

## THE TINDER-BOX, AND ITS PRACTICAL SUCCESSOR.

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THE objects of this paper are—first, to show that friction lucifer matches were first sold in the year 1827; secondly, that Mr. John Walker, of Stockton-upon-Tees, was the inventor;—points which, although never strictly disputed, have not as yet been laid down as facts. It is necessary, in commencing, to distinguish between the friction and phosphorus match: the latter was not invented till the year 1834, and has since been superseded by other matches of more agreeable composition.

The word match, according to the London Encyclopædia, is derived from the Greek noun *μικης* signifying dried fungus, and is there further defined as a splinter or cord used to set fire to a candle or gun. The corresponding Italian word is *micchia*; the French being *meche*, from which we have our English word match.

The word lucifer is made up of the two Latin words, *lux*, signifying light, and *fero*, to carry; and the light-carrier phosphorus has exactly the same meaning, being, however, derived from the Greek. Therefore in English lucifer match means a light-bearing splinter (of wood).

The following appears in the Illustrated London News (October, 1860):—

“The brimstone matches, the tinder-box, and the flint and steel, as well as the song, are now amongst the matters of the past; and so completely have the lucifers superseded them, that the fire-producing apparatus which was, and had been for centuries, so common in every dwelling throughout the land, are almost as rare as the schoolboy’s ‘Hornbook,’ the street oil lamps, the London hackney coaches, sedan chairs, and other matters which have vanished from view. It is remarkable how gradually yet surely those matters which have been made useless by improvements vanish.

There is now only one of the two-horse hackney coaches in London, so that a person who remembers the multitude of them once in the streets, if curious about it, might have some difficulty in finding the remaining example. It may, however, be often seen in the cab rank on the London Bridge railway terminus. Just as scarce has the flint and steel tinder-box become. When searching for matters of greater importance we have inquired in many parts of the metropolis, and in many

districts of England and Scotland, for a remaining example of an apparatus which was once so well known, and which has so often tried the patience of the dames of the preceding generation. Some thought they had one, others knew somebody who had. When inquiry, however, came to be made, they were either not to be found or were in some way imperfect."

Without myself attempting a history of the subject, I will give the following comprehensive extract (for the suggestion of which I am indebted to the kindness and courtesy of Dr. Lyon Playfair, M.P.) from the XXIX. Report of the Juries of the Exhibition of 1851, reported by Warren De La Rue, Ph.D., F.R.S., &c., and A. W. Hofmann, Ph.D., F.R.S., F.C.S., Corresponding Member of the Royal Academy of Turin, of the Philomathic Society of Paris, &c., Professor of Chemistry, Royal College of Chemistry:—

"In another part of this Report will be found some descriptive notices of several conveniences for travellers and others contained in the hollow heads of walking sticks. One of these consisted of an apparatus for procuring instantaneous light, and the contrivance appears almost to realize the fable of Prometheus, who concealed the fire which he stole from Jupiter in his *narthex ferula*, or stem of fennel, on which he leaned in travelling.

'I am he who sought the source of fire,  
Enclosing it hid in my narthex staff;  
And it hath shown itself a friend to man  
And teacher of all arts.'<sup>1</sup>

This invention, however, was in reality only the means of preserving fire unextinguished, somewhat like the German tinder of the present time, and not of causing instantaneous ignition. The giant fennel, of which the ordinary ancient walking sticks were made, sheds its seeds about September, when the stem decays, and becomes a substance so easily ignited as to be employed in Sicily for tinder. The pith of the plant also is stated by Proclus to be an excellent preserver of flame, to which Pliny adds his testimony, that it makes excellent matches, the Egyptian sort being the best.<sup>2</sup>

"There is, however, another form in which a staff may be metaphorically said to conceal fire, since one of the most primitive means of producing it was by the friction of two pieces of wood against each other until sparks were emitted, and flame was then easily communicated to dry leaves or decayed vegetable matter. This method of procuring fire has been found generally in use in several savage nations, though with some difference in the process; and St. Pierre describes one of the most common, as practised by the West India negroes:—'With the sharp edge of a stone,' says his narrative, 'Paul made a small hole in the branch of a tree that was sufficiently dry, which he fixed firmly between

<sup>1</sup> Æsch., Prometh. Vinct. 110.

<sup>2</sup> Proclus, Comment. in Hesiod. Opera et Dies, i. 52. Plinii Hist. Nat. xiii. 22.

his feet, and he then employed the stone to shape into a point another piece of wood, equally dry, but of a kind different from the former. He next placed the pointed wood in the hole which he had provided, and made it to turn rapidly between his hands like a chocolate mill, and in a few moments he saw smoke and sparks issuing from the place of contact, and then collecting dry plants and sticks, he lighted a fire at the foot of the palm tree.<sup>3</sup>

“It appears that the same process was in ordinary use with the Romans down to a late period, even when the flint and steel were well known. ‘This experience,’ says Pliny, ‘was first discovered in camps and by shepherds, when a fire was wanted and a fitting stone was not at hand; for they rubbed together wood upon wood, by which attrition sparks were engendered, and then collecting any dry matter of leaves or fungi, they easily took fire. For this purpose nothing is better than to rub the wood of the ivy with that of the laurel, and a wild vine, different from the labrusca, which grows upon trees in the manner of ivy, has been also approved to be good.’<sup>4</sup> The same authority, in enumerating the different kinds of wood fit for kindling a light, denominates them *igniaria*, or those trees out of which fire may be produced. *Pyxidicula igniaria* appears to have been the usual name of a Roman tinder-box, but Solinus calls the fire-box *ignitabulum*, and assigns its invention to Pyropolis, in the island of Delos.<sup>5</sup> In those receptacles the apparatus probably consisted as well of a small iron bar and a fragment of flint or pyrites, as of pieces of those woods which were the most readily ignited. Virgil notices ‘the hidden fire in the veins of flints,’<sup>6</sup> as being one of the benefits anciently bestowed on man at the commencement of the reign of Jupiter; and pyrites are described by Pliny as being well known and esteemed for producing sparks. ‘Certain of them,’ he says, ‘have much fire in them, whence we call them *living*, and they are very heavy. They are sought for because they are most valuable in camps; for when they are struck hard with an iron spike (*clavus*) or another stone, they will emit sparks, which being taken by sulphur or dry fungus or leaves, will cause them to catch fire even with the rapidity of speech.’<sup>7</sup>

“There does not appear to be any information extant relating to the material anciently employed for tinder, unless it may be presumed to be indicated in that passage of the Prophet Isaiah (chap. i., v. 5), which declares that ‘the strong shall be as tow, and the maker of it as a spark, and they shall both burn together, and none shall quench them.’ It is probable that a very small degree of experience would suggest the thought that flax or the linen wicks used for lamps would easily receive sparks and become ignited, but of this there has not been any certain information preserved.

“For many centuries the apparatus of a stone struck against a piece of iron continued, with but little improvement, to be the only means of procuring light. By the Saxons the flint or the pyrites was used under the general name of *fyr-stan*; and any piece of iron that was sufficiently substantial was the substitute for the modern steel: a writing stylus is known to have been used for the purpose by the Abbot

<sup>3</sup> Suite des Etudes de la Nature : Paul et Virginie.    <sup>4</sup> Nat. Hist., xvi. 40.

Polyhistor., c. xi.

<sup>6</sup> Georg., i. 135.

<sup>7</sup> Hist. Nat.; xxxvi. 19.



Bertin, in Burgundy, early in the seventh century. An instrument, however, which should be at once more substantial and more convenient for striking, must have been soon required, and was probably as speedily invented in the form of the fusil, a thick rhomboidal piece of steel, having the faces cut into many angles. This was in use at a very early period of the middle ages, when it is frequently to be found mentioned under a variety of names, all of them being derived from the same original. In 1429 Philip the Good, Duke of Burgundy, established the Order of the Golden Fleece, in the collar of which the flint and steel of the time formed the principal device. The latter was thereon represented as a short and stout fusil, sharpened to a pointed edge on one side, and on the other having two small curved handles, with a vacant space between them for the hand; and a modification of this shape for the steel continued to exist to the close of the history of the old-fashioned tinder-box.<sup>8</sup>

“It was not until after the middle of the seventeenth century that the discovery of phosphorus indicated a quicker or more certain means of procuring light or fire. In 1677, Dr. Hook, in one of his Cutler lectures, described the effects of phosphorus as they had been recently exhibited in England to the Hon. Robert Boyle and several other Fellows of the Royal Society, by Daniel Krafft, ‘a famous German chemist.’ Even after all the earliest experiments, however, the new matter appeared to be regarded only as a curiosity, which Boyle entitled the ‘Noctiluca,’ and a ‘factitious self-shining substance’ procured but in very small quantities, and with great labour and time, the principal value of which was to supply a light in the night or in dark places, when exhibited in glass vessels. It can scarcely be doubted but that some trial was made as to whether an ordinary match could be inflamed by the substance; but Boyle’s recorded experiments refer only to the strength, the diffusion, and the continuance of the light.

“After these notices of the older apparatus devised for procuring light, it will be an interesting inquiry briefly to glance at the history of chemical matches. And here it may be first remarked that the transition from the tinder-box, with its flint and steel, to the elegant friction match, was not so simple as a superficial consideration of the subject might lead one to infer. In the daily enjoyment of a luxury, we but too often forget the persevering efforts which are always necessary to render available the discoveries of the experimental philosopher, and take but little heed of him whose disinterested labours are constantly bringing to light new truths from the hidden but inexhaustible stores of nature.

“The perfecting of chemical matches has been accomplished chiefly during the last thirty years, for before 1820 scarcely any other method of producing fire was employed than that of the well known trio before alluded to, with which the ordinary sulphur match was inseparably associated.

“Soon after this period Doebereiner made the remarkable discovery that finely-divided platinum (spongy platinum) is capable of inflaming a mixture of hydrogen gas and atmospheric air, and he founded on this property of platinum the invention of the instantaneous light apparatus first known by the name of Doebereiner’s Hydrogen Lamp. This was greatly admired at that time, and is even now frequently employed, it

<sup>8</sup> Du Fresne, Glossarium, 1736, vi., col. 562, voce Sol. 3.



having been again recently applied to light an ordinary gas burner required to be ignited at intervals during the day-time for the purpose of sealing parcels and other similar objects. Although it was without any immediate influence on the development of the manufacture of chemical matches, which had before this time been repeatedly attempted, Doebereiner's discovery appears, nevertheless, to have attracted attention more generally to the subject, and thus, at least, to have contributed indirectly to their perfection.

"A method of producing ignition, proposed about the same period, has never been generally adopted. It depends upon the property which certain compounds of phosphorus and sulphur possess of inflaming, when slightly rubbed, in contact with the atmosphere. For this purpose about equal quantities of phosphorus and sulphur are fused together in a glass tube, which is to be subsequently closed with a cork.<sup>9</sup> Upon opening the tube, if a splinter of wood be dipped into the mass, so that a small quantity of the composition may adhere to the wood, it will become ignited when slightly rubbed on the cork used to close the phial. This apparatus, however, has become almost entirely obsolete.

"The most important and permanent improvement in the means of obtaining light consisted in covering the sulphurized end of a match with a mixture of sugar and chlorate of potash; which being deflagrated by immersion into concentrated sulphurated acid, communicated the inflammation to the underlying coating of sulphur. Many persons will call to mind the small glass phial containing asbestos moistened with concentrated sulphuric acid, which was usually fixed in a paper or tin box having two compartments, one of which held the prepared matches. These matches were in all probability invented in France, whence at least they were certainly first introduced into England; but prior to their introduction Captain Manby had been accustomed to employ a similar mixture for firing a small piece of ordnance for the purpose of conveying a rope to a stranded vessel; and indeed the composition was also described by Parkes in his *Chemical Catechism*<sup>10</sup> amongst the experiments illustrative of combustion and detonation at the close of the volume.

"Exactly the same principle was involved in the preparation of the matches invented by Mr. Jones, of the Strand, and used for some time under the name of 'Prometheans,' but which do not appear to have found their way to the Continent. These were made of a roll of paper, into one end of which was placed a small quantity of a mixture of sugar and chlorate of potash, with a small tube (hermetically sealed), similar to those in which the leads of ever-pointed pencils are preserved, containing a minute quantity of strong sulphuric acid. By compressing the match with a pair of pliers sold for the purpose, or between two hard substances (between the teeth, for example), the tube was crushed, and the sulphuric acid came into contact with the mixture, and ignited it. These matches, though very convenient, were so expensive that they were not very generally employed; but they certainly formed, as it were, the stepping-stone to the production of the friction match.

<sup>9</sup> To those who would repeat this experiment, we would remark, that the fusion should be performed with great caution, inasmuch as the mixture frequently detonates at the moment when the components enter into chemical combination.

<sup>10</sup> Third edition, 1808, p. 563.

"The first friction matches, or congreves, made their appearance about 1832. They had a coating of a mixture of two parts of sulphide of antimony and one part of chlorate of potash, made into a paste with gum-water, over their sulphurized ends, and were ignited by drawing them rapidly *between* the two surfaces of a piece of folded sand-paper, which was compressed by the finger and thumb.

"The Reporters have not succeeded in learning with certainty by whom the substitution of phosphorus for the sulphide of antimony was first suggested; the mixture of the sulphide with chlorate of potash requires so much pressure to produce the ignition that it was frequently pulled off from the match, and this substitution was therefore an important improvement.<sup>11</sup> The phosphorus matches, or lucifers, appear indeed to have been introduced contemporaneously in different countries about the year 1834. In Germany they were first manufactured on a large scale in the Grand Duchy of Hesse, and especially in Darmstadt, where Dr. Moldenhauer, in particular, contributed much to the improvement of this branch of industry.

"From Darmstadt the manufacture was gradually extended through Germany; but its progress was at first very slow, on account of the lucifer match being prohibited, until the year 1840, in Bavaria, Brunswick, Hanover, and various other states, on account of the alleged risk of fire consequent upon its employment."

The next evidence we have is that of Mr. Isaac Holden, a woollen manufacturer and inventor of woollen machinery, formerly a member of Parliament. It occurs at page 150 of the Report from the Select Committee on Letters Patent (1871). Mr. Holden there says—

"I began as an inventor on a very small scale. For what I know I was the first inventor of lucifer matches, but it was the result of a happy thought. In the morning I used to get up at four o'clock, in order to pursue my studies, and I used at that time the flint and steel, in the use of which I found great inconvenience. I gave lectures in chemistry at the time at a very large academy. Of course I know, as other chemists did, the explosive material that was necessary in order to produce instantaneous light, but it was difficult to obtain a light on wood by that explosive material, and the idea occurred to me to put under the explosive mixture sulphur. I did that, and published it in my next lecture and showed it. There was a young man in the room whose father was a chemist in London, and he immediately wrote to his father about it, and shortly afterwards lucifer matches were issued to the world. I believe that was the first occasion that we had the present lucifer match, and it was one of these inventions that some people think ought not to be protected by a patent."

There is here a remarkable absence of dates, but there cannot be a doubt that Mr. Holden means the phosphoro-sulphur match, which of course was not the first lucifer match; but as we are here not contending

<sup>11</sup> Detonating mixtures of chlorate of potash with either sulphide of antimony or phosphorus are described in Parkes's *Chemical Catechism*, 10th edit., published in 1822; and the latter in the 3rd edition (1808).

who invented that particular kind of match, but who invented the friction lucifer, there is no need to enter further into the matter, except to notice it as having gone the round of the papers, and still therefore fresh in the memory of many persons.

John Walker (the subject of this memoir) was the third son of John Walker, a grocer, draper, and spirit merchant, who occupied and was the owner of the shop No. 104, High Street, Stockton (opposite the Town Hall), and was born on the 24th of May, 1781. He was educated in the town, and when he had attained the usual age was apprenticed to Mr. Watson Alcock, surgeon. After completing his apprenticeship, he went to London for a few years, then came back to Mr. Alcock; afterwards he spent several years in Durham and York in the employ of wholesale druggists, finally settling down in Stockton as a druggist in June, 1819. He would then be 38 years of age. In physique he was a little thin man, never weighing more than nine stones. He was never married. He commenced business in the druggist's shop next door to Messrs. Jennett & Co., and not, as is generally said, on the opposite side of the street. Many persons can remember the matches being sold at this establishment. It is said that Mr. Walker's relations were desirous that he should become a surgeon, but as he had an invincible horror to surgical operations, he would not follow out their wishes. When an apprentice with Mr. Alcock, he first began to show his scientific proclivities. He became an expert botanist, and was well acquainted with all the common plants of the neighbourhood, as well as the most likely places to find them. He was also very fond of mineralogy, a science which was just then springing up, and which later was much studied by young men in the town, who frequently consulted him about rare or difficult specimens. He was also constantly making chemical experiments, and it is within the recollection of John Clennett, a bookbinder, still living, that he used to go to the shop where Clennett was working to beg the gold leaf which was brushed from the lettering of the books, for the purpose of making fulminating gold. On one occasion, when in his house upon the Quayside, near to Cleveland Row, some chemical mixture he had compounded fell upon the hearthstone and ignited, and then Walker exhibited some of his compound to the wondering gaze of the bookbinder, and the mixture was handed about as a novelty, no one thinking that the discovery possessed any really practical use. The following account was published in a local newspaper in the year 1852:—

“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. This was the first friction match, and

the hint was not lost. He commenced to make friction matches, selling with every box a piece of doubled sandpaper to set them in flame by pressure of the thumb and forefinger and a sharp pull. It was in the month of April, 1827, that he began the sale, and his first customer was the late Mr. John Nixon, solicitor, of Stockton. Harrison Burn was employed to make the matches, and the boxes were made by John Ellis at threehalfpence each, the price of a box containing fifty being one shilling."

The exact chemical composition of the matches Mr. Walker always kept secret, and from a careful search which has been made in his books it has not been possible to find it. Showing how near he was the discovery of the phosphorus match, there are a number of experiments on light-producing substances, which he has noted in a book now in the possession of his niece, Mrs. Hutchinson Wilkinson (who has very kindly revised this part of my paper). According to some notes I have of lectures delivered in the University of Edinburgh, session 1863-4, friction matches were there said to have been invented in the year 1832, that is to say, five years after the subject of this paper manufactured and sold them. It is there likewise said, as it is by all other authorities I have consulted, that they were composed of chlorate of potash and sulphuret of antimony, and for want of other proof, we must conclude Walker's matches were of the same composition. Phosphorus matches were not invented till the year 1834. Phosphorus was added in the place of the sulphuret of antimony. Sulphur is not now used in the preparation of the best matches: stearine or some fatty matter is generally substituted. The first friction matches sold by Mr. Walker were made of cardboard or a substance similar to what the present fusee pipe-lighters are made; but he soon substituted splinters of wood for this. The sandpaper sold with them in shape resembled a cocked hat, into which the match was inserted and drawn out sharply. For the manufacture of the matches and boxes, Walker employed, besides his own men, all the old pensioners in the alms houses. It is said, with how much truth it is impossible to find out, that the late Professor Faraday heard of the invention, and came to Stockton to see Mr. Walker about it, and then strongly urged him to take out a patent, which he declined to do. He, however, gave Faraday an account of their composition, which Faraday communicated to some German, who at once started a manufactory of them in his own country. With reference to the patenting of his invention, it is said that he, like the inventor of phosphorus matches, thought at the time that they were of such trifling importance that they would not pay the expense, and it was well known that Mr. Walker was a studious retiring man, caring more to pursue his scientific studies, whether botanizing or experimenting in chemistry, than speculating in order to make money. It may be stated that he-





realized sufficient to enable him to live in retirement for many years previous to his death. He died at Stockton on the 1st of May, 1857, aged 73 years, having been afflicted for some time with dropsy. It is right to say here that Mr. Alderman Jackson, J.P., of Stockton, has written several letters to various newspapers on this subject.

After a careful consideration of what has here been advanced, there cannot now be two opinions as to who was the inventor of friction matches. In point of date no one has yet brought forward a prior claim. All authorities state that the first friction match was invented in the year 1832, whereas I hope the evidence now given has proved that they were publicly sold at Stockton in the year 1827, that is to say, five years before they were generally known to scientific men.

If we take into consideration the distance of Stockton from London, and the difficulties in those days of communicating between the two places, we can almost think that it would take that time for the knowledge of the invention to travel so far southwards. Also, when we look at the varied scientific knowledge and constant application to scientific work of the man—although we have no exact formula of the composition of the matches—coupled with the fact that he has left notes of a great number of experiments (many original) with phosphorus and other readily ignitable substances, the argument is still further strengthened; for it is proved more and more distinctly every day that no discovery is the result of accident or mere chance, but always the terminating link of a sorites of logical propositions thoroughly discussed; and we have no doubt that for many years he had this subject clearly before his mind. It is true that if it had been possible the production of actual specimens of the matches would have clearly established the nature of their composition; but this has been prevented by reason of the number of years which have elapsed, and the essentially destructible nature of the articles under notice. It is proper to point out that the friction match had no rival, and it is admitted on all sides that it was the first practical match; also that it was soon superseded. It, like all other new ideas, although the public mind was gradually for many years by various light-producing inventions prepared for its reception, met with opposition, and it was many years before it became the indispensable household article that it now is, and it is not so long since many of the captains of the old Tyne colliers would not consider it "lucky" to have a lucifer on board. It is to be regretted he did not patent his invention, because then we should easily have known all the essential and necessary particulars.

\* \* \* Since writing the above, my attention has been directed by Mr. J. G. Forster, of Newcastle, to the following curious paragraph which

occurs in the "Lounger's Common-Place Book," 1805, under the heading "The Black Assize," and, as illustrating the kind of opposition which the introduction of lucifer matches met, is very interesting.

"The recusant papist perhaps might have been able to have performed the task assigned to him [the alledged setting fire to a poisoned lamp-wick by Rowland Jenks, whilst being sentenced to death for seditious and treasonable words spoken against Queen Elizabeth] had he been furnished with *phosphorus matches*, that invention of modern times, by which the chemist and the philosopher have so effectually forwarded the purposes of house-breakers and nocturnal assassins, but which, like its cotemporary discovery, the air balloon, cannot, I believe, be applied to any purpose of utility or convenience."

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### ECCLESIASTICAL RECORDS.

TO THE HONORABLE THE COMMONS OF THE UNITED KINGDOM OF  
GREAT BRITAIN AND IRELAND IN PARLIAMENT ASSEMBLED,

*The Humble Petition of the Society of Antiquaries of Newcastle-upon-Tyne*

SHEWETH,

That the members of this Society have learned with great dissatisfaction that, in a bill introduced into your Honorable House, intituled "An Act for better enforcing the Laws Ecclesiastical respecting the Discipline of the Clergy; amending the constitution and regulating the mode of procedure of the Ecclesiastical Courts; and regulating the government of the Ecclesiastical Registries in England," clauses have (without any public enquiry) been introduced by the Lord Romilly, the Master of the Rolls, providing for a transfer to himself, and the placing in the Public Record Office of London, of various deeds, wills, processes, acts, proceedings, registers, and other documents relating to the various dioceses of England and Wales, unless the respective bishops thereof shall, within two months after the passing of the act, certify that the same several documents have been duly sorted, classed, and indexed, up to a period within five years ending December last: and that another attempt is to be made to obtain the removal of parish registers.

That these clauses would enable a continuation of the removal of local records to London, whereby local students are practically debarred from the use of them, great local mistrust has arisen, the general progress of historical knowledge in this kingdom is impeded, and the costs of legal proceedings and the hindrances to the honest administration of justice are seriously increased.