



A SPECTACULAR HISTORY OF
SPECTACLES

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EARLY TIMES

9th Century BC

Possible use of some form of magnification by engravers producing fine hieroglyphics on stone.

1st Century AD

The Roman emperor Nero is said to have used an emerald to view events in the Colosseum. It is not known whether he used the stone as a sun glass or if he was myopic and the stone had a concave surface.

The Chinese used spectacles made from tea stone, not for the optical effect but they believed that there was a force in the stone which helped visually defective people.

700 AD

A casual reference to the use of a magnifier was made by St. Boniface.

1000 AD

Al Hazan in Egypt described the power of magnification and the refraction of light. He suggested the use of a lens to help vision and also described the anatomy of the eye and the function of the crystalline lens.

Middle Ages

"Reading stone" developed by the monks. A segment of a polished sphere of rock crystal or beryllus (emerald or beryl) was laid flat on the parchment to enlarge the print. Later the lens was held by a handle.

1267

Roger Bacon sent a segment of a sphere, probably rock crystal or beryl, to the Pope as a reading glass.

1280

Two lenses were combined together, one for each eye. The lenses were surrounded by a frame of wood or horn equipped with handles which were fixed together with a nail or rivet, the so called 'rivetted spectacles'.



Rivet spectacles



Horn pivot nosed spectacles with wooden case. One lens +2.0 dioptre, other lens +5.0 c. 1760

Horn pivot nose spectacles with green glass with +2.0 dioptre prescription. c. 1730



The lenses

1300

Original lenses of rock crystal or beryl were replaced by glass produced by the glass industry in Venice.

15th Century

Invention of printing increased the need for spectacles. An optical industry was established in Germany at Nuremberg. All these original lenses were convex.

Circa 1450

Concave lenses were developed

1517

First known painting of a person wearing a glass for myopia was of Pope Leo X painted by Raphael.

16th Century

Production of lenses was only allowed in special shops licensed by edict of the various city councils. Later these edicts became less effective and lenses of inferior quality were produced elsewhere e.g. in prisons or work houses. These poor quality spectacles were sold by itinerant peddlers.

1611

Kepler developed a meniscus form of lens and also described prisms which were not used clinically until about 1860 by von Graefe and also Donders.

1756

Development of an achromatic lens by the English optician, John Dolland.

1775

Benjamin Franklin invents bifocals

1805 onwards

There was a gradual development of the modern 'best form' spectacle lens as we know it. Important steps in this process were:

- William Wollaston (1805) introduced the periscopic lens to overcome astigmatism produced by oblique pencils of lights
- Sir George Airey (1827) developed the astigmatic lens.
- Further developments by Gullstrand (1905) with the aspheric lens and also work by Tscherning (1908) overcame the problems of peripheral distortion.
- Crown glass manufactured by Zeiss from 1885 onwards gave lens glass increased clarity and uniformity of structure.
- Gradual modifications during this century have been directed to removing further imperfections



2 pairs of nose spectacles – distance and reading with tortoise shell rims and steel bridge in shaped shagreen case c. 1690.



Pivot nose spectacles with faceted +3.0 dioptre lenses and gilt copper rims and bridge with original paper banjo-style case c. 1740s

The Frames

The original rivetted spectacles, often pressed together to grip the nose, were cumbersome and difficult to use. In the 15th century they were replaced by spectacles with a fixed arch bridge, which were usually made in one piece, with the frame often made of leather to help grip the nose. Bridges made of horn were sometimes slit to make them more flexible. These still had to be held by hand but sometimes were fixed to a headband or cap. Threads were sometimes attached to eyelets on the frame and tied behind the head or attached to weights hanging down over the ears.

17th Century

A technique was developed to enable a round wire to be pressed flat and a groove to be placed in one side, thereby producing a frame to hold the lens.

Early 18th Century

The rigid fixed bridge was replaced by a flexible spring and later replaced by separate spring-loaded nose pieces.

Circa 1720

Side bars, or arms, were fitted. These were either made to press on the temples or were longer straight arms which rested on the fashionable wigs of the day.

When wearing of wigs ceased, the arms were designed to fit behind the ears or jointed to fold behind the head.

Circa 1850

Modern spectacle arms with curved ear pieces were developed.



Bamboo frames with a metal bridge covered with cotton to prevent metal touching the skin. Used by those in the Jain religion, which forbids skin to metal contact

Spectacles hanging from a headband



Spectacles and art

Following the spread of the use of spectacles for reading during the 14th century, the only people to use them were the educated and literate. Portraits of famous people of the time were therefore often painted with a pair of spectacles as they came to be seen as a mark of wisdom.

Painters of that era, who were portraying religious topics such as the birth or early life of Jesus Christ, often showed individuals in the picture with a pair of spectacles to show their status and wisdom. Hence the wise men at the Crib are sometimes shown wearing or holding a pair of spectacles. Paintings of the circumcision of the infant Jesus may show one of the group of men wearing spectacles and reading from a book.



Monet's aphakic glasses with a yellow-green tint. Note the curvature of the right lens, and the flat darker left lens.