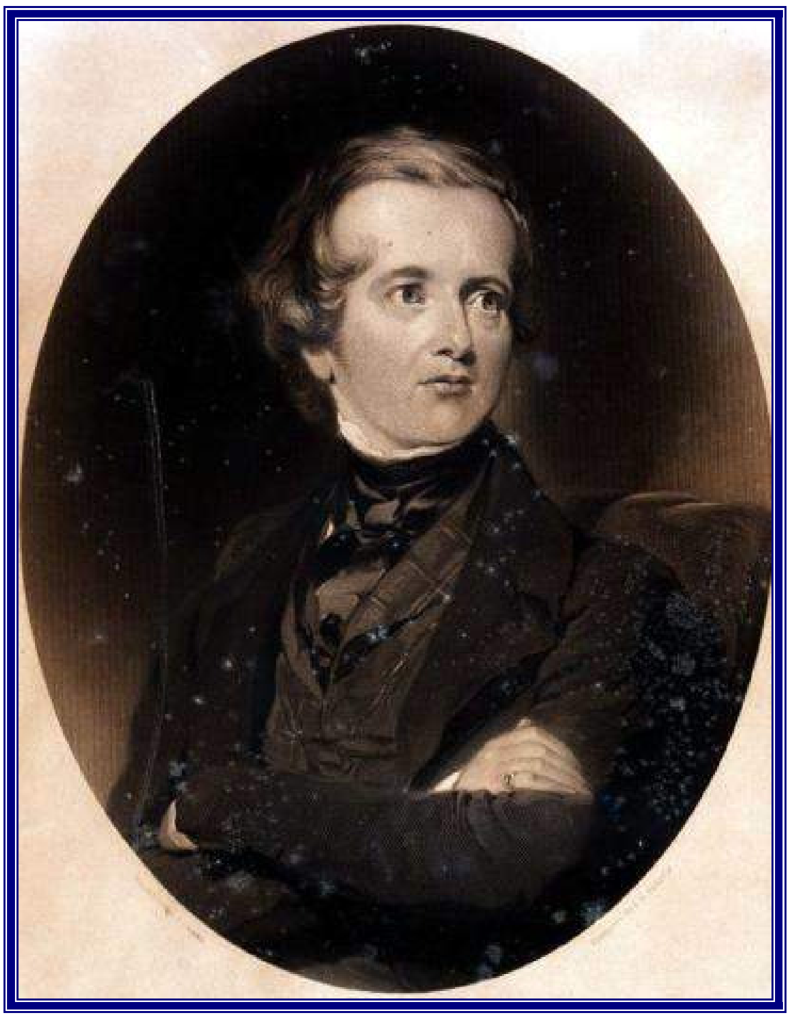


Edison's first lamp factory—1881



First efforts to secure a carbon "filament"

HARVEY LONSDALE ELMES
1814-1847

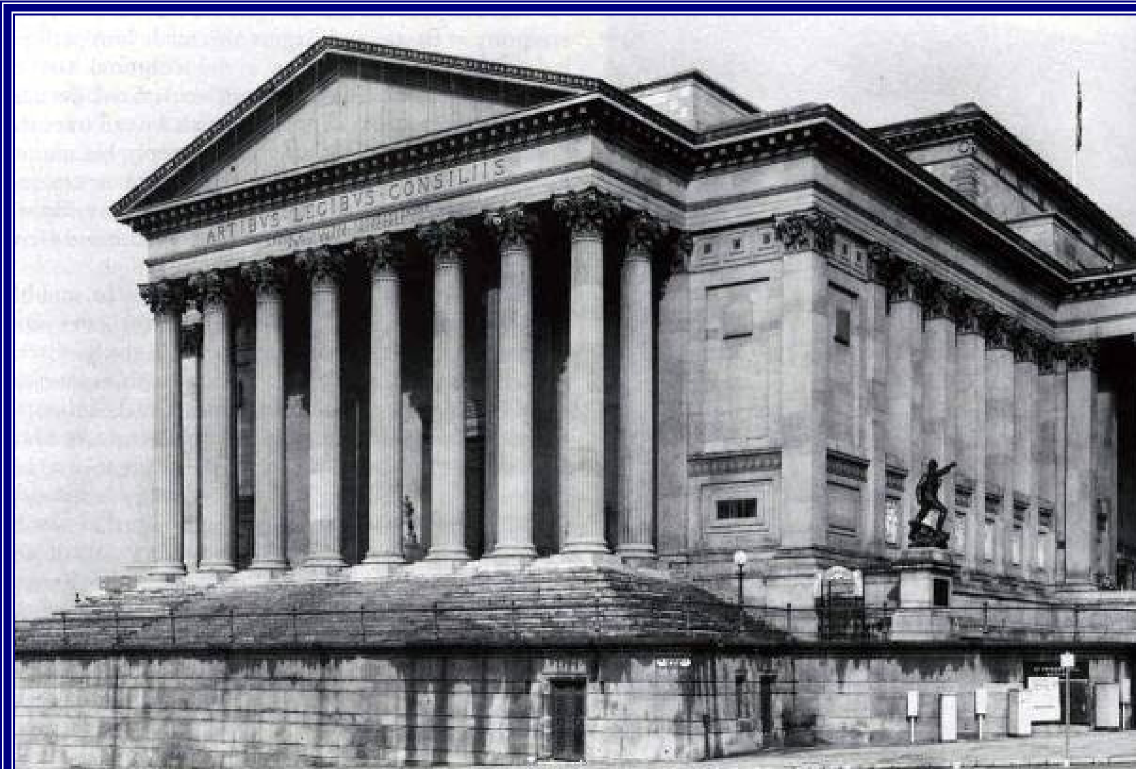


Neoclassical Style Architect

[194] Harvey Lonsdale ELMES **1814-1847**

English architect. Best known work is St. George's Hall in Liverpool (1851), with an interior inspired by the Roman Baths of Caracalla [see 183]; has been described as "perhaps the finest Neoclassical building in England." Dr. Reid [58] was engaged to design a heating and ventilating system on the recommendation of Dr. W.H. Duncan [170]. Air was taken into the building through two shafts and warmed by five batteries of hot water pipes served from four boilers. Circulation was aided by steam-engine driven fans. Cold water sprays cooled and cleaned the incoming air. Elmes died of consumption in Jamaica at an early age, and his great work was completed by Prof. C.R. Cockerell.

(Min-biography from "The Comfort Makers," Brian Roberts, ASHRAE, 2000)



St George's Hall, Liverpool

Detailed Information on St George's Hall is available elsewhere on this web site under ***Electronic Books****: Merseyside & North Wales CIBSE Region,*
A 75th Anniversary Book by Dr Neil S Sturrock, Vice-Chairman CIBSE Heritage Group

*The Mechanical Ventilation and Warming of St. George's Hall, Liverpool**

BY CHARLES R. HONIBALL

There exists to-day no finer example of the genius and skill of that brilliant pioneer of mechanical ventilation, Dr. David Boswell Reid, than the warming and ventilation installation of St. George's Hall, Liverpool. Though Dr. Reid was associated with the designs of, or alterations to, installations for many large public buildings in this country, St. George's Hall is the largest public building in which his system of ventilation was carried out in its entirety according to his own views.

The installation has been in constant work since the opening of the assize courts and St. George's Hall in 1851 and 1854, respectively, and it is working to-day. It has proved entirely successful in working, without occasioning any difficulty at any time. Though it may lack modern labor-saving devices, it possesses many, if not all, the essential features which characterize successful installations of to-day, which is the more remarkable when we consider the position mechanical ventilation occupied during the period of the design and erection of the plant (1841-51).

In designing this installation Dr. Reid was guided by the results obtained from a series of experiments he had made, and which clearly demonstrated the necessity not only for a more ample supply of air than had been previously given in public buildings, but also of the introduction of much more specific means for regulating its ingress, and controlling its temperature, state of moisture, and discharge, according to the ever-varying circumstances under which they are occupied.

PECULIAR REQUIREMENTS IN VENTILATION

The peculiarity of the case, so far as regards St. George's Hall and other buildings of the same class, consists in this: Effective ventilation necessarily demands many special adaptations in such buildings. The great hall, the law courts, the concert room, and the numerous other apartments, connected together by passages in constant communication, made this great work rather resemble a series of public buildings, aggregated together, than any ordinary structure. Special arrangements accordingly became still more indispensable.

When an architect exercises absolute control over everything done in any building, he becomes necessarily responsible for the ventilation, if he uses that control at variance with the views of the ventilating engineer; on the other hand, the engineer might interfere with the architecture were he allowed unlimited power in carrying out his views. A compromise accordingly becomes indispensable where there must be divided responsibility, hence the co-operation of architect and engineer before the erection of such buildings becomes of paramount importance.

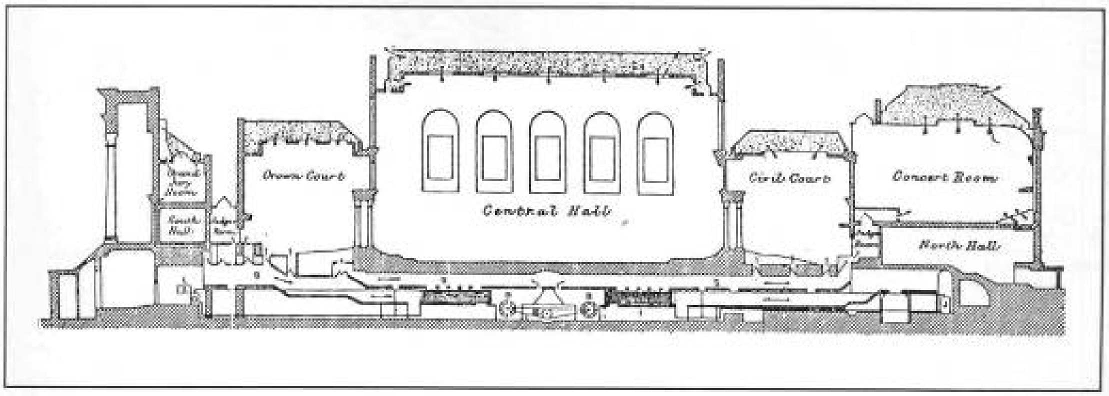
The success of St. George's Hall, both from an architectural and engineering point of view, is in a large measure due to the early co-operation of the architect, Harvey Lonsdale Elmes, and Dr. Reid, which enabled them to satisfactorily adjust the rival claims of architecture and ventilation, and evolve an efficient and harmonious arrangement for the whole building before it was erected.

MAIN FEATURES OF INSTALLATION

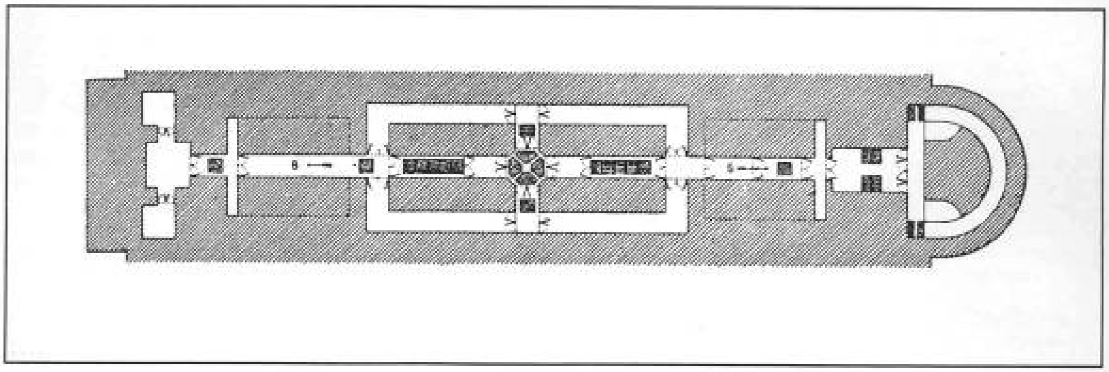
The essential features of this installation may be classed under the following heads:—(1) Supply of air; (2) warming; (3) cooling; (4) moistening; (5) ventilation. The arrangements for these several purposes are shown in the diagrams.

*Paper read before the British Institution of Heating and Ventilating Engineers, London, England, October 8, 1907.

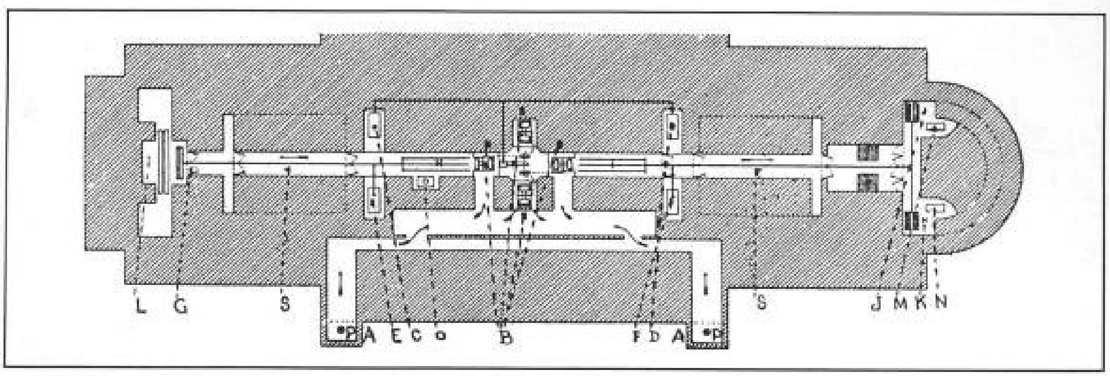
First page of Charles R Honiball's paper on St George's Hall
(From The Heating & Ventilating Magazine, USA, October 1907)



a. Longitudinal section of St. George's Hall.



b. Basement plan, St. George's Hall, at level of upper air channels.



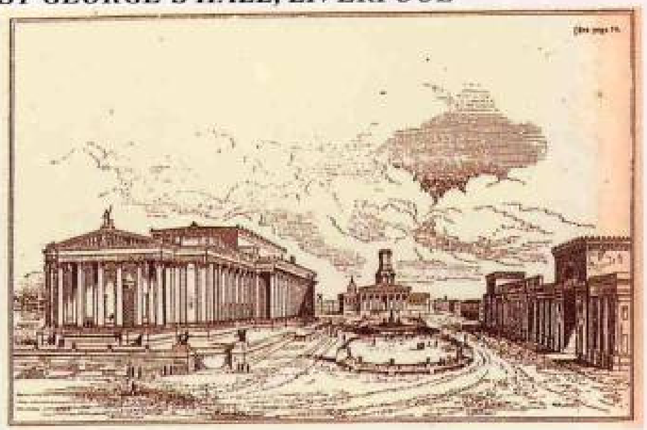
c. Basement plan, St. George's Hall, at level of lower ducts.

Figure 7-11 *Section and plans, St. George's Hall, Liverpool, 1854 (from Honiball).*

*(From "Heat & Cold: Mastering the Great Indoors,"
Barry Donaldson & Bernard Nagengast, ASHRAE, 1994)*

ST GEORGE'S HALL, LIVERPOOL

Dr David Boswell Reid



Beneath the Organ Gallery 1990s

The Hall today

St George's Hall, Liverpool, 1842-51

Harvey Lonsdale Elmes drew up the orginal plans with the interior design inspired by the Roman Baths of Caracalla. The building has been described as perhaps the finest neoclassical building in England. But, when in 1847 Elmes died of consumption at an early age, his great work was completed by Professor C R Cockerell. Dr David Boswell Reid was engaged to design a heating and ventilating system, not included in Elme's scheme but now instigated by the city surveyor, Dr W H Duncan, concerned that infectious diseases seemed to spread due to lack of proper ventilation. [Liverpool had experienced a severe outbreak of cholera in the 1840s.] In Reid's design, air was taken into the building through two shafts and warmed by five batteries of hot water pipes served from four boilers. Natural convection of the heated air was assisted by a 10 hp steam engine driving four 10 ft fans. Cold-water sprays in the main shaft cooled and cleaned the incoming air, which was introduced behind sculptures in the Great Hall and through risers in the seating tiers in other rooms. Vitiated air was exhausted through grilles incorporated in the decorative ceilings, passing into the roof space, its movement aided by gas burners sited in shafts at the corners of the Great Hall. Heating and cooling of the various zones of the building was accomplished by a small army of workers in the basement controlling the passage of air by canvas flaps and doors connected to a system of pulleys and ropes. Much of Reid's system is still in place today.

The installation is described in "The Mechanical Ventilation and Warming of St George's Hall, Liverpool," Charles R Honiball, *The Heating and Ventilating Magazine*, Vol.4, New York, October 1907, 15-23.

(From "Building Services Heritage," Brian Roberts, CIBSE Heritage Group, 2003)

The Interior of St George's Hal during Construction, painted 1854
(From "Buildings for Music," Michael Forsyth, 1985)