

Subsequently he was appointed Resident District Engineer on the Brighton, Lewes, and Hastings Railway, on which line he superintended and carried out several large works, including the curved viaduct from the Brighton Station, in the direction of Lewes; the tunnels at Rose Hill, Falmer, and Lewes, and a draw-bridge for carrying the railway over the River Ouse near Lewes. He afterwards took charge, for the same company, as Resident Engineer, of the Keymer Branch, from Hayward's Heath to Lewes. In 1847 he accepted the position of District Engineer, during the construction of the Nottingham and Grantham Railway, where, among other works, he executed the Gonerley Tunnel. He also designed and superintended the execution of the Grantham water-works, reservoir, &c. In 1852, Mr. George Meredith went to Holland, as the representative of an English contractor, during the construction of the Antwerp and Rotterdam Railway, and on the completion of those works he was named Engineer to the Ottoman Railway Company, from Smyrna to Aidin. He next made a survey of a proposed line of railway from Constantinople to Adrianople, and he returned to England with the intention of taking measures to have this line carried out, when he was suddenly seized with an illness which terminated fatally on the 21st of October, 1864, in the forty-seventh year of his age.

Mr. Meredith was elected a Member of the Institution of Civil Engineers on the 6th of March, 1849, and was occasionally present at the meetings. He was of an unassuming and retiring disposition—of a frank and genial temperament—was much esteemed by his friends and acquaintance—and gave general satisfaction to all those by whom he was employed.

MR. JACOB PERKINS was born in 1766, in New England, United States of America. His direct ancestor is traced to have been born at Newent, in the county of Gloucester, in 1590, and he emigrated with his family to New England in 1631. Of the position of the family, as of the early education of Jacob Perkins, nothing positive is known; but it appears, that at an early age he exhibited considerable talent for mechanical invention, fostered doubtless by the examples around him, of men striving to supply every-day wants. Before he was twenty-one years of age, he had invented, and constructed, machinery for producing several articles of utility and luxury. Under the old Confederation, the State of Massachusetts established a Mint for striking copper coins, and Mr. Perkins was early employed by the Government to assist in doing this, and the old Massachusetts cents, stamped with the Indian and the Eagle, now only to be seen in collections of curiosities, were produced by him. At the age of twenty-four he

invented a machine, which cut and headed nails at one operation, the title to which invention was only sustained by a lawsuit of seven years' duration. The nail-machine was first erected at Newburyport, his native town, and afterwards at Amesbury, on the river Merimac, where he erected a mill and a water-wheel, which, at that date and place, were considered wonderful efforts of mechanical boldness and ability, and the manufacture of nails is still carried on there.

One of the most important of his inventions was the engraving of bank-notes upon steel plates. Seventy-five years ago forgery of notes was carried on with an audacity and success which would be incredible at the present time. The ease with which the clumsy engravings of that day were imitated, was a temptation to every knave who could scratch copper; and counterfeits flooded the country to the serious detriment of trade. He at that time invented the stereotype check-plate, which no art of counterfeiting could match, and a security was thus given to bank paper which had never before been known. As this discovery has produced important and beneficial results, its origin merits some description. The stereotype check-plate was constructed in the following manner:—Small strips of wrought iron, about 3 inches long and $\frac{1}{2}$ inch square, were obtained. It was, however, at that time so difficult to procure iron, even of that small size, without a flaw, and yet sufficiently smooth to engrave upon, that it required a ton of iron bars to be cut up, in order to select a sufficient number of pieces to make a plate, only about 12 inches square, and $\frac{1}{2}$ inch thick. These small pieces of iron were nicely fitted together, and fastened by means of wedges into a frame of brass, and after being “properly smoothed” on the surface, the plate was elaborately engraved with steel punches and graving-tools; by which means every portion of the plate was covered with small figures and letters. After this was done, all the pieces were removed from the brass frame, were enclosed in an iron box, and the box, filled up with finely-sifted animal carbon, being well luted with clay to prevent the possible admission of air, was then placed in a furnace, and kept red hot, for a few hours, after which it was taken out of the furnace, and the contents were thrown into a vessel of cold water. This process converted the iron into steel, and case-hardened all the pieces. To such an extent was this effected, that it became a matter of some difficulty and patience to replace all the pieces again into their original positions, particularly as the heating and cooling had somewhat changed their condition. This was, however, at length accomplished, and a perfect impression, suitable for the back of a bank-note, was produced. This engraving proved so difficult to imitate, that a law was passed, in the United States, making it imperative upon all

banks to use the steel stereotype check-plate for printing the backs of the notes. The plate, from its extreme hardness, served the purpose of backing all the notes required for many years, without any deterioration of the engraving. Siderography,¹ or the art of engraving on steel, including another of his inventions, that of transferring or reproducing the original engraving on steel, by machinery, was subsequently extended throughout the United States.

In 1819, Mr. Perkins brought his bank-note machinery to this country, and explained the system to the Directors of the Bank of England, but he could never induce the authorities of that establishment to adopt it, while his patent was in force. It was, however, with certain modifications, afterwards introduced by the late Mr. John Oldham, of the Bank of Ireland, and the Bank of England notes were, for many years, printed from steel plates, engraved according to Mr. Perkins' system, without any recognition to the inventor, nor even the repayment of his expenses. The private banks, however, sustained him, and he was enabled by the aid of capitalists, who purchased an interest in the invention, to establish a manufactory for making and printing bank-notes, &c., which is now a flourishing concern, to the great advantage of the heirs of those who invested their capital in it.

In 1820, Mr. Perkins presented to the Society of Arts several valuable and well-matured inventions, which were published in the "Transactions" of that Society, and for which medals were awarded to him.² Soon after his arrival in London he made many scientific experiments, which were received with great interest by the Engineers and others of that day. His method of generating high-pressure steam, at a time when it was considered dangerous to exceed 5 lbs. to the square inch, was the wonder of the day. In 1824 he discharged bullets, under a pressure of 1,500 lbs. to the square inch, from a steam gun, which was exhibited at the Adelaide Gallery, Strand; and he also worked a steam engine expansively, under the same high pressure; from which latter experiment the working of high-pressure steam engines doubtless received an impulse. The Ordnance Select Committee, under the late Duke of Wellington, reported that the effect of steam at 1,500 lbs. upon the square inch, was equal to that of the best gunpowder, in discharging bullets of one ounce weight; but

¹ Vide "Transactions of the Society of Arts," vol. xxxviii., p. 47. London, 1820.

² The large Silver Medal for his "Method of Warming and Ventilating Rooms, and of Ventilating the Holds of Ships;" ditto for his "Method of Fastening the Seams of Hose for Fire-engines, and of Connecting Two or more Lengths of Hose together;" the large Gold Medal for his "Improved Ship's Pump;" and the smaller Vulcan Gold Medal for a "Method of Drawing off Waste Water from Water-wheels."

the Committee did not recommend any experiments to be made at the expense of the Government. Subsequently the French Government had a gun constructed by Mr. John Penn, of Greenwich, and sent it to Versailles, where an experiment was made in discharging leaden balls of three pounds weight; but in consequence of illness, Mr. Perkins could not superintend the trial, and it therefore was not attended with success.

The various experiments led Mr. Perkins and his friends into heavy expenses, but with all his great perseverance, he was unable to persuade Engineers to adopt his system of generating steam, although he showed that it was possible to construct boilers, which were perfectly safe from dangerous explosion,—an object still very desirable, as is testified by the great number of boiler explosions constantly occurring. Successive and harassing disappointments at length induced Mr. Perkins to retire from active pursuits, and the last fifteen years of his life were passed in retirement. He died in London in the year 1849, in the 84th year of his age, surrounded by his family, whom he left heir to his many discoveries, some of which have led to beneficial results, not only to his immediate descendants but to the public at large.

Mr. Jacob Perkins became a Member of the Institution of Civil Engineers in the year 1820, and was much esteemed by his contemporaries. He contributed a Paper, which was read at the Meeting on the 7th of February, 1837,¹ “On Locomotive Engines and the means of supplying them with Steam,” in which he proposed that the steam should be generated, through the medium of steam surcharged with caloric, recommended the division of labour in the workshop, suggested that all the parts of different engines should be facsimiles, and that these should be manufactured at the places best adapted for their production. He possessed great inventive faculties, and had he lived only a few years later, when, by means of improved tools, his ingenious ideas could have been carried out, he would doubtless have attained great success.

MR. FREDERICK WALTER SIMMS was born on the 24th of December, 1803, in the parish of St. Anne's, Blackfriars, London. He was the son of a manufacturer who, although at one time possessed of considerable means, was, during the latter years of his life, so much reduced by adverse speculations as to be unable to give any of his family much assistance at the outset of their various careers. Mr. F. W. Simms, therefore, having received a fair rudimentary education under such schoolmasters as those days afforded

¹ *Vide* Minutes of Proceedings Inst. C.E., vol. i. (1837), p. 20.