Hands On Learning
with Reading Museum Service

READING MUSEUM SERVICE

FIRE AND LIGHT H39A

Two Sulphur Matches



Before the introduction of friction matches in the 1830s, similar to the ones we have today, the only convenient way to make a light was by using a tinderbox. The illustration below right shows a tinderbox/candle-holder set.

To get a light you held the metal striker like a kind of knuckle-duster while the flint-stone was grasped firmly in the other hand. The striker was swept vigorously downwards across an edge of the stone. With a good piece of flint it was possible to get a spark, which hopefully dropped into the box (which held combustible material, often rags of scorched linen, wood chips or dried moss) and this tinder would then begin to smoulder. It could then be blown on to produce a glowing spark.

A wooden or paper spill would then be lit from this smouldering material and used to light a candle, or the fire, or whatever task you needed a flame for. It was found, however, that spills would light more easily if their ends had been dipped in sulphur. When placed in contact with the smouldering tinder the sulphur would ignite, giving a strong flame. These two wooden spills had been treated in this way to make them more flammable.



R. Bell & Co. Vesta Box



In 1827 John Walker an English chemist living in Stockton-on-Tees discovered that if he coated the end of a stick with certain chemicals and let them dry, he could start a fire by striking the stick anywhere. These were the first friction matches. The chemicals he used were antimony sulphide, potassium chlorate, gum, and starch.

During the nineteenth century other mixtures were used by various manufacturers. In 1831, Charles Sauria of France added white phosphorus to remove the smell. These new matches had to be kept in an airtight box but were popular. Unfortunately white phosphorus caused phossy-jaw, an appalling jaw disease from which many workers died.

Reading Borough Council

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R. Bell & Co. Vesta Box (continued)



The safety match was invented in 1844 by the Swede Gustaf Erik Pasch and improved by Johan Edvard Lundström a decade later. Their safety is due to the separation of the combustible ingredients between the match head and a special striking surface; and the replacement of white phosphorus with red phosphorus. The striking surface was composed of powdered glass and red phosphorus; and, the match head was composed of antimony sulphide and potassium chlorate. The act of striking converted some of the red phosphorus to white by friction heat and this started the combustion of the match head.

This box was made by R. Bell & Co. who had a factory on Bromley-by-Bow, London. Bell's produced Vesta matches that is, a friction match that had a wax braided stem, rather than a wooden one. The emery panel at one end of the box is for striking the match.



In 1903 George Roberts Sims produced a book called *Living London: Its Work and Play, Its Humor and Its Pathos, Its Sights and Its Scenes* which contains a description of a visit to this factory. The author paints a rather rosy picture! Here is his description of one of the workers:

She is a fine-looking girl. Quietly dressed and with an air of responsibility about her, she is a young mother. Her husband is employed at the soap works hard by, and though some one has to tend the babies during the day she is happy - happy because there are two incomes to maintain the bairns in plenty. Her daily output is 2,500,000 match stems. Watch her. She has a cutting machine all to herself, and as the strands of wax flow into the frame she presses her thumbs at a certain spot, and behold a hundred stems are cut. Her thumbs never weary. The stems ready, up they go to the roof to be dipped. A man stands at a slab on which is spread the composition - a thick paste. He takes a frame and presses it on to the slab, and in ten seconds you have 10,000 finished matches. If any one should suffer from the deadly "phossy jaw" this man should, for he has been dipping matches for a quarter of a century, but he breathes the air of Heaven - the kindly proprietors, who do not look upon their employees merely as so many machines, lay stress on this - and as a further precaution fans are kept going throughout the day to drive away the fumes.

R. Bell & Co. Vesta Box (continued)

In reality conditions were harsh. There was a famous strike in the Bryant & May factory in London in 1888. The women workers toiled for fourteen hours a day for a wage of less than five shillings a week. However, they did not always receive their full wage because of a system of fines, ranging from three pence to one shilling, imposed by the Bryant & May management. Offences included talking, dropping matches or going to the toilet without permission. The women worked from 6.30 a.m. in summer (8.00 in winter) to 6.00 p.m. If workers were late, they were fined a half-day's pay. Led by Annie Besant and Catherine Booth of the Salvation Army the match girls scored a famous victory

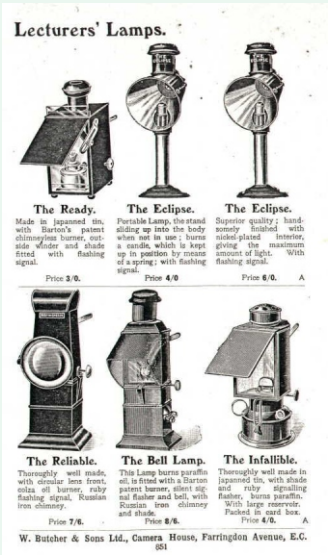
Bell's, too, experienced a strike in 1894 and for similar reasons. R. Bell and company later seem to have merged with Bryant & May.

Candle Sconce



Candles, in one form or another, have been with us for thousands of years. This nineteenth century example of a candleholder comes from the dying days of their widespread use in Britain.

This example works by twisting the top off to reveal the spring mechanism inside the tube. The candle was pushed into the tube and, once lit, the coiled spring kept the candle pressed up against the opening in the top of the column. A similar mechanism was used in, for example, in candle-lit carriage lamps, where the candle needed to be kept burning brightly, but it was difficult for anyone to keep tending the flame.



In this case the device was probably intended to work as a reading lamp. Similar candleholders were made for use by lecturers at magic lantern lectures. These were popular events in the nineteenth century in which a lecture was read to the audience as slides were projected. Special lecturer's lamps shone the light directly on to the text, yet allowed the rest of the room to remain in darkness. Often these lamps (a selection is shown in the illustration on the right) had some sort of signaling device (usually a bell or, more discretely , a tiny flash of coloured light). This signal indicated that the lanternist should project the next slide.

Candle Sconce (continued)

This candleholder is more probably a travelling candleholder. The arm is clearly intended to allow it to be fixed on a wall, or bed-frame, or similar vertical surface. It has a rubberised ring inside, although it is difficult to believe that suction alone would have held it in place. The swivel arm at the top possibly held a reflector to direct the light.

Pigeon Lampe Merveilleuse



The use of candle light was probably at its peak in the mid-nineteenth century. Even at that date gas was spreading in urban areas as a means of domestic lighting. From the 1850s, too, kerosene and paraffin oil became available in large quantities. By the 1860s cheap paraffin lamps costing less than a shilling were flooding the market. Finally, by the end of the nineteenth century electricity was beginning to spread as a source of power for light.



As is clear from the inscription on the front, this small benzoline lamp was designed and made in France. Its inventor was Charles-Joseph Pigeon (1838-1915). He patented his lamp in the early 1880s. Pigeon's design was guaranteed not to explode! This is emphasised on the front of this example 'Absolute Security Guaranteed'. This example could be stood on a table, but it also has a bracket to fasten it onto a wall (or to carry it by hand). The text on the front underlines the cheapness of this source of light '12 hours good light for one half penny'. There were many different variations of the Pigeon Lamp. Some had a glass chimney but others, like the example in this box, were sold without one. An illustration of one which included a chimney can be seen on the left.

Miller Regalite Lamp



This was a cycle lamp. It was a carbide lamp. This kind of lamp burns acetylene gas produced by reacting calcium carbide with water. Pellets or chunks of calcium carbide (CaC_2) were placed in the lower chamber (the generator). The upper chamber was then filled with water. A screw valve or other mechanism was used to control the rate at which the water was allowed to drip into the chamber containing the calcium carbide. By controlling the rate of water flow, the production of acetylene gas was controlled. This, in turn, controlled the size of the flame (and thus the amount of light it produced). When all of the carbide in a lamp had been used, the carbide chamber was left with a wet paste of lime. This had to be emptied into a waste bag and the chamber then refilled.



This is quite an elaborate procedure but, unlike candle lamps, the flame would burn more reliably in difficult conditions. These lamps were popular with cyclists and motor car drivers from the 1890s until the 1930s. This example has red and green transparent side light panels. It is rather battered. A similar light in much better condition can be seen in the illustration to the left.