A century ago: 1878-9

by David Hamilton & Brenda Sowan

Electric lighting

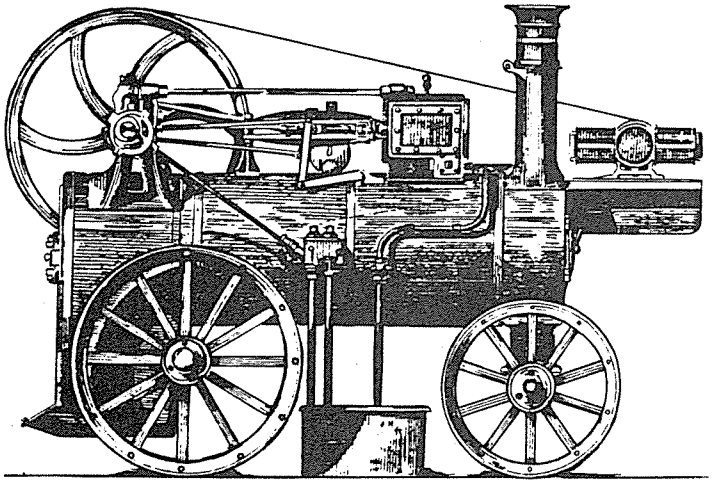
A study of the technical press of 1878 - 9 reveals tremendous interest resulting from the public demonstrations of electric lighting by various pioneer engineers. Early trials showed the inadequacies of the portable steam engines when coupled to a dynamo. The Electrician, December 14, 1878 reported:

'Many of the visitors at the meeting of the Society of Arts on December 4 were too eager to call attention to what they termed a failure of the electric light. Dr. Siemens, however, in a very few words, pointed out that the varying intensity of the light was not due to any fault of the electrical apparatus, but to the great difficulty experienced in obtaining a constant steam pressure, and, therefore a steady revolution of the machine generating electricity.'

The report continued

'The attention shown in the manufacture of the carbons has gone a long way to get rid of this fault, and with the perfecting of the homogeneity of the carbons, we realise more clearly the failure in steadiness of the driving power. . .

'Messrs. Ransomes, Sims, and Head, of Ipswich, have devoted a considerable amount of attention to engines adapted to electric light purposes. The firm has supplied engines for lighthouses in Russia and New Zealand, &c., and during the late loan exhibitions at South Kensington one of their engines was used. Recently a portable engine, specially designed for the purpose of driving dynamo machines, has been constructed. As will be seen from the illustration . . .



the machine to be driven is placed on a platform in front of the smoke box.

The accurate control of the speed of reciprocating steam engines used for electric power generation remained a problem for the next 20 years. The difficulty in obtaining an unfluctuating supply from a 'pulsating' prime mover was overcome only with the advent of the steam turbine. However, the improvements made by Messrs Ransomes & Co. were to some extent successful, and six months later The Electrician (June 7, 1879) reported on the 'careful and well-considered experiments' of Sir J.W. Bazalgette and Mr T.W. Keates in lighting the Thames Embankment:

'The engine, which was supplied by Messrs. Ransomes and Co., deserves the most unqualified praise. The principal feature of the engine is, however, an automatic governor of remarkable sensitiveness. The action of this governor rendered the movement of the engine so uniform, that in an experiment of twelve nights the greatest difference in the mean number of revolutions each night was only 1.12 upon an average of 142.36 . . . With five lamps in circuit the expenditure was 1.59 h.p. per lamp, . . . and with twenty it was 0.92. . . . The cost of working the engine, as regards fuel, oil, labour, &c., per night of 5.5 hours was, £1 9s. 8½d., being 3.24d. per lamp per hour.

The report went on to describe photometric measurements taken with various types of lamp and discussed the economies of electric lighting. It concluded that under

'particular circumstances of street lighting, or lighting of great interiors, railway stations or similar places, the electric light will be used; but at present there are defects connected with it that must prevent its adoption as a general mode of lighting competing with gas.'

The Electrician declined to elaborate further on the comparison of electric versus gas lighting on the grounds that it was:

'not sufficiently exhaustive to make it of absorbing importance.'

A week later The Electrician reported:

'METROPOLITAN RAILWAY.—On Monday night the Edgware-road Station of the Metropolitan Railway was illuminated for the first time by electric light. Two lights were fixed in the station, one being placed at each end, about 240 feet apart; and though it could not be said that the illumination was not susceptible of improvement, yet everything was sufficiently clear, and when the electric light was extinguished, and the 25 gas burners generally used were restored, the difference between the light and the comparative darkness which succeeded was plainly visible. The lighting was under the management of Mr. Ward, of the British Electric Light Company, the sole licensees of the Gramme Electric Lighting Machine, two of which were used. One of these machines was made by the Silvertown Indiarubber Company, and was working at 1,000 revolutions per minute. The other was supplied by Messrs. Sautter, Lemonnier and Co., and ran 1,100 revolutions.

'Each machine was calculated to need 2½ horse-power, but the engine used being that which works the lathes, &c., in the workshops, it was not possible to estimate with accuracy the power employed, as a long series of shafts had to be kept revolving. The Serrin lamp was used. It is said that the cost of the lamps amounts to about fourpence per hour, and the gas consumed by the twenty-five jets usually employed to light the station costs about sevenpence per hour. The company are further put to considerable expense for cleaning the large number of lamps in use on the line, besides having to pay for new glasses to replace such as are broken, a cost which amounts on the line to more than £700 annually.

'The Metropolitan Railway Company is to be congratulated on having thus taken the initiative in its practical introduction in a railway station, and especially as in this case the question of purity of atmosphere is an important one. The electric light does not vitiate the air like its competitor, gas.'

The telephone

Throughout 1878 - 9 other significant developments were taking place which were somewhat overshadowed by the enthusiastic public response to the electric lighting demonstrations. Certain members of the business community in the City were convinced of the value of the telephone and were impatient about the delay in setting up an exchange system. Letters were written to The Times. The Electrician of 30 August 1879 reproduced the correspondence in full and the following are extracts:

'SIR: In reading your account in The Times of to-day of inventions to be exhibited at the meeting of the British Association, I notice a reference to the telephonic exchange system, and am led to ask how much longer it will be before this most useful arrangement is established in London? To any one who has visited the United States, and seen how very generally the telephone is used by business men it is a matter of surprise why so simple a thing as this telephonic exchange is not adopted here. I am convinced that a well-organised and cheap system would answer admirably. . . . I am, Sir, yours faithfully,
GEORGE H. CHUBB. 128, Queen Victoria-street, Aug.19.'

The Edison Telephone Company of London promptly replied:

'Mr. Edison has lately given the subject of Telephone Exchanges his earnest attention, and has devised means, at once efficient and simple, which supersede the noisy and expensive system prevailing in the central bureaux in the United States. It is true that, as Mr. Chubb implies, the English commercial public are at present behind the age in respect to telephonic communication; but the Edison exchanges now being organised by this company will surpass in cheapness and efficiency anything of the kind known in America.'

Within a few weeks The Electrician (September 13, 1879) was able to report:

'THE EDISON TELEPHONE.—On the 6th inst., a private trial of the Edison Telephone Exchange took place at the offices of the company, Mansion House Chambers, Queen Victoria-street, the experiments embracing playing on the cornet from the Exchange room in Lombard-street, singing and whistling tunes, speaking and whispering from *The Times* office in Queen Victoria-street, and speaking and singing from other offices in Lombard-street, Copthall-buildings, and Carey-street (Chancery-lane). In the office a "stick" of matter was displayed which had been set up by a type-composing machine at *The Times* office from the dictation of an Edison telephone. From the offices in Mansion House Chambers there is at present communication with ten offices, including the above, the most distant being in Carey-street. The various experiments appeared to be successful, and as Mr Johnson, who conducted them, explained, if they can be successfully carried out at ten offices, *a fortiori* they can be carried out successfully at very many more.

'Mr. Johnson is the chief engineer of the Edison Telephone Company and Mr. Edison's scientific representative in this country. Great merit is claimed for the instrument on account of being able to speak in a loud or soft voice with it, so that what is said can be heard by a room full of people or by only one person, and, as was explained, the instrument is purely mechanical, controlled by electricity.

'After leaving the offices in Mansion House Chambers the party proceeded to the Exchange room in Lombard-street, and were shown the different wires by means of which the experiments had been conducted, and the practical working of them. There were in all twenty-four wires, and Mr. Johnson stated that out of these twenty-four distinct offices twelve combinations could be made at one time — a cross connection could be made with any two wires, by which two offices could be placed in communication.

John Penn, 1805 - 1878

At a time when dramatic advances in electrical technology were being made, an event took place which focused attention on London's more traditional industries and sources of wealth. On 23 September 1878 the death occurred at the age of 73 of John Penn, recently retired owner of John Penn & Sons, Greenwich, one of the leading engine and shipbuilding companies on the Thames. His obituary in The Engineer of September 27, 1878 recorded:

'Some of his earliest engines were those with which he fitted the steamers Ipswich and Suffolk. These were beam engines of 40-horse power, and in 1835, four passenger boats to run between Greenwich and London were similarly engined by him. In 1838 his well-known oscillating engines with tubular boilers were applied to some of the boats running above London Bridge. The admirable way in which these worked, their finish and compactness soon attracted general attention, and in 1844 the Lords of the Admiralty placed their yacht, the Black Eagle, in his hands. He replaced her former engines by oscillators of double their power, with tubular flue boilers, the change being effected in the same space and without any increase of weight. The Black Eagle, by these and other improvements, from being a very slow ship had her speed so increased that an immense number of orders followed to fit up ships on the same principle. Among them we may mention her Majesty's yacht, the Victoria and Albert, and the Great Britain, as examples of the comparative swiftness and regularity secured by his new engines.

'The necessity for large powers in small spaces for the propulsion of war vessels by the screw propeller, was, however, productive of the class of engines to which Penn's name is equally attached, namely, the trunk engines, by which screws were driven direct; the engines brought everything below the water line, and practically below the line of shot penetration, but little room was occupied. In 1847 Penn was commissioned to fit her Majesty's ships Arrogant and Encounter on this system, and he executed these orders in so satisfactory a manner that his firm has received orders for and have applied trunk engines to no less than 230 vessels.

'Among other inventions connected with Penn's name, which include several of the machine tools at the Greenwich and Deptford works, specially adapted for building large marine engines and boilers, was his arrangement of the gear by which the glands of steam engine pistons and trunks could be uniformly tightened. Though most of our younger members may not remember the fact, many others had experience of the great difficulty which was experienced in finding a suitable material for the sea-bearing of screw shafts; no material, no metal, could be found that could stand the strain and wear, and the difficulty seemed at one time to threaten the screw with abandonment, and to make a return to paddles necessary. Penn solved the problem by using "lignum vitae" wood bearings, which lubricated by water were found to act without any appreciable wear, and in this simple, economical way the screw has already been able to reach a point of development from which we can now calmly look back upon the financial risks and terrors which beset the early days of ocean steam navigation.'

The lignum vitae bearing continued to be fitted to ships until after the second World War, and was superseded by oil lubricated white metal bearings after nearly 100 years of superiority.

The fortunes of many famous engine- and shipbuilders declined throughout the latter part of the 19th century. John Penn & Sons became part of the Thames Ironworks & Shipbuilding Co. in 1899. This company managed to remain in business until just after the outbreak of the first World War. Thus, over a century of steam-shipbuilding on the Thames came virtually to an end.