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### The Invention of the Lucifer Match.

By the late James Clephan.

**N**ATURE acquaints man with her great fact of fire, forcing it upon his gaze in storm and volcano; and what he sees in the lightning-flash, and in belching flame and molten lava, he has learnt to evoke for himself and subdue to his use.

Captain Cook, discovering the eastern coast of Australia in 1770, saw the smoke that rose up from the homes of the inhabitants, and witnessed with admiration how they gained possession of fire and diffused it in increasing volume:—"They produce it with great facility, and spread it in a wonderful manner. They take two pieces of dry soft wood: one is a stick about eight or nine inches long, the other piece is flat. The stick they shape into an obtuse point at one end; and, pressing it upon the other, turn it nimbly by holding it between both their hands as we do a chocolate mill, often shifting their hands up, and then moving them down upon it, to increase the pressure as much as possible. By this method they get fire in less than two minutes; and from the smallest spark they increase it with great speed and dexterity. We have often seen one of them run along the shore, to all appearance with nothing in his hand, who, stooping down for a moment, at the distance of every fifty or a hundred yards, left fire behind him, as we could see first by the smoke and then by the flame, among the drift-wood and other litter which was scattered along the place. We had the curiosity to examine one of these planters of fire when he set off, and we saw him wrap up a small spark in dry grass, which, when he had run a little way, having been fanned

by the air that his motion produced, began to blaze. He then laid it down in a place convenient for his purpose, enclosing a spark of it in another quantity of grass; and so continued his course."

From Australia let us now follow Captain Cook to "Oonalaska's shore," where we find the natives producing fire both "by collision and attrition: the former, by striking two stones one against another, on one of which a good deal of brimstone is first rubbed. The latter method is with two pieces of wood, one of which is a stick of about eighteen inches in length, and the other a flat piece. The pointed end of the stick they press upon the other, whirling it nimbly round as a drill, thus producing fire in a few minutes. This method is common in many parts of the world. It is practised by the Kamtshadales, by these people [the natives of Oonalaska], by the Greenlanders, by the Brazilians, by the Otaheitans, by the New Hollanders, and probably by many other nations."

Meanwhile, Cook's countrymen at home were using flint and steel, with match and tinder; as "the Fuegians have for centuries" done, "striking sparks with a flint from a piece of iron pyrites." (Tyler's "Researches into the Early History of Mankind.") But in these later days men have gone ahead of the old courses. The trees of the forests are sliced by machinery into thousands of shreds; and millions of matches, dipped in imprisoned fire, are ready, at a moment's notice, to escape at a touch into flame. Orators have been wont to glow and perorate about that encircling drum which all the earth round proclaims the presence of England and her empire. But

the crack of the lucifer is a still more universal sound, the sharp explosion dating from the decade of the present century in which the world's first passenger railroad entered upon its career.

How to procure fire at will is to be numbered among the many inventions of man through the ages. The heating and ignition of wood by friction was practised by the Romans. In the Reports by the Juries of the Exhibition of 1851, to which we now turn, Pliny's account of the process is quoted, "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." "Virgil notices the 'hidden fire in the veins of flints,' 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."

Ancient is the process of fire-making. Long was the reign of stone and steel and tinder. "It was not until 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. Hooke, 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 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."

The Jurors' Reports proceed to glance at the history of chemical matches, scarcely any other method of producing fire being employed] before 1820 "than that of the well-known trio," flint and steel and tinder, "with which the ordinary sulphur match was inseparably associated."

It was soon afterwards that "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." Another method of producing ignition, proposed about the same period, but never generally adopted, "depends upon the property which certain compounds of phosphorus

and sulphur possess of inflaming when slightly rubbed, in contact with the atmosphere." "The first 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 sulphuric acid, communicated the inflammation to the underlying coating of sulphur." "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,' 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 in England under the name of Prometheans." These matches were compressed "with a pair of pliers, sold for the purpose, or between two hard substances (between the teeth, for example)," and thus ignited, "forming, as it were, the stepping-stone to the production of the friction match."

Thus do we approach the period of the friction lucifer; and now the Exhibition volume of 1852 (to which we have been so greatly indebted) has this paragraph:—"The first true friction matches, or congraves, made their appearance about the year 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."

There is here, by inadvertence, a missing link, which was supplied in the month of August, 1852, by the Editor of the *Gateshead Observer*, who wrote a short article on "The Origin of the Friction Lucifer." "The Jurors' Reports, just printed, treat," said he, "of everything, great and small, that found a place in the Exhibition of Industry, from the Kohinoor or Mountain of Light to a Lucifer Match. On the latter luminous subject the reporters are in the dark, and, in another column, we have briefly enlightened them. We may here, at some greater length, present a short report supplementary to those of the jurors, that the origin of the friction match may be placed on record, before the evidences pass beyond the reach of the world, and are irrecoverably lost. A quarter of a century ago, Mr. John Walker, of Stockton-upon-Tees, then carrying on the business of a chemist and druggist in that town, was preparing some lighting mixture for his own use. By the accidental friction on the hearth of a match

dipped in the mixture, a light was obtained. The hint was not thrown away. Mr. Walker commenced the sale of friction matches. This was in April, 1827. 'Young England,' who has come into being since that day, now buys a pocketful of lucifers for a penny. Mr. Walker, for a box of fifty, with a piece of doubled sand-paper for friction, got a shilling! 'Prometheans' and other competitors beat him down to sixpence. And then, unwilling to be beaten down still further, he renounced the sale, Old Harrison Burn, an inmate of the Stockton almshouse, was Mr. Walker's match-maker; and John Ellis, book-binder, made the paper-boxes at three halfpence each. Mr. John Hixon, solicitor, was Mr. Walker's first customer. Production has been cheapened in all directions, but few commodities have 'fallen like lucifers.' Paper-boxes, gorged with matches, are now sold wholesale at 1s. 6d. to 1s. 10d. per gross; and wood-turned boxes, containing double the number of matches, at half-a-crown! And yet the makers do not burn their fingers."

The first rail of the world's first passenger railroad had been laid at Stockton in the spring of 1822; and there, in the spring of 1827, the first friction match burst into flame; the rail and the match alike going ahead, and circumflaming the globe. Thomas Wilson, author of "The Pitman's Pay," in the course of an address, partly autobiographical, written for a social gathering held in the Public Rooms, Gateshead Low Fell, March 15, 1854, referred to the extraordinary improvements and discoveries that had taken place in the land during the previous thirty years, and remarked:—"How much all these have contributed to the comforts and conveniences of society, I need not point out: you are all able to see their value. I need not point out to you the plague and trouble that are spared by the lucifer match, particularly to those of you who have frequently required a light during the night for the infant. Instead of knapping for half-an-hour with flint and steel upon half-burnt tinder, as we of the olden time had often to do, you have a light instantly, without scarcely rising from your pillow. Don Quixote's friend, Sancho, blessed the man who invented sleep; but if you knew the trouble attending flint and steel operations, you would doubly bless the man who produced the lucifer match."

"That man," repeated the *Observer* (in a foot-note to the address), "was Mr. John Walker, of Stockton." And having set forth anew the incidents of 1827, the Editor added:—"The Jurors' Reports (Exhibition of 1851) refer the appearance of the *friction* matches to the year 1832. On the publication of these reports, we drew the attention of Dr. Warren De La Rue, one of the authors, to the facts now stated, and he courteously expressed his regret that he was not earlier acquainted with them."

It may be as well to add, while we are on the subject,

that Mr. Walker's friction lucifers adhered to the old form of the flat brimstone-match, with two pointed ends.

The question of the origin of the friction lucifer has frequently since been brought under public notice. The paper of Dr. Foss, on "The Tinder Box, and its Practical Successor," which appeared in 1876 in the *Archæologia Eliana* (vii., 217, N.S.), should be read by every one who takes an interest in the subject. Not longer ago than the month of August, 1880, an answer of the *Newcastle Daily Chronicle* to an inquiry from one of its correspondents gave rise to a letter from Mr. William Hardcastle, of "the Medical Hall," Stockton, who, being in possession of Mr. John Walker's books, did the good service of committing to print the evidence which they had to give on this subject. We thus learn that the first entry bears date April 7, 1827, when Box No. 30 was put down to Mr. Hixon. At that time, therefore, 30 boxes had been sold before the close of the first week in the month of April. The box sold to Mr. Hixon is described as containing 84 "sulphurated hyperoxygenated" matches; and the price was a shilling. On the 26th of July, No. 36 occurs as entered to Mrs. Faber, Rectory, Longnewton, who had the like number of "oxygenated matches" at the same price. Afterwards come two boxes sold to Mrs. Maude, of Selaby Park; and then Colonel Maddison, Norton, has nineteen boxes for distribution among his friends. Slow was the sale at the outset, but "during 1828 it increased rapidly," and the inventor, who took out no patent, "lived to see the introduction of cheap matches," the result of his discovery, in all directions.

Very interesting it is to have the early sale of the friction lucifer thus traced out for us, in its birthplace, in the valuable communication of Mr. Hardcastle. Mr. Walker, who had been brought up to the medical profession under Mr. Watson Alcock, an eminent surgeon in Stockton, but never entered into practice, was studious and well-read. His information was large and extensive, and his conversation instructive. He was one of the order of men known as "walking encyclopædias," while modestly avoiding all pretence of superior knowledge. Establishing himself in business as a chemist and druggist, he was ever inquiring and experimental; and it was while making a detonating or deflagrating mixture, and dashing off against the hearth-stone some portion of it, taken from a crucible for examination, that his first match may be said to have seen the light. Many an elderly ear was startled, from time to time, on "The Flags" of the High Street, by the explosion of John Walker's "pea-crackers," the delight of Young Stockton.

In the time of the tinder box, every match, with its two brimstone tips, discharged a double debt, first one end being used and afterwards the other. When sparks were struck from flint and steel, and the tinder was

aglow, the pointed brimstone match was applied, and a light obtained, often the result of a long and tedious experiment, the time dependent on the operator and his implements; for some were more skilful than others, and had also better tinder. But with Mr. Walker's lucifer, swiftly drawn under pressure of thumb and finger, from the doubled sand-paper supplied in the box, there was instantaneous flame. Times change. Flint and steel and tinder box, so familiar in the homes of our fathers, were all exploded by the crack of the friction lucifer! And that crack was first heard in the spring of 1827. And John Walker now takes his place in "Haydu's Dictionary of Dates" as the inventor.

The Exhibition Jurors say:—"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 required so much pressure to produce the ignition that it was frequently pulled off from the match; and this substitution was therefore an important improvement. The phosphorus matches or lucifers appear indeed to have been introduced contemporaneously in different countries about the year 1834." And now, in an age which never sees the tinder box, what volumes of these matches may be bought at shops round the corner for a groat! The friction match, indeed, is sold to you—not only over the counter—but by boys in the streets at home and abroad. It has come into common use indeed in the isles of the South Pacific. The crack of the lucifer is heard among the inhabitants of the Tonga islands. "I had some difficulty," says Mr. Moseley in his interesting "Notes of a Naturalist on the Challenger" (1879), "in persuading one of the natives to get fire for me by friction of wood. Matches are now so common in Tonga that they do not care to undergo the labour necessary for getting fire in the old method, except when driven by necessity. No doubt the younger generation will lose the knack of getting fire by friction altogether." The instantaneous light struck on John Walker's hearth in 1827 has relieved all Oceania from the laborious process of kindling fire in the fashion of centuries. The world, and the isles thereof, are becoming one. "Hearing the sound of music in the native district of the town of Banda," the metropolis of nutmegs, Mr. Moseley "made his way, one evening, towards a house from which it came, in the hopes of seeing a Malay dance. Instead of this, he found Malays indeed dancing, but, to his disappointment, they were dancing the European waltz!" The waltz whirls and the lucifer explodes the whole world round.

Our record will be read with curious interest by elderly inhabitants of Newcastle whose memories carry them back to the twofold cry at the Old Market—"Good shoe-blackening, halfpenny a ball! Tar-barrel matches, halfpenny a bunch!"—brimstone matches, made out of tar-barrel staves that had served their original purpose,

being popular companions of the tinder box in the days that are no more.

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## Charles Cowden Clarke's Visits to Newcastle.

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ONE of the most interesting visitors to Newcastle was Charles Cowden Clarke, the friend of Keats, Leigh Hunt, Hazlitt, and others who adorned the early years of the century. One of Keats's poetical epistles is addressed to Mr. Clarke, and sets forth in glowing numbers the relationship of the companions and friends:—

You first taught me all the sweets of song,  
The grand, the sweet, the terse, the fine;  
What swelled with pathos, and what right divine;  
Spenserian vowels that elope with ease,  
And float along like birds o'er summer seas.

. . . . . Ah, had I never seen  
Or known your kindness, what might I have been?

Mr. Clarke is well known as the editor of the "Riches of Chaucer," and (in concert with his wife) as the compiler of the Shakspeare Concordance, as well as the author of many volumes. But it was as a lecturer that Mr. Clarke's name is specially connected with Newcastle. In his *repertoire* there were four lectures on the Genius and Comedies of Moliere; four on the Great European Novelists; sixteen on the Comic Writers of England; four on Shakspeare's Jesters and Philosophers; twenty-four on Shakspeare's Characters; three on the Poetry of Prose Writers; one on Ancient Ballads; and fourteen on British Poets. Many of these lectures, as we shall mention, were delivered in the Lecture Room of the Literary and Philosophical Society, Newcastle.

Mrs. Clarke (Mary Cowden Clarke) accompanied her husband on his first visit in 1843. The accomplished couple had the advantage of a letter of introduction from Sir John Trevelyan to Mr. John Adamson, president of the Literary and Philosophical Society, who was most courteous and hospitable to them. He invited the visitors to his house, showing them his fine collection of shells, beautifully and tastefully arranged, introducing them to his choice library, and presenting them with his two volumes of Portuguese translations, respectively entitled, "Lusitania Illustrata: Selection of Sonnets," and "Lusitania Illustrata: Minstrelsy." Mr. Adamson also gave them a collection of Sonnets by himself, and wrote a touching letter therewith, describing the disastrous fire in which the whole of the books in his library were consumed to ashes.

Another very interesting acquaintance made in Newcastle was Mr. Charnley, the well-known bookseller, who