Hands On Learning
with Reading Museum Service

THAUMATROPE D45/A



A thaumatrope is a small disc, held on opposite sides of its circumference by pieces of string, or held on an axle within a frame. An image is drawn on each side of the disc, and is selected in such a way that when the disc is spun, the two images appear to become superimposed. The faster the disc rotates, the greater the clarity of the illusion.

It was invented by Dr J. A. Paris of Penzance in 1827. The example of a bird on one side, and a cage on the other, was used on the first thaumatrope and became something of a trademark. The earliest images, however, also had riddles written around the bottom of the disc. For example, the question 'Why is this Parrot like a drunken Man?' The answer, written on the side with the cage was 'Because he is often in the Cage' (that is, in prison).

Most pairs of thaumatrope images were static. A thaumatrope could only take two images and merge them, essentially creating one still image from two. The phenakistoscope (see next page) was a great improvement on the thaumatrope, creating one moving image from several stills, and became the first optical toy to create a true illusion of motion.

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Ingenious devices such as the thaumatrope were very popular in the nineteenth century. Other inventions of this kind were:



•**The phenakistoscope** (right, above) - a revolving card with slits cut in it between which there were figures drawn in different attitudes. The card is spun with the images facing a mirror. The viewer looked through the slits at the mirror and it appeared that the images were in actual motion, such as an animal leaping. Invented by the Belgian scientist J.A.F. Plateau in early 1832.

•**The kaleidoscope** - a tube, with mirrors arranged inside, so that scraps of coloured glass contained in the end opposite the viewers eye are arranged into constantly changing symmetrical patterns as the tube is twisted. Patented by Sir David Brewster in 1817.



•**The zoetrope** (right, below) - a cylinder with slits cut vertically in the sides, rather than a disc on a handle. Invented by W.G. Horner (1786-1837) of Bristol in 1834. Horner's own name for his invention was The Daedalum (or the Wheel of the Devil).

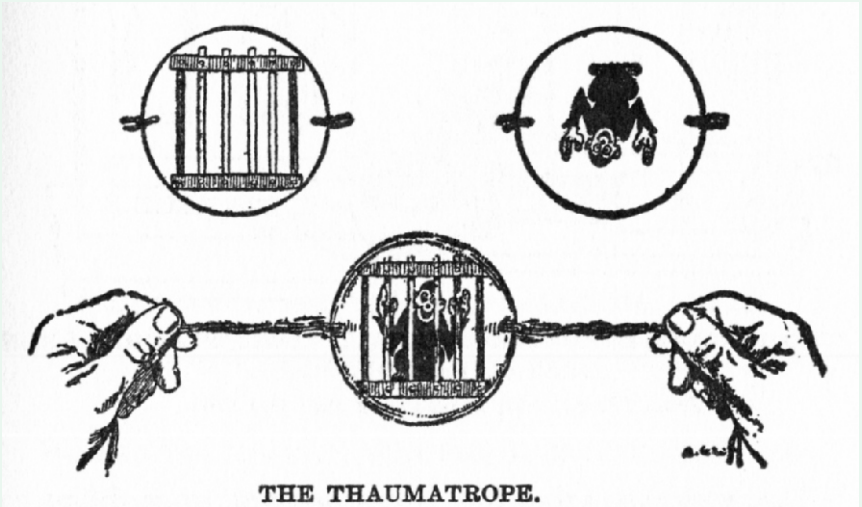
Although toys, most of these devices were the work of scientists with a serious interest in optics. Sir David Brewster, for example, invented the lenticular stereoscope, the binocular camera, the polyzonal lens, the polarimeter, and the lighthouse illuminator although today he is mostly remembered because of the kaleidoscope! Such devices were popular with adults as well as children because they mixed fun with scientific curiosity. These and other devices led to the invention of the film projector and the cinema. Without them Hollywood might have remained an insignificant small town on the west coast of America.

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How does the thaumotrope work? In 1825 Dr P.M. Roget (1779-1869), the creator of the famous *Thesaurus of English Words and Phrases*, published a paper in the *Philosophical Transactions of the Royal Society* in which he suggested the idea of 'persistence of vision'. He suggested that the human eye and brain retain a visual impression for about 1/30th of a second. The image in the zoetrope appears to move because 'persistence of vision' blurs together individual images into a smooth sequence. This idea has been used to explain our failure to notice that a cinema screen is dark about half the time, and that a television image is just one bright, fast, little dot sweeping the screen. Motion pictures show one new frame every 1/24th of a second. Each frame is shown three times during this period. The eye retains the image of each frame long enough to give us the illusion of smooth motion.

However, in recent years this theory has been questioned. The experimental work is complex, but in simple terms the alternative suggestion is that the eye is unable to distinguish closely spaced stimuli.



THE THAUMATROPE.

Above: How the designs of the two sides are placed with respect to each other.
Below: The combined image when the thaumatrope is twirled.