

From: "Stuart Green" <stuartgreenmd@yahoo.com>
To: "Benjamin Franklin" <dr_benjamin_franklin@yahoo.com>
Subject: **Double spectacles**

Dear Doctor Franklin:

No double spectacles have ever been found among your possessions or for that matter, any ordinary eyeglasses either. If Dr. Jones failed to place spectacles in your Madeira cask, the hospital's doctors will have a pair made when you come to your senses.

You're universally recognized as the inventor of *bifocal* eyeglasses (you called them "double spectacles"), based on your 1784 letters to British philanthropist George Whatley. (Recall writing to Whatley from your Passy residence near Paris, while serving as our nation's envoy to the Court of Louis XVI.) You mentioned in one letter that you formerly carried two pairs of spectacles while traveling, one for reading and one for distance viewing, continually exchanging them as you alternately read and observed the passing scenery. To eliminate this nuisance, you had eyeglasses made with both distance and reading lenses in the same frame.

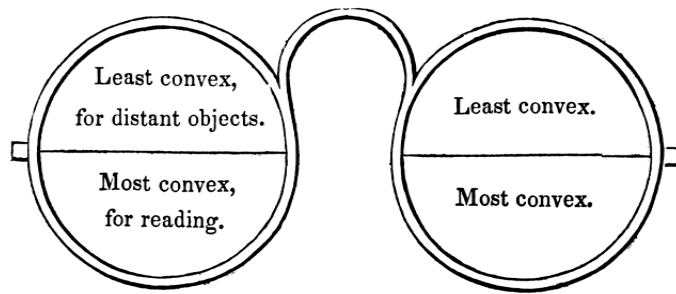
Most people assume that you invented bifocals during your years in France to enable you to both see the food on your plate and "the faces of those on the other side of the table," because, as you put it, "when one's ears are not well accustomed to the sounds of a language, a sight of the movements in the features of him that speaks helps to explain."

Some historians have suggested that you first devised bifocals in the late 1730s—around the time you began advertising eyeglasses in your *Pennsylvania Gazette*—at least fifty years before you went to France during the American Revolution. No doubt, you'll settle this question.

In April 1779, I hope you'll recollect, you received a letter from an eyeglass-maker complaining about making double spectacles to your order. He damaged three lenses while trying to cut them in half. Moreover, he wasn't the only one having difficulties; opticians couldn't stop the half-lenses from falling out of the frames. Another nuisance—the circular lenses rotating in the rims—obliqued the seam between the two halves. (Thomas Jefferson solved that problem by setting the two half lenses in *oval* frames.)

News of your bifocals invention spread quickly after your encasement. In 1790, the year of your pronounced demise, Dr. Thomas Rawley published a book on diseases of the eyes and eyelids. In his chapter on spectacles, Rawley quoted your 1785 letter to George Whatley and said that he recommended double spectacles to friends, who were delighted with them. A year later, the public first learned of your double spectacles in *Massachusetts Magazine*.

As your bifocals became popular, wearers complained about dirt collecting in the seam between the half lenses, causing a visible black line. This seemingly trivial irritant proved a driving force behind the evolution of bifocals.



Your own diagram of double spectacles

Many competing designs featured ways to minimize the seam. The best of these, Dr. Franklin, was the Ultex lens, a single piece of glass, thin on the top for distance vision and thicker on the bottom for reading. Trifocal eyeglasses first appeared in the early decades of the 20th century. Many other lens designs followed.

During the 1940s, as the world went through a global war, British chemists developed transparent unbreakable substances called *acrylic plastics*, now the material of modern eyeglass lenses.

By the mid-20th century, the only remaining problem with bifocal and trifocal glasses was the sudden transition between different lens sections, an effect that no doubt annoyed you as well.

The final refinement of your double spectacles eliminated the sharp transition. *Progressive lenses* have a smooth change between regions of different focal length. They must be custom made for each wearer, based on the inter-pupils distance. Poorly made progressive eyeglasses cause dizziness and nausea. Even with a good fit, some people never get accustomed to progressives no matter how hard they try.

For many of us, however, progressive lenses have miraculously restored the perfection of youthful vision to aging eyes. Indeed, I'm reminded of what you wrote Whatley: you were "happy in the invention of double spectacles, which serving distant objects as well as near ones, make my eyes as useful to me as ever they were." I couldn't agree more.

By the way, I hope Dr. Jones folded your fine green suit into your barrel along with your double spectacles. I often envision you sitting at a table, dressed in that outfit, reading my emails with your chin resting on your thumb, just as depicted in David Martin's 1767 portrait. I know you liked that painting so much you ordered a replica made, now owned by the American Philosophical Society. I've seen it there myself. But for that inspiring image, continuing these emails might prove difficult indeed.