The Centenary of the Friction Match.

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EXACTLY a hundred years ago next Thursday, John Walker, pharmacist of Stockton-on-Tees, recorded in his Day-Book the first credit sale of his newly-invented 'Friction Lights,' which were indisputably the first practical and useful friction matches. This historic record was as follows:

"*Die Saturni Apr. 7th* 1827
No. 30
Mr. Hixon
Sulphurata Hyperoxygenata Frict. 100
Tin Case 2*d*. 1. 2."

There are few scientific inventions which have been more saving of time and trouble to Mr. Everyman, or more generally used the world over, than that of the humble friction match. It is now so cheap and ubiquitous that to offer a light to a stranger on a railway journey is perhaps the commonest of everyday courtesies amongst all classes of society. No one feels the cost of matches; they are supplied gratis almost everywhere, and the vast number wasted passes unnoticed: truly a 'universal aid,' without which we should be thrown back to the inconveniences of the good old 'flint and tinder' days.

John Walker, to whose memory honour is due to-day, was born at Stockton-on-Tees in 1781 and died there in 1857; my grandfather (the late Thomas Hutchinson, *d*. 1893) knew him well. A memoir published by Dr. R. W. Foss ("Archæologia Æliana," vol. 7) says that as a youth he was articled to Mr. Watson Alcock, surgeon of his native town, and that, after completing his apprenticeship, he went to London (doubtless as a student) for a few years, returning to become Mr. Alcock's assistant.

It was during his apprenticeship that John Walker first began to show his scientific proclivities. He was constantly making chemical experiments, attained considerable reputation in the locality as a botanist, and later on took up the study of mineralogy, in which he became very proficient. After his invention of friction matches (or 'friction lights' as he usually called them) had brought him wider fame, as well as the prospect of a fortune, he steadily refused to patent it, being (as Dr. Foss remarked) "a studious, retiring man, caring more to pursue his scientific studies, whether botanising or experimenting in chemistry, than speculating in order to make money."

Although qualified as a surgeon, "an invincible horror to surgical operations," which he never was able to overcome, soon led Walker to abandon that profession, whereupon he spent some years in Durham and York acquiring commercial experience in the employment of wholesale druggists. Eventually, in 1819, at the age of thirty-eight years, he returned to his native town, where he established himself in business as a pharmacist, at No. 59 in the High Street (since 1896 marked by a suitably engraved brass-plate), living in a house on the Quayside, then a pleasant locality but now much dilapidated. Thirty years later he retired from business, having acquired sufficient for all his needs. He died in 1857 at Stockton-on-Tees, and was buried in the churchyard of the neighbouring parish of Norton-on-Tees, where an unpretentious stone marks his grave.

Walker was never married, but lived with a niece who survived him more than thirty years. He was described by a contemporary as "a trim, dapper, little man," of cheery disposition and ready wit; a man rather particular as to fashion in dress, well known at the time of his invention by his brown tail-coat, drab knee-breeches, grey stockings, white cravat and tall beaver hat.

For many years, how Walker came by his invention was scarcely known. According to an account published in a local newspaper in 1852, it was the result of chance. "Mr. Walker was preparing some lighting mixture for his own use when a match, after being dipped in the preparation, took fire by accidental friction on the hearth . . . and the hint was not lost." Also, Dr. Foss said, "On one occasion . . . some chemical mixture he had compounded fell upon the hearthstone and ignited . . ."; moreover, that Walker did not divulge the exact chemical composition of his matches, and that "from a careful search which has been made in his books it has not been possible to find it. . . ." Such, then, was the local tradition more than fifty years ago.

About the year 1890, however, an old Day-Book in Walker's own handwriting was found among a heap of other papers relating to his pharmaceutical business, which gave a new clue as to how he made the invention. This Day-Book covered the period from Aug. 9, 1825, to Sept. 22, 1829, inclusive, during which time the invention was made. It was handed over to me for investigation (1896) together with eight matches, which undoubtedly had been purchased of Walker himself sometime not later than November 1827. I copied all the relevant entries from the book, and made an analysis of the tip of one of the matches, which confirmed a then current belief that he had used a mixture of potassium chlorate and antimony sulphide made into a paste with gum and starch.

The Day-Book also revealed that, so early as 1825, Walker had been selling a mixture of equal parts of potassium chlorate and antimony sulphide to three different persons, but chiefly to a Mr. Vollum, Junr., of Hartlepool. Entries of such sales continued until Dec. 6, 1828, quite independently of those of his 'friction lights,' the first being as follows:

"*Die Saturni Nov.* 19 1825
Mr. Walton Jr. Norton
by Potassa Chlorat. 3 j Ant. sul. nigri 3 j
Muc. g. i. Aqua q. s. ft. pasta
N.B. Excellent. 1. 6."

The "N.B. Excellent" suggests that the com-

position in question had been made up *experimentally* for some purpose, which had been well answered. There is also strong evidence in the Day-Book that the purpose was percussion powder, because (1), there are six entries during the years 1826–8 of the Mr. Vollum in question purchasing a composition described either as "pulv. percuss." or as a mixture of equal parts of antimony sulphide and potassium chlorate, the name of Vollum not occurring in any other connexion; and (2), all these six entries, as well as the only two others relating to the purchase of such material during the years covered by the book, were in the autumn or early winter months (September to January), when game-shooting is practised, no such entry ever having been made during any other time of year.

Two entries in the book (dated July 26, 1827, and Sept. 12, 1828, respectively) refer to sales to a Mrs. Faber of "*oxygent*[d]. *matches*" tipped (as is recorded) with chlorate of potash and sugar only. Undoubtedly these refer to the 'oxymuriate or dipping matches' (strips of wood tipped with a mixture of chlorate of potash, sugar and gum, and ignited by contact with strong sulphuric acid) invented by Chancel in 1805, which had been fairly widely used since 1812.

Therefore it seems reasonable to suppose (1), that Walker had occasionally made Chancel's 'oxymuriate matches' to the order of at least one of his customers; (2), that so early as 1825, if not before, he was experimenting on the production of a sporting 'percussion powder,' composed of equal parts of chlorate of potash and antimony sulphide, for certain other customers, more particularly Vollum; and (3) that, having succeeded, it occurred to him to produce a *friction* match by substituting the same composition for the mixture of potassium chlorate and sugar used for tipping the Chancel *dipping* match. It is important also to observe (4) that he never used the term 'matches' in reference to his own invention, which he usually called 'friction lights' (sometimes, however, 'attrition lights'), and (5), that in the first entry in the book of their sale (*q.v.*), there occur the words "No. 30," probably signifying (as I think) the batch-number of the friction lights in question. If this surmise be correct, he probably had been making them for some time prior to the first recorded sale, which (be it noted) was a credit, and not a cash, transaction.

Walker's 'friction lights' were thin splints of wood, three inches long, one-sixth inch broad, and one-twentieth inch thick, tipped with the aforesaid composition of equal parts of antimony sulphide and potassium chlorate, as my analysis has shown. They were sold by him at 100 for a shilling, in a cylindrical tin case, for which he charged an extra twopence (or a shilling for 84 lights *plus* case). With each case was supplied a piece of 'glass-paper,' folded in two, and a 'light' was ignited by pinching its head between the folds, and then suddenly withdrawing it.

In the Day-Book are entered 23 credit sales of friction lights during 1827, 76 during 1828, and 69 during 1829, or 168 altogether. By the year 1829 their fame had reached London; it is said that Faraday had exhibited some of them at a lecture in London "which set the scientific world thinking."

In that year, also, the following notice of them appeared in the *Quarterly Journal of Science, Literature, and Art*, under the title of "Instantaneous Light Apparatus." "Amongst the different methods invented in latter times for obtaining a light instantly ought certainly to be recorded that of Mr. Walker, chemist, Stockton-on-Tees. He supplies the purchaser with prepared matches, which are put up in tin boxes, but are not liable to change in the atmosphere, and also with a piece of fine glass-paper folded in two. Even a strong blow will not inflame the matches, because of the softness of the wood underneath, nor does rubbing upon wood or any common substance produce any effect except that of spoiling the match; but when one is pinched between the folds of the glass-paper, and suddenly drawn out, it is instantly inflamed. . . ." From 1829–30 onwards, Samuel Jones, of 201 Strand, London, made and sold imitations of them as 'lucifers' (a name which Walker always repudiated), saying that they had been "lectured on at the London and Royal Institutions." It is said that Walker, who was always very modest about his invention, even to the extent of thinking it unimportant, did not long afterwards continue to make 'friction lights.'

Such, then, were the nature and circumstances of this most useful invention. Before many years had passed, other claimants to it arose. At one time the late Sir Isaac Holden thought himself to be the original inventor of 'friction matches,' but in a letter which he wrote to the late Mr. Joseph Parrott of Stockton-on-Tees on Feb. 3, 1894 (*after* hearing of the discovery of Walker's Day-Book), of which I have a photograph, he said, "My invention, if so it may be called, was introduced by me in Oct. 1829 in *entire ignorance* of Mr. Walker's." Unfortunately, the Report of Juries of the Exhibition of 1851 contained a judgment by Warren de la Rue and A. W. Hofmann that "The first friction matches or congreves made their appearance about 1832," without even mentioning Walker's prior invention. Now the 'congreves,' which were introduced into England from Germany and Austria in that year, were originally invented by a young French chemist, Charles Sauria of St. Lothair (*d.* 1895), who in January 1831 (or nearly four years after Walker's invention), whilst a student at the Collège d'Arc, Dole (Jura), made friction matches containing phosphorus, but (like Walker) he did not patent his invention, which some think was pirated in Germany. In 1884 the French Government recognised Sauria's 'l'Invention des Allumettes Chimiques' by appropriately granting him a 'bureau de tabac'; and a medal was also bestowed upon him by the Academie Nationale Agricole. Unfortunately, except that in 1913 *Punch* published some verses in his honour, so far nothing has yet been done in Great Britain to recognise or commemorate John Walker's invention; but its centenary affords the opportunity of removing this reproach.