

it is nearly impossible, when men are working together at the improvement of a machine, to appraise with any exactness the precise share of merit due to each.

The first steam hammer made in England was delivered to the Lowmoor Iron Works in 1843. Mr Wilson left Patricroft, and became engineer to the Lowmoor Works, where in 1853 he added what is known as the circular-balanced valve to the original machine. This invention was patented by Mr Wilson. In 1856, when Mr James Nasmyth retired from business to follow the scientific pursuits by which he has greatly added to his reputation, Mr R. Wilson was recalled to Patricroft, where he became the managing partner of Messrs Nasmyth, Wilson, & Co.

Mr Wilson did not take much part in local affairs, but was for some years president of the Patricroft Mechanics' Institution. In 1873 he was elected a Fellow of the Royal Society of Edinburgh. He continued to apply himself to the management of his works until his death, which occurred on the 28th July 1882.

A list of no less than thirty patents stand in his name, either solely or jointly with others.

Mr Wilson will be remembered as worthy of mention among the group of able Scotch mechanicians who, by their power of invention, energy, and business capacity, have not only won distinction and wealth for themselves, but have added to the resources and strength of the empire

JAMES YOUNG, LL.D., F.R.S. By Dr Angus Smith.

James Young was born in Glasgow, and on leaving school was engaged for some time in a joiner's shop. It is characteristic of his energy that at this time he would, during his holidays, make long journeys on foot, having on one occasion walked as far as Aberdeen, and on another having walked the greater part of the way to London, visiting places of historic interest on his way. His occupation in the joiner's shop was the occasion of his becoming a chemist. He attended the class of chemistry in Anderson's College, and his skill as a workman led to his being employed by Professor Graham, who then taught the class, in constructing

pieces of apparatus for the experiments. By his usefulness and intelligence he eventually became assistant to Professor Graham, and lectured when the Professor was absent. He held the assistantship for seven years, and accompanied Professor Graham to London when the latter obtained a chair in University College. Among his friends at Glasgow were Dr Stenhouse, F.R.S., Dr Lyon Playfair, and Charles Griffin, an eminent manufacturer of chemical apparatus.

Young now engaged in the great enterprise from which he became widely known as a public benefactor, and which was destined to bring him both fame and profit. One Mr Oakes mentioned to Dr Lyon Playfair that there was oil flowing from a pit at Alfreton in Derbyshire. Dr Playfair then told this to Young, who at once perceived what an improvement might be made in the system of domestic lighting by the utilisation of this natural product. The flow of petroleum, small though it was, from the source in question, and the results obtained from it by Young, were the means of leading the Americans to avail themselves of the vast supplies of this useful substance that are to be found in their own continent.

The discovery, however, with which his name is most intimately associated, was his mode of obtaining oils from coal and shale, by which he succeeded in producing an illuminant oil at a price which enabled him to compete with the oil that was latterly obtained in such quantities from the petroleum springs in America.

Young did not discover solid paraffin; two little bits had been produced before his time; but he saw that it could be profitably made on a large scale, and, by the methods he introduced, hundreds of tons of solid paraffin are now made annually, and by his improved processes in the manufacture of this article he has transformed the candle, as he had previously by the introduction of petroleum transformed the lamp.

He founded a chair for the advancement of Technical or Economic Chemistry in Anderson's College, Glasgow, whilst he liberally contributed to the endowment of professorships in other branches of science in that institution.

When he worked in the laboratory of Professor Graham, solid caustic soda, as now manufactured on a large scale, could only be made in small quantities in silver vessels. Dr Young first made

it in iron vessels, and caused to be recalled an order for a silver vessel to cost £1500, by showing how that alkali could be prepared in iron.

He had the degree of L.L.D. conferred on him, and became a Fellow of the Royal Society. He was elected a Fellow of this Society on April 1st, 1861. He was Deputy-Lieutenant for Kincardineshire. Though his successful enterprises had brought him wealth, he was unostentatious in his habits, and of a kindly and hospitable disposition. He died in May 1883.

JOHN MILLER, M.Inst.C.E.

Mr John Miller was born at Ayr on the 26th of July 1805. He was educated at the Academy of his native town, and on leaving it entered a solicitor's office; but feeling no liking for the legal profession, he determined to abandon it for that of a Civil Engineer. After making himself well acquainted with the theory and practice of engineering, he became a partner of Mr Thomas Grainger, M.Inst.C.E., whose office was in Edinburgh. Whilst in partnership with that gentleman, he was engaged in constructing roads in various counties in Scotland, and in the south of Ireland, and was acting engineer for the Dundee and Arbroath Railway; the Glasgow, Ayr, and Kilmarnock Railway; the Edinburgh and Glasgow North British Railway. He also designed and constructed the North British Railway, Edinburgh to Berwick, and the Edinburgh and Hawick Railway; the Dundee and Perth Railway; the Stirling and Dunfermline Railway. Mr Miller was also engineer for many other lines, both in Scotland and England. In November 1845 he deposited in Parliament plans for upwards of 1500 miles of railway.

On the above railways there are probably some of the finest viaducts in Great Britain, notably the Almond Valley Viaduct, consisting of 46 arches of 50-feet span; the Dunglass Viaduct, the centre arch of which has a span of 135 feet; whilst the centre arch of the Ballochmyle Viaduct has a span of 180 feet. Mr Miller, however, always considered the Lugar Viaduct, with nine arches of