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.

to the sons of persons of the middle classes, was obliged, in order to acquire the higher mathematical knowledge by which he was so much assisted in after-years, to attend the evening classes of an old master, who having served as a schoolmaster in the Navy, and being discharged after the long war, was glad to eke out his scanty means by hard work at all hours. After a start in a line of life which was ill suited both to his health and his tastes, and which was soon relinquished, Mr. F. W. Simms was articled to a surveyor, and quickly found himself, by a mere accident, placed upon the Irish Ordnance Survey, in which he was soon promoted to be the head of the Computing Department, a position which, although not a lucrative one, yet gave him the best opportunities for acquiring a practical knowledge of his profession with a rapidity and exactitude in taking field observations, to which he always acknowledged himself greatly indebted for his success in after-years. After passing a few years in Ireland, Mr. Simms applied for, and obtained, the post of Assistant Astronomer at the Royal Observatory, Greenwich, where he served under the late Mr. Pond, and having married upon the slender income his post afforded him, he was compelled to add to it by giving lessons in navigation to officers in the merchant service, and by surveying iron steam-ships for the adjustment of their compasses, according to a method just then introduced by the present Astronomer Royal, and taught by him to a few of his assistants, but which in a few years became generally known. This portion of a most laborious life was also marked by the production of several works which were published, but for which he received scarcely any pecuniary recompense; in such low light were literary and scientific attainments held in those days.[1] Being tired of hard continuous night work and only scanty reward, Mr. Simms became assistant to the late Mr. Henry Robinson Palmer (Vice-President, Inst. C.E.), on the South Eastern Railway and other works. He was afterwards Engineer to the Asphalte Company, in which capacity he visited Paris, to ascertain the French method of working that preparation, and to assist in its introduction into England. He was then employed under the late Sir William (at that time Mr.) Cubitt (Past-President, Inst. C.E) in laying out the line at present followed by the South Eastern Railway, the Company having been driven from the more direct route which the London, Chatham, and Dover Railway now takes, and being obliged to pay enormously to the refractory Kentish landlords for the circuitous line so selected; the struggle was continued year after

[1] Including "A Treatise on Mathematical Instruments," 8vo., 1836; "A Treatise on Levelling," 8vo., 1837; and a "Treatise on Mathematical Drawing Instruments," 8vo., 1839; besides editing "The Public Works of Great Britain," folio, 1838.

year, and the attempts to wring assents from stubborn farmers, together with the difficulties overcome in the survey of the country to be passed through, furnished Mr. Simms with many amusing anecdotes for after-years. When the works of the South Eastern Railway were commenced, Mr. Simms was appointed Resident Engineer on the Pound Hill and Salt-wood Tunnel, by which he gained much of that practical experience and knowledge, afterwards embodied in his book on Tunnelling.[1] At that time he presented two communications to the Institution of Civil Engineers, one, the "Results of the application of horse-power to raising water from the working shafts at the Saltwood Tunnel, on the South Eastern Railway in 1842;" the other, "An account of the Brickmaking at the Blechingley Tunnel, during the winter of 1840 and the summer of 1841,"[2] for which he received a Telford Medal. His connection with the Company ceased after the completion of the Folkestone Hotel and Harbour Works.

Mr. Simms then became engaged in general practice; he laid out several lines long since completed, among others some of the French railways, and was rising rapidly during the few years which preceded the well-known panic of 1847, when the country seemed anxious to have all its railways made at once. At that time his friend the late General Sir Charles Pasley (Hon. M. Inst. C.E.) recommended him to the East India Company to fill the position of Consulting Engineer to the Government of India, an office which a taste for travelling, with the liberal and certain salary it afforded, induced him to accept, but which eventually became a loss, as ill health, induced by the fulfilment of duties involving much labour and exposure, obliged him at the early age of forty-nine to relinquish all further professional work, or ambition of advancement. Although he was sent to India to report to the Home Government on the capability of that country to receive the benefits of railway communication, Mr. Simms soon found that the title of Consulting Engineer to the Government meant a liability to be called upon to inspect the engineering works of India in general, and therefore he found himself sent out at all seasons to report upon the embankments of rivers, the sanitary state of towns, and the positions for new harbours, all which involved great exposure and much hardship, and drew from him a number of interesting reports and suggestions, as well as a survey of Calcutta on an extended scale, a work undertaken by him as Chairman of the sanitary commission of that city, for even twenty years ago the state of that town had attracted the attention of the authorities.

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[1] *Vide* "Practical Tunnelling, &c.," 4to., London, 1844. Ditto, 2nd edition, 4to, London, 1859.

[2] *Vide* Minutes of Proceedings Inst. C.E., vol. ii. (1843), pp. 112 and 145.

Unfortunately Mr. Simms, relying on an iron constitution, went to India at an age too advanced to bear the climate. He, therefore, fell a more ready prey to the mischief which hard work, ill health, and domestic troubles, wrought upon him, so that thoroughly shattered, he was obliged to leave India at the end of his five years' engagement, and to decline the offer of a reappointment. The thanks of the Indian Government, together with a compliment on the "energy and promptitude" with which all business had been passed through his office, were some solace for his many afflictions whilst resident in India.

On his return home, at the close of the year 1850, Mr. Simms had to struggle hard for life through a severe attack of inflammation of the liver, and on his recovery received the appointment of Consulting Engineer to the London, Chatham, and Dover Railway, then called the Mid-Kent Line: and so was once more upon old and well-known ground. But his nerve was gone: the slightest mental exertion was too much for him, and feeling incapable even of giving evidence before a Committee of the House of Commons in favour of that line, Mr. Simms resigned all professional work, and henceforth devoted himself entirely to scientific amusement. His name soon ceased to be publicly thought of, and he was only remembered by a few old acquaintances, by whom he was known as "South Eastern Simms." About eighteen months before his death, which occurred on the 20th of February, 1864, in the 61st year of his age, Mr. Simms was elected a Director of the East Indian Railway Company, and had the satisfaction to see the railway (now called the Chord Line) which he had recommended when in India, and had indicated as the best direction, adopted as a necessity; not merely because of its directness, but on account of the excellent coal-fields through which it must pass.

Mr. Simms was elected a Graduate of the Institution of Civil Engineers on the 13th of February, 1838, and was transferred to the class of Members on the 23rd of February, 1841. He was likewise a Fellow of the Royal Astronomical and of the Geological Societies, and to both he had contributed Papers, which received the favourable notice of those bodies.

MR. GEORGE ABERNETHY was born at Aberdeen, in the year 1815. He was first trained as a mechanical engineer at the establishment of Messrs. William Simpson and Co., in that city. Subsequently he was employed under Sir John Macneill (M. Inst. C.E.), in Ireland, and afterwards under Mr. Alexander Gibb (M. Inst. C.E.), as Resident Engineer on the Scottish North Eastern Railway. Since the year 1850 he was engaged under