

The politician and the piano

David Baker explains the link between optics and one of the founding fathers of the United States of America

What has a Founding Father of the US – also a scientist, diplomat, printer and publisher – got to do with optics?

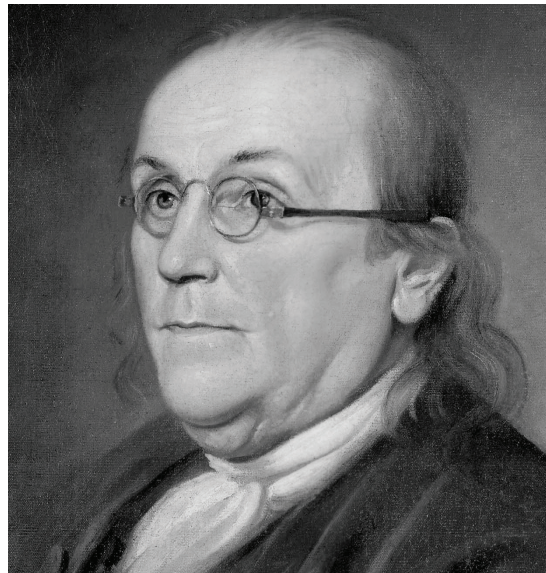
And what's his optical claim got to do with a form of upright piano? The first question is easy enough: it is well-known that Benjamin Franklin (1706-1790) is credited as the inventor of the bifocal spectacle lens. The background to that is the basis of this article. The piano connection will be revealed in due course.

Franklin was a confirmed spectacle wearer by his 30s. His real problems began, of course, when he became presbyopic. It was a straightforward process to order reading glasses of various powers at that time. A wealthy person, such as Franklin, who realised the reading power would need increasing over the years, could purchase an entire set of lenses. This he certainly did for other people.

He sent his sister 'a pair of every size of glasses from 1 to 13' from England in 1771, telling her to 'take out a pair at a time, and hold one of the glasses first against one eye, and then against the other, looking on some small print. By trying and comparing at your leisure, you may find those that are best for you, which you cannot do well in a shop, where for want of time and care, people often take such as strain their eyes and hurt them.'

In this letter he showed his awareness that each eye may have different needs, which is why he did not subscribe to the usual policy of the time of selecting spectacles by one's age: 'I advise your trying each of your eyes separately because few people's eyes are fellows, and almost everybody in reading or working uses one eye principally, the other being dimmer or perhaps fitter for distant objects.' He also advised that once she had selected the appropriate lenses she should 'keep the higher numbers for future use as your eyes may grow older.'

In the early 1780s, Franklin the presbyope wrote that he could not, without his reading glasses, 'distinguish a letter of even large print', although he had no doubt suffered the problem for some time previously. It meant that he



A portrait of Benjamin Franklin wearing bifocals

had to use 'two pair of spectacles which I shifted occasionally, as in travelling I sometimes read and often wanted to regard the prospects. Finding this change troublesome and not always sufficiently ready, I had the glasses cut and half of each kind associated in the same circle.' By this means,' he continues, 'as I wear my spectacles constantly, I have only to move my eyes up or down, as I want to see distinctly far or near, the proper glasses being always ready.' Thus he professed himself 'happy in the invention of the double spectacles, which, serving for distant objects as well as near ones, make my eyes as useful to me as ever they were.'

Expensive prescription

It is unclear when exactly Franklin had the idea for using bifocals, but a clue is found in a note he received in 1779 while in France. It was sent by H Sykes 'Optician: Privilégié du Roi' who made glasses in Paris from 1776 to 1785. He 'cut' (rather than 'ground') a second pair of spectacles for Franklin, mentioning that he had 'been unfortunate, for I have broke and spoilt three glasses.' This comment, and the high price of 18 francs, suggests that they may have been bifocals. But by 1874 he was certainly wearing the pair mentioned previously.

The first known portrait of Franklin wearing bifocals dates from this year (pictured). The American painter of the work, Charles Willson Peale, was

impressed with them, as they enabled him to examine his subject and then easily switch to his canvas; a better solution than hinging one set of small lenses above the other, a current fad in London. So impressed, in fact, that he had his own pair made: 'Bought 2pr spectacles one of 9 inch focus & the other of 18, I cut the glasses of both pr and put the longest focus above and the shorter below in each frame, so that I have 2pr of spectacles which will serve for near or greater distance.' Fellow artists Sir Joshua Reynolds and Benjamin West became early converts. Thomas Jefferson adopted 'Dr Franklin's plan of half-glasses of different focal distances, with great advantage' to become, as President of the USA, the first head of state to wear bifocals.

Franklin may have invented bifocals, but who coined that word for his 'Double spectacles'? The neologism was the idea of civil engineer and inventor John Isaac Hawkins (1772-1854). He was initially known as co-inventor of an early type of mechanical pencil, but became best known for his invention of the cottage piano or pianino (or 'portable grand' as he called it).

Hawkins, an Englishman who emigrated to Philadelphia, knew both Jefferson and Peale through another of his inventions, the polygraph. This was a mechanical device which linked the writer's pen to another so that a facsimile of one's signature could be produced together with the original. Jefferson used one, and Peale obtained the American rights to it. Hawkins coined the term 'bifocal' in 1824, crediting Franklin, and even patented a design for a trifocal in 1827.

Doubts remain as to whether Franklin was the first to wear bifocals or was merely a populariser of them. Certainly, as a hyperope in his 70s by the time of his purchase of the French specs, he would have benefited from them many years earlier; and he refers in his correspondence to another's experiment on lenses in London some years previously.

Hawkins was happy to acknowledge Franklin as the originator of bifocals, but the reality is perhaps less than certain. But if Franklin's reputation as the inventor of these lenses ultimately derives from his writing about them, he at least covered his bases. As he himself said: 'If you would not be forgotten as soon as you are dead and rotten, either write things worth the reading, or do things worth the writing.' ●

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