THE ANSCHÜTZ ZOETROPES

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On a moment's reflection, it appears strange that the Zoetrope, the most popular and widely used viewer for either drawn or photographed pictures giving an illusion of movement, went through so little real optical development during the 19th century. While collectors identify many different instruments with varying bases, diameters, number and dimensions of viewing slots, and overall quality of performance, they all act optically in the same way: a band of pictures, of the appropriate length, is laid inside the deep drum of the viewer which, when spun, produces a brief moving image when observed through the slots in the upper part of the cylinder. Along with the Phenakistiscope, or 'stroboscopic disk' and Emile Reynaud's Praxinoscope – the mirror-based revolving drum which is in many ways an optical development of the Zoetrope – this homely and well-known instrument was accepted all over the world in the form that was first proposed and manufactured. Although sometimes used by scientists as well as for evening entertainment in the home, no one seems to have seriously considered the Zoetrope's principles of operation or tried to make distinctive improvements in its function. No one, that is, until Ottomar Anschütz introduced several new models of the Zoetrope in the late 1880s – models now highly prized by collectors and museums.

Born 16 May 1846 in Lissa (Posen), East Prussia, Anschütz was a photographer who was interested from the earliest days of his career in capturing movement. In 1867 he had already achieved notice for a picture of the King of Saxony on horseback, taken in Vienna while he was studying with the court photographer Ludwig Angerer. After building a reputation for 'instantaneous' photographs of military manoeuvres and the flight of storks in the early 1880s, Anschütz turned to chronophotography in 1885 using a battery of at first 12, then 24 glass-plate cameras. From the beginning of this work Anschütz was interested in reproducing the motions captured by his cameras. Unlike his great contemporary Etienne-Jules Marey in Paris, Anschütz was not a scientist. Marey's passion was the dissection of movement, its analysis, measurement and recording, as an aid to understanding the physiology of movement. Marey, who made many different cameras that were important steps on the path towards the invention of modern moving pictures, had no interest in reproducing motion; instead, for him photography was a way of capturing unseen movements and making scientific measurements for principally medical reasons. In contrast, Anschütz was driven by the photographic artistry of his images, proud that his work in recording motion was repeatedly considered far more advanced photographically than the coldly analytical images of Marey or of the great pioneer of chronophotography, Eadweard Muybridge.

> ... the outstanding photographers, the American [sic] Muybridge and the French physiologist Marey, have captured only silhouettes; in other words instead of fully dimensional modelled bodies, the bare outlines themselves. The first to solve this problem, through his unusual technical skill and his willingness to spend his energy, is the German photographer Ottomar Anschütz in Lissa (Posen); with this success he has created material that is equally important for science as it is for the Arts.[1]

This was a typical comment on his work, one that was echoed in all of the photographic journals of the day.

Primarily interested in the artistry of motion, and not in its analysis, as soon as Anschütz started to make series chronophotographs, he also began to work on instruments which would reproduce the natural motions he recorded. He called all of these instruments by his own new word: Schnellseher; literally, 'Quick-viewer', or 'Speed-viewer'. Like many other moving picture inventors who were committed to a particular word for different instruments (outstanding amongst them C Francis Jenkins with his many different machines called 'Phantoscope'), Anschütz's use of a single word for several devices has given headaches to later historians trying to sort out his work. There were four different models of Schnellseher which are developments of the drum-shaped Zoetrope, and at least seven models of Schnellseher that were all (with one exception) rotating disks with glass or celluloid diapositive photographs mounted around their edge and illuminated intermittently from behind by the flash from a Geissler tube. The story of these latter instruments has been told elsewhere.[2] The one basic obsession that linked both types of Schnellseher was Anschütz's implacable commitment to the photographic quality of his images and to the excellence of their reproduction. This obsession led him to make a disk-form Schnellseher automat with the help of the electrical firm of Siemens & Halske. An apparatus that was hugely intricate and over-engineered to make it capable of using picture series of anywhere between 18 and 24 images, this was widely seen in England, on the Continent, and in America from 1891. It was this same uncompromising commitment to the visual quality of his work that led Anschütz to make the first substantive improvements in half a century to the familiar shape and optical arrangement of the Zoetrope.

Anschütz introduced the first of these improvements, a Zoetrope with three rows of viewing slots around the circumference of the drum, in September 1887 at the convention of natural science researchers in Wiesbaden.[3] Using an especially deep drum, 58cm in diameter, the apparatus featured three rows of viewing apertures with 19, 20 and 21 slots in each respective row. The picture bands also were provided with various numbers of images. For a picture band in which the movement was contained in 20 images, the moving object represented would seem to be standing in the same place when seen through the middle row, would seem to be moving forwards when seen through the upper row, and would seem to be moving backwards when viewed through the bottom row of slots. (This was a principle first demonstrated by Faraday.) The Zoetrope was motivated by a small metal crank connected to a drive-shaft at the centre point of the viewing cylinder by means of two bevel gears. With its tin cylinder, low cast-iron circular base and metal crank, this was a massive instrument, weighing 12kg (26.4lbs). The picture bands, placed at the bottom of the viewing cylinder inside the drum in the usual manner, were 180cm long, with images 12cm high.

Very little is known about the use of this version of the Anschütz Zoetrope, or how many picture bands were created for it. The distinguished physicist and electrical researcher Hermann von Helmholz said in his *Handbook of Physiological Optics*,[4] that this apparatus was a 'much-used type', but few instruments or picture bands have survived and Helmholz's reference is unclear. Certainly Anschütz himself used this form of Zoetrope several times in the years up to 1890, when he demonstrated various of his chronophotographic series at meetings of professional photographers in Germany and Austria, sometimes in parallel with demonstrations of his Electrical Schnellseher. Etienne-Jules Marey certainly bought one of these Anschütz Zoetropes,[5] the three alternative viewing arrangements making it particularly useful in the scientific analysis of motion. At the time Anschütz introduced this model, he was already working primarily to perfect the Electrical Schnellseher, giving his first demonstrations on this remarkable apparatus, and laboriously creating by hand its first picture disks. There was only modest motivation for Anschütz to take the triple-slot zoetrope seriously in this context, and it is likely that few machines, and few picture bands for it, were made.

On 20 and 21 November 1890, Anschütz introduced his next modification of the Zoetrope at meetings of the two principal Berlin photographic associations, the Photographische Verein and the Verein zur Förderung der Photographie.[6] This was an ingenious and refined apparatus which took into account every aspect of the reproduction of motion captured by serial chronophotography, using a battery of cameras. The most startling improvement was also the most simple: the picture band itself was now fixed to the very shallow rim of the viewer, and the band also incorporated the necessary viewing slots between the images. The interchangeable picture bands, in other words, formed the wall of the cylinder. With each band now incorporating the proper number of slots for viewing it, the Zoetrope was no longer limited to a fixed number of images to reproduce movement. Importantly, this meant that if a motion – a horse jumping a hurdle, for example – was 'complete' in 21 images, and another was 'complete' in that its first and last images matched in only 18 pictures, then either band could be attached to the rim of the Zoetrope and would look like a natural and complete movement to the viewer. Anschütz also carefully refined the viewing slots between the images on his bands, making them very narrow and quite short, as they were in his earlier model. While this passed less light to the viewer's eyes, the thin slots also increased the clarity and sharpness of the images when the drum revolved, presenting the movement of Anschütz's photographs to their best advantage.

Sometimes called the 'Salon-Schnellseher', the wrought-iron support of this model Zoetrope allowed the drum (formed by the picture bands) to be placed in either a vertical or a horizontal position, making possible the use of records of non-continuous, or non-repetitive movements. A rectangular black pasteboard 'viewer' was included with the zoetrope, and is often shown in illustrations of the apparatus. This 'viewer', with its large rectangular aperture, was held by hand before the eyes when the Zoetrope was used in bright daylight, to reduce the light reflection from outside the drum and thereby sharpen the observation of the images through the narrowed slots. This 'viewer' was not used when the Zoetrope was used in the evenings or in darkened rooms. Lithographed photographic bands for this instrument, 180cm long and 12cm high, were sold individually for 2.50 marks or as a group of five for 10 marks; the Salon-Schnellseher itself, weighing 1.5kg (3.3lbs) cost 10.50 marks initially, later 13.20 marks.

Fifteen photographic picture bands were made for the Salon-Schnellseher, delivered in three groups of five bands each. The subjects were of various animals in motion, gymnasts, and marching soldiers. Interestingly, several serial chronophotographs which Anschütz had made of entertaining or comical subjects (such as 'Two Old Men Taking Snuff' or 'Barbershop Scene'), and which he used in public screenings of various models of his Electrical Schnellseher disk machines, were never reproduced for the Zoetrope models, indicating that Anschütz intended the apparatus to be used primarily for scientific or educational purposes, and perhaps for adult amusement, but not popular entertainment. For him, the Zoetrope was a way of

The final, 'popular' version of Anschütz Schnellseher. From left to right, the box lid which also served as the zoetrope drum; the standing base; a picture band sitting on the box; the base, lid and band assembled for use

seeing photographic moving pictures in which the overriding principle was quality reproduction of the original images. The fifteen picture bands produced for the Salon-Schnellseher, with the number of images in each band, are as follows:

Group 1

Sprunglauf (19) Running gymnast

Galopp (20) Horse and rider at the gallop

Hürdesprung (24) Horse and rider jumping a hurdle

Galopp-Hund (17) Dog at the gallop

Kamel (21) Camel walking

Group 2

Parademarsch (23) Uhlan in full uniform at the march

Türnersprung (24) Gymnast jumping over another's back

Spanischer Tritt (18) Horse and rider at the Spanish walk

Springender Bock (21) Goat jumping a hurdle

Reiher(16) Heron in flight

Group 3

Tanzerin (21) Female folk dancer

Schritt (21) Horse and rider walking

Elefant (21) Elephant and rider walking

Trab (21) Horse and rider at the trot

Kranich (21) Crane walking

When this model of the Zoetrope was first demonstrated at the Photographische Verein zu Berlin[7] each picture had a viewing-slot related to it. With an equal number of pictures and slots, this meant that all motion was 'in-place' motion, which was useful for the scientific observation of movement. During the discussion at the Society, the suggestion was made that Anschütz might use one viewing slot less per band, which would transform the movement into progressive forward motion, which would look more natural to the viewer. According to the later report of Guido Seeber,[8] reprints of the bands in Group 1 and Group 2 incorporated this improvement.

On 17 April 1891, Anschütz demonstrated a simplified model of his Salon-Schnellseher for the Verein zur Förderung der Photographie in Berlin.[9] The main distinguishing characteristic of this Zoetrope was that it appears, from illustrations, only to have been used in the vertical position. There were also subtle improvements: it was easier to attach the picture bands to the base that formed the drum, and the fixed position of the drum-head meant that the Zoetrope was easier to rotate, since the rods connecting the turning gears were fixed in place. Overall, this was a somewhat simplified version of the Salon-Schnellseher, and it also sold for a somewhat lower price of 10.50 marks, later increased to 22 marks and then 23.20 marks, inclusive of five picture bands. The apparatus weighed 1.7kg (3.74lbs).

At the end of 1891, ready for the Christmas season, Anschütz introduced his final model of the Zoetrope.[10] This was a very inexpensive version made of pasteboard and with a hand-held turning axle. This model was 23cm in diameter, and used picture bands 72cm long, with images 5cm high. First presented in Berlin, the picture bands were lithographed and again contained the viewing slots between each image on the band. Initially, this inexpensive model was sold for 6 marks including 10 picture bands, a package that was later increased to 15 bands, while the apparatus with only 10 bands was reduced in price to 4.50 marks. The improved model also replaced the hand-held axle with a standing base.

Although a great artistic photographer and much under-rated chronophotographer, Anschütz was not very suited to the world of business. His arrangements for the commercial exploitation of his various devices, from what we know today, seem not to have been very stable and he frequently changed his mind about how best to promote his work. At the same time his fixation with the quality of his images was frequently in conflict with his hopes of selling them to a wide public, since he personally undertook the manufacture of most of the images intended for sale; even his few photographic publications were issued from his own studio in very small editions. As a result it is difficult to estimate how many of these Zoetropes were actually made and sold. In the early 1890s they were sometimes advertised by agents, mostly photographic supply houses, in cities like Leipzig and Dresden;[11] the small cardboard model was available through the direct-sales toy catalogue of A Wahnschaffe in Nuremberg and the educational catalogue of the Deutsche Lehrmittel Anstalt in Frankfurt-am-Main.[12] At his studio in Berlin, Anschütz himself sold all models of the Zoetrope, along with home models of his disk Schnellsehers at least until 1905. An invoice for the sale of a Salon-Schnellseher, now in the Siemens Archive in Munich, might indicate that Siemens & Halske had a hand in making the metal parts for this Zoetrope, although there is no other evidence of any involvement.[13] The scarcity of Anschütz Zoetrope Schnellsehers today is certainly an indication that they were not produced in very large quantities.

NOTES:

1. *Illustrierte Zeitung* (Leipzig), 2 January 1886, No. 2218, p. 21. Another typical comment is from the article 'Instantaneous Photography and its Meaning for the Teaching of Movement' by Dr F A Schmidt in the *Deutsche Turn-Zeitung* (Leipzig), No. 51, 22 December 1887, p. 763: 'chronophotographic series taken until now have been achieved, as by Muybridge, with dark images against a bright background, and by Marey with bright images against a dark background, more of an outline than a precisely dimensional representation; it was reserved to a German photographer, Anschütz, in Lissa, to reach the highest level in this area also, as in his individual high-speed photographs.'
2. See Deac Rossell: *Ottomar Anschütz and his Electrical Wonder* (The Projection Box, London, 1997).
3. This was Naturförscherversammlung, an annual conference of natural science researchers. *Photographische Mittheilungen*, 1887/88, p. 179.
4. Hermann von Helmholz: *Handbuch der physiologische Optik*, 3rd edition (1907), p. 495.
5. Now in the collection of the Cinémathèque française; see Laurent Mannoni: *Le mouvement continué. Catalogue illustré de la collection des appareils de la Cinémathèque française*, (Paris/Milan, 1996), p. 270, entry no. 8426.
6. *Photographische Nachrichten*, 1890, pp. 746 and 755; *Photographische Mittheilungen*, 1890/91, p. 244.
7. *Photographische Nachrichten*, 1890, pp. 746-48.
8. This is claimed by F Paul Liesegang in *Ottomar Anschütz. Meister der Augenblicks- und Reihenphotographie, Meister der Reihenwiedergabe* (unpublished), citing Guido Seeber, 'Ottomar Anschütz zum Gedächtnis', in *Die Filmtechnik*, 1926, 2. Jg., p. 97. I cannot however find this in the source named. Nonetheless it is clear that later bands incorporated this change, giving an impression of forward movement.
9. *Photographische Mittheilungen*, 1891/92, p. 48. This modified Zoetrope was presented a few weeks later, on 21 May, to the Photographische Verein zu Berlin (*Photographische Nachrichten*, 1891, p. 356).
10. *Photographische Nachrichten*, 1891, p. 803.
11. For example, advertisements of Adolf Deutsch, Leipzig, in *Der Komet*, 10 February 1894, No. 463, and 2 February 1895, No. 515.
12. *Illustrierte Katalog für Private über Nürnberger Spielwaren und praktische Geschenke*, von A Wahnschaffe, Nuremberg, 1895, p. 48; *Illustrierte Katalog Nr. 1 über Spiele Beschäftigungsmaterialen, Apparate und Modelle. Empfohlen für Kinder und Erwachsene als Unterhaltungs- und Lehrmittel*, Deutsche Lehrmittel Anstalt, Frankfurt-am-Main, 1892/1893, p. 50. Both the small cardboard Zoetrope and the larger metal Salon version appeared in the 1892 catalogue of Bernhard Wachtl of Vienna. My thanks to Georg Füsslin for bringing these items to my attention.
13. Siemens-Archiv, LN238, invoice of 5 September 1891 to Frau Anna Zanders in Berg Gladbach, for 1 Schnellseher with 10 picture bands. This is the third item in the first of the main Siemens files on Anschütz, before the Charlottenburg Werke of Siemens & Halske has gone into full production of the automat version of the Electrical Schnellseher, but after they had produced the prototype models for Electrical Exhibition in Frankfurt during the summer – the model's first public showing. Since Siemens & Halske was always punctilious about referring potential buyers directly to Anschütz, this normal Siemens & Halske invoice is a distinct oddity in the files. It may be a stray, misfiled document from an earlier arrangement with Anschütz, or perhaps a special case.