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### *Leading the Way*

 BEING a Series of brief Sketches of Quaker Inventions and of Friends who led the Way in various Directions.<sup>1</sup>

#### I

ABRAHAM DARBY (1677-1717), iron manufacturer; patented a method of casting iron-ware in sand, 1708.

*D.N.B.*

#### II

ABRAHAM DARBY (1711-1763), son of the above, devised, when manager of the Coalbrookdale Ironworks, a method of smelting iron-ore by the use of coke. "For many years unsuccessful experiments were made in smelting iron with coal, but at last, about 1735, Abraham Darby, a Quaker ironmaker from Dudley, read the riddle and succeeded in smelting the iron properly with coal, at Coalbrookdale in Shropshire." (*The British Hive and its Working Bees*, by H. C. Miall Smith.)

*D.N.B.*

#### III

ABRAHAM DARBY (1750-1791), son of the preceding, manager of the Coalbrookdale Ironworks; built across the Severn at Coalbrookdale, the first iron bridge ever

<sup>1</sup> The Editor would be glad to receive information regarding other Quaker inventions, etc., or of other claimants to any of the inventions or positions here introduced. The length of the Sketch bears no proportion to the importance of the invention.

constructed (opened in 1779) for which he received the gold medal of the Society of Arts.

*D.N.B.* ; *Jnl.* x. 79.

## IV

JOHN THOMAS (1690-1760) assisted Abraham Darby (I) in an iron and brass founder's business in Bristol. After many failures and disappointments Darby and his man succeeded in producing round metal pots such as had previously been made only in Holland and for which Darby took out a patent in 1707.

*Jnl.* xvii. 31.

## V

WARNER MIFFLIN (1745-1798) was, according to Thomas Clarkson, "the first man in America to unconditionally emancipate his slaves."

*Life and Ancestry of Warner Mifflin*, Phila. 1905.

## VI

JOSIAH WHITE (1781-1850), of New Jersey, made great improvements in using anthracite coal for making iron. "The first boat-load of iron from the Lehigh Iron Works shipped to Philadelphia, arrived in August, 1840, about six weeks after the furnace was put in blast, on which the *North American* of that city remarks: 'It is the opinion of those best qualified to judge in relation to such matters, that the new application of the anthracite, with which our mountains abound, forms an era in the history of Pennsylvania of which it would be difficult to over-estimate the importance.'" (*Memoir of Josiah White*, Phila. 1873, p. 103.) "He did much to develop the material resources of Pennsylvania, despite much doubt and opposition." (*Jnl.* xvi. 40.)

## VII

JOSEPH, LORD LISTER (1827-1912), discoverer of the antiseptic system of surgery: the application of which completely revolutionised surgical treatment in the latter half of the nineteenth century.—*Life*, by Sir R. J. Godlee, 1917.

## VIII

JOSHUA WATSON (1772-1853), "on his seventy-eighth birthday, crossed the High Level Railway Bridge (then in course of construction) from Gateshead to Newcastle, walking part of the way on planks ; and he was told at the Newcastle side, by Robert Stephenson that he was the first man who had done this." (*Robert Spence Watson*, 1914, p. 15.)

## IX

MOSES PENNOCK (1786-1860), of Pa., was "the inventor of the revolving horse-rake, patented in 1822, and of the discharge hay-rake, 1824." (*The Quaker*, Phila. vol. i. (1920), p. 87.)

## X

BENJAMIN BEALE ( - ), of Margate, invented several varieties of bathing machine, *circa* 1750. It is claimed for them that "the pleasure and advantages of sea-bathing may be enjoyed in a manner consistent with the most refined delicacy." (*Jnl.* vi. 176, with illustration.) There are other claimants to the honour of the invention. (*Daily Chron.*, Jan. 20th, 1912.)

Beale was also an inventor of a light carriage for the conveyance of passengers between Margate and Canterbury. James Jenkins gives an amusing account of the meeting of his carriage with one belonging to a rival owner. (*Records*, p. 758.)

## XI

ROBERT RANSOME (1753-1830) was "a man of great ingenuity, of an active turn of mind, and, possessing considerable skill as a workman, he made improvements in ploughs. Having in 1789 removed from Norwich to Ipswich, he took out a patent for chill-cast ploughshares, and thus laid the foundation for the manufacture of plough shares destined to all parts of the world." (*Biog. Cata. of Friends' Institute, London*, 1888, p. 545.) *Jnl.* xv. 111.

## XII

WILLIAM ROTCH (1734-1828) was the owner of the first ship to display the American flag in British waters.  
Jones, *William Rotch*, 1901.

## XIII

JOHN STEAD (1710-1779), of Yorkshire, "though possessed of very little school learning, became a clever and ingenious man," and it is said, "invented the barley mill for taking the skin off barley to prepare it for the pot . . . . Whilst residing in Gateshead, he invented a machine for cutting timber and other purposes by the help of the fire-engine." (*Annals of the Richardsons*, 1850, p. 47.)

## XIV

JOHN DALTON (1766-1844) "discovered the law of chemical combinations and tabulated the atomic weights of various elements, 1805." (*D.N.B.*)

## XV

ARTHUR ALBRIGHT (1811-1900) was the first to produce on a commercial scale the substance known as amorphous phosphorus, used in the manufacture of safety matches.

*Arthur Albright*, no date, p. 49; *The Friend* (Lond.), 1900, p. 520.

## XVI

GEORGE DIXON (1731/2-1785), of Cockfield, Co. Durham, claimed "to have been the first to use coal gas for illuminating purposes, but he was a quiet, retiring man, and did not push his discovery to a practical result." (*My Ancestors*, by Norman Penney, 1920, p. 189—this book records some of Dixon's dangerous experiments in pursuit of his object.)

## XVII

JOHN HUSTLER (1768-1842) "was a noted farmer and is supposed to have been the first man to use bones as a fertiliser." (*The Friend* (Lond.), 1921, p. 132.)

## XVIII

SAMUEL WETHERILL (1736-1816) and CHRISTOPHER MARSHALL (1709-1797)<sup>2</sup> established "the first factory for weaving cloth in the American colonies. The cloth woven

<sup>2</sup> Dates and other particulars supplied by courtesy of a descendant, Charles Marshall, 235 West Chelton Avenue, Germantown, Pa.

by this factory was also supplied to the army, and it is said that a timely shipment of these supplies to the little army of Washington at Valley Forge saved it from disbanding." (*History of the Free Quakers*, 1894, p. 16.)

## XIX

SAMUEL FROTHERINGHAM ( -1745) was a Friend, of Holbeach, Co. Lincoln. "He was the first man in England who invented a clock with two minute hands, one showing the true time and the other the apparent time." (*Jnl.* ix. 93.)

Britten's *Old Clocks and Watches*, 1911, states that "John Berridge made a clock with compensated pendulum in 1738 to the order of Mr. F[r]otheringham, a Quaker of Lincolnshire."

## XX

R. AND J. LECKY, of Ireland, built the first screw steamer, the *Rattler*, in 1846, "which at once focussed the attention of the propeller as a new means of propulsion and went far to establish its use in the mercantile marine." (Barry, *History of Port of Cork Steam Navigation*, 1919, pp. 4, 47.)

The same firm built "the first double dredger built in the United Kingdom having a chain of buckets on each side." (*Ibid.* p. 5.)

## XXI

THOMAS MOORE (1760-1822), of Sandy Spring, Md., was "the inventor of the first refrigerator, for which he took out a patent in the year 1803. The first refrigerator was of small size, made for the purpose of carrying butter to market on horseback. The State of Maryland is greatly indebted to him for many improvements in agriculture." (*Friends' Intelligencer*, Phila. 1912, p. 485.)

## XXII

TANGYE BROTHERS, of the Cornwall Works, Birmingham, were the inventors of the hydraulic jack. It was used to launch the *Great Eastern* in 1857 (as put by Sir Richard Tangye—"We launched the *Great Eastern*

and the *Great Eastern* launched us"), and also to raise Cleopatra's Needle to its position on the Thames Embankment, after it had been brought from Egypt by John Dixon and his brother, Waynman Dixon, both descendants of Friends. (*My Ancestors*, by Norman Penney, 1920, pp. 197-200).

## XXIII

JOHN LEES ( ) "invented the perpetual revolving cloth, called a feeder, on which a given weight of cotton wool was spread, and by which it was conveyed to the cylinder. This was in 1772. He successfully proved in evidence in a trial against Sir Richard Arkwright's patent on June, 25th, 1785, that he was the inventor of the feeder." (Ward, *Retrospect of Oldham Meeting*, 1911, p. 35.)

## XXIV

JOHN FOWLER (1826-1864), "inventor of the steam plough; with Albert Fry conducted experiments at Bristol, from which resulted the drain plough, 1850; . . . his steam cultivator, improved in 1860; . . . took out thirty-two patents for himself and partners, 1850-1864." (*D.N.B.*) There is in **D** a *Catalogue of Prices and Particulars of Steam Ploughs, sold by John Fowler, Jun., 28, Cornhill, London*; manufactured by R. Stephenson and Co., Newcastle, and Ransomes and Sims, Ipswich; with lithographs.

John Fowler married, in 1857, Elizabeth Lucy Pease, daughter of Joseph Pease, M.P., of Darlington.

## XXV

JOB ROBERTS (c. 1756-1851) was known as "The Pennsylvania Farmer." "As a pioneer in advanced agriculture, he stood easily foremost in the State of Pennsylvania, for the time in which he lived, and it may safely be stated that no man in this Commonwealth, since his death, has *originated* as many important improvements in agriculture as he did during his long and useful life. . . . He lived long enough to see his inventions extensively used and highly commended." (*Life of Samuel J. Levick*, Phila. 1896, p. 375.)

## XXVI

WILLIAM CHAPMAN was born at Whitby in 1713 and died at Newcastle in 1793. "He spent some years as the captain of a merchant ship, and in one of his voyages . . . in September, 1757, having run short of water, he discovered and applied successfully the conversion of salt into fresh water." (*Whitby Authors*, 1867, p. 20.)

## XXVII

FRANK J. RUSSELL (c. 1870-1914), of Maryland, was "an inventor of electrical safety appliances for ships, and other electrical devices." (*Friends' Intelligencer*, Phila. 1914, p. 124.)

## XXVIII

JAMES NICHOLSON RICHARDSON (1818-1896), of Ireland, inaugurated the system of carrying steerage passengers at about £5 per head from Liverpool to Philadelphia, a sum then considered to be such a low figure that it would prove unpopular. However, the capital accommodation and food provided, so vastly superior to the old emigrant ships, attracted such crowds of emigrants and others that it proved a great success and other companies soon followed suit.

*Jnl.* xvii. 111.

## XXIX

PHILIP EVAN THOMAS (1776-1861), originator and first president of the Baltimore and Ohio Rail Road, organised, in 1828, the first railroad company in the United States. (See page 11).

## XXX

EDWARD BENNIS (1838-1918) took an active interest in the mechanical firing of boilers. He succeeded, after laborious and lengthy experiments, in inventing a self-clearing furnace and thereby effecting a complete revolution in machine-firing.

*Jnl.* xviii. 114.

## XXXI

ISAAC BRIGGS, A.M., F.A.P.S. (1763-1825), was born of Quaker parents at Haverford, Pa. His father, SAMUEL BRIGGS, was the inventor of a machine for making

nails (1791), and his brother, SAMUEL BRIGGS, took out a patent for the application of steam to machinery and used it successfully (1803). Isaac was a mathematician, astronomer, surveyor, and engineer. He surveyed and laid out the city of Washington. President Jefferson wrote of him in 1803: "In point of science he was second to no man in the United States." (Article by Ella K. Barnard in *Maryland Historical Magazine*, vol. vii. 1912, p. 409.)

An address, by Isaac Briggs, dated "Utica, 10 mo. 29, 1817," delivered before the Oneida Society for the Promotion of American Manufactures, is in **D**.

## XXXII

JOHN FRY WILKEY (1799-1884) was a Minister, of Exeter, who married into the Gregory and Dymond families. It is presumed that he was the Friend who was the inventor of "Wilkey's Patent Trirota," of which an illustrated prospectus is in **D**. This broadside begins:

"The object of this Invention is the production of a Carriage combining the lightness of draught of a two-wheeled Vehicle, with the security in case of the horse falling, possessed by a four-wheeled Carriage."

It concludes:

"Coach Builders may obtain licenses on application to the Patentee, J. F. Wilkey, Mount Vernon, Exeter."

## XXXIII

We are reminded by the previous Sketch of another Friend, well-esteemed in his day, JOSEPH STORRS FRY (1769-1835), of Bristol. He wrote: *An Essay on the Construction of Wheel-Carriages, as they affect both the Roads and the Horses, with Suggestions . . . as to Tolls and . . . the Formation of Roads* (London, 1820, 145 pp., copy in **D**). He also wrote a pamphlet *On the Necessity of Freedom from Sin in this Life*, thus illustrating the happy blending of "secular" and "religious" so often found among Friends.

## XXXIV

THOMAS CLARKE WORSDELL (c. 1789-1862) was a coach-builder, of London, and later, of Liverpool, who,

through the influence of James Cropper, was entrusted with the construction of the first passenger carriage of the new line between Liverpool and Manchester. He had three sons, Nathaniel, Thomas and George.

## XXXV

NATHANIEL WORSDELL (1809-1886) was the inventor of the method, now in universal use, for picking up or dropping mailbags without stoppage of the train. He assisted to set up the "Rocket" and to construct its wooden tender. He was a Minister in the Society of Friends.

## XXXVI

THOMAS WORSDELL (1818-1893), when of the age of sixteen, won a prize of £200 offered for the best model of a carriage to be adopted by the London and Birmingham Railway, then being built. In the model the screw coupling, the lad's own invention, was first employed. Later, after work on German lines, he established a business in Birmingham in which he trained as assistants the brothers Tangye.

## XXXVII

GEORGE WORSDELL (1821-1912), the third son, established himself at Warrington and by his business energy and foresight largely contributed to the industrial prosperity of the town. There is an account of him and the above members of the family in the *Liverpool Post*, Dec. 3rd., 1912.

## XXXVIII

DOROTHY MADISON (1768-1849) was the wife of James Madison, fourth President of the United States. At the request of Professor Morse, she sent the first real message over the wires from Washington to Baltimore, 24th May, 1844, "Message from Mrs. Madison. She sends her love to Mrs. Wethered." Mary Thomas Wethered was a daughter of Philip E. Thomas (XXIX.).

*Dorothy Payne, Quakeress*, by Ella Kent Barnard, 1909.

*To be continued*