THE QUEST FOR STEREOSCOPIC MOVEMENT: WAS THE FIRST FILM EVER IN 3-D?

DENIS PELLERIN
London Stereoscopic Company

Abstract

Histories of the cinema mention the Lumière brothers and sometimes Louis Le Prince as the precursors of the moving pictures but they usually forget the important part played by Antoine Claudet, Louis Jules Duboscq, Charles Wheatstone and Joseph Plateau. Barely a year after the introduction of the lenticular stereoscope, these polymaths managed to create what can not only be considered as the first "movie" ever but also happens to be in 3-D!

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CONTACT
Denis Pellerin
denis@londonstereo.com

When photography was first revealed to the world in 1839, some people were disappointed that Nature could only paint herself in various shades of grey or sepia, either on the silver-coated copper plate used by Daguerre's process or on the sheet of prepared paper necessary to Fox Talbot's. The Victorians had been expecting photography – even if they had not conciously realised they were – but they wanted it complete, in full colours and, why not, in 3-D. It would not take too long before they had both. And since no dream was too big and nothing impossible for the Victorians, it would only be a matter of time before movement was added too.

The colour issue was settled very early in a roundabout way. Even though commercial colour photography was not available until the first years of the 20th century with the invention of the Autochrome process by the Lumière brothers, tinted daguerreotypes appeared at an early stage. A lot of miniature painters were saved from extinction by the tinting business and scraped a living applying dry colours to the delicate surface of the daguerreotype after they were almost made redundant by the Daguerrean portraits.

3-D – or rather stereoscopy as it was called at the time – was actually invented at the same time as photography but officially presented *before* Daguerre's official announcement of his and Niépce's discovery, on June 21, 1838, to be precise. Although binocular vision had already been discussed in Ancient Greece and many treatises on optics had been written in several languages and published in various parts of the world for centuries, it was not until Charles Wheatstone got an interest in the subject that it was actually proved by experiment that the two slightly different flat pictures our eyes see coalesce in the brain to form a three dimensional representation of the external world. Wheatstone, who started life as a musical instrument-maker (he is also the inventor of the Concertina and the family firm made and sold hundreds of those), was fascinated by the representation of sound before he turned to his optical studies. It is not clear how he went from the one to the other but it appears that he got hooked on to optics as early as 1826 (he was only 21 years of age then) and that by 1832 he had developed an optical instrument called *stereoscope*, from two Greek words meaning, "I see solid". Wheatstone's apparatus used two mirrors at an angle of 90 degrees and since no photographs were available then the binocular disparities necessary to re-create the illusion of depth had to be hand-drawn on two pieces of paper that were upheld opposite one another in front of the said mirrors. It may seem odd that having designed his stereoscope as early as 1832-33 he waited until 1838 to publicly present it but Wheatstone, like most polymaths, was always working on some other projects which he considered more important. In the 1830s one of these happened to be the electric telegraph, which he was developing with William Fothergill Cooke. It may also be worth mentioning that in 1834 Wheatstone had been appointed Professor of Experimental Philosophy at King's College, which kept him busy too.

The prototype Wheatstone presented in front of the Royal Society on that day of June 1838 is now in the storage rooms of the Science Museum in London (Figure 1). It looks quite coarse but perfectly fits the purpose it was built for. Wheatstone's

1838 paper was accompanied by 12 figures that were used to demonstrate some of the "remarkable and hitherto unobserved phenomena" related to binocular vision and the stereoscope. Wheatstone's invention sparkled some interest in the scientific community but never became a commercial success, although its inventor realised, as soon as Daguerre and Talbot made public their process, the potential of photography.

We know that some time in 1840 Wheatstone asked Henry William Fox Talbot to make some calotype stereoscopic pairs for his instrument. Talbot appears to have sent over half a dozen of these early tests – the first ever stereoscopic photographs – in October 1840. Wheatstone acknowledged receipt in December but was not entirely satisfied with the results as the angle between the two images that had been chosen by Talbot, or his assistant, was far too big (47.5 degrees!) which would have made the fusion of the two halves very difficult. I say "would have made" because, unfortunately, these photographs have not been located yet so it is impossible to judge for ourselves how good or bad the 3-D effect was. These photos were last seen in public in the spring of 1873 at a meeting of the Royal Photographic Society. John Spiller (1833-1921) who was to become the president of the said society in 1874 had asked Wheatstone to lend him those first specimens. When Wheatstone died in 1875 he bequeathed his papers, books and photographs to King's College but the 1840 calotypes were not among them. Did Spiller fail to return them? Did he return them and they were not put with the other photographs, thus being overlooked when the time came to send the bequest to King's College ? These are questions for which we haven't got any answers yet.

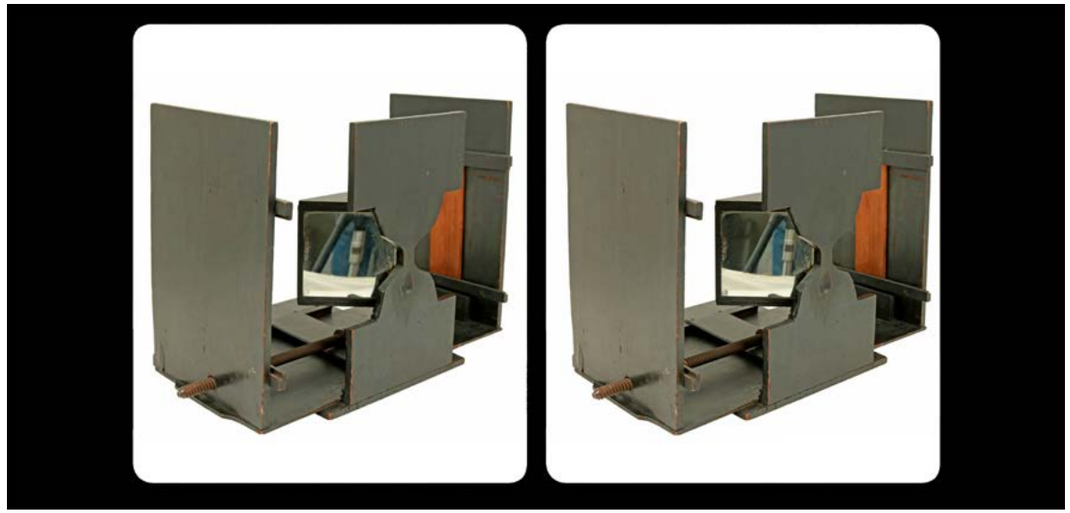


Figure 1. Wheatstone's original 1838 stereoscope, now in the Science Museum, London.

We know from Wheatstone's own hand that between 1841 and 1842 Henry Collen made calotypes "of full sized statues, buildings and even portraits of living persons" for his instrument, and that Hippolyte Fizeau and Antoine Claudet provided him with the first stereoscopic daguerreotypes. The Daguerreotype was probably not the best process to be viewed with Wheatstone's apparatus, being a mirror-like image that would be observed via the mirrors of the reflecting stereoscope, but it shows how keen Wheatstone was on testing every known photographic technique to promote his invention. None of these early daguerreotypes seems to have survived but we know of a stereoscopic pair that was made of Wheatstone's friend and colleague Michael Faraday which was

part of the Wheatstone collection housed at King's College and is now on loan to the Bradford National Media Museum where it was recently displayed.

Athough Wheatstone did get photographs for his instrument at a very early stage in the development of the photographic medium, these did not prove very promising, mostly for technical reasons – mirroring of the daguerreotypes and fast fading of the early calotypes – to which one must add the relatively high cost (at the time) of having two photographs made instead of one. After his first attempts, Wheatstone seems to have consigned the pairing of photography and the stereoscope to the back of his mind until it was brought forward again over a decade later with the promises of the lenticular stereoscope, developed by Sir David Brewster (formerly known to the British public as the inventor of the kaleidoscope). Wheatstone later claimed he had made a lenticular stereoscope before Brewster came up with the idea of substituting prisms to the mirrors but since all the corroborating evidence appear to have been put forward after the fact, namely the presentation of the Lenticular Stereoscope by Sir David Brewster to the Royal Scottish Society of Arts in 1849, it is difficult to be one hundred percent sure this was the case. What we know for certain is that in January 1852, Wheatstone presented the second part of his paper "On some remarkable and hitherto unobserved phenomena of binocular vision" to the Royal Society. He alluded to several types of lenticular stereoscopes he had developed and included a diagram of one of them (Figure 2) which exists as a prototype (Figure 3) and was apparently commercialised if we are to judge by a sample we have seen in a private collection and a woodcut which appeared in *The Illustrated Exhibitor* in April 1852 (Figure 4).

What differentiated Brewster's lenticular stereoscope and Wheatstone's reflecting instrument, despite the use of prisms or half lenses instead of mirrors, was the greater portability of the former and the fact that the pictures were no longer mounted on two different supports but side by side on the same glass-protected daguerreotype. Brewster, who had a tendency to fall out with everyone he worked with, had originally asked a Dundee optician, George Lowdon, to build his stereoscopes. Lowdon, however, made the very rash mistake of suggesting an improvement and the two men parted after some strong words. Brewster took his instrument with him to Paris in the spring of 1850. There he met with scientific populariser Abbé Moigno who took him to see the French optician Jules Louis Duboscq-Soleil. Duboscq was immediately interested in Brewster's invention and started making stereoscopes for him. These were introduced in Britain on the occasion of the Great Exhibition that was held in London from May to October 1851. The stereoscope was then but one of the odd 100,000 exhibits displayed inside what was to be known as the Hyde Park Crystal Palace and it was noticed only when it was presented at one of the soirées organised by Lord Rosse, who was, at the time, President of the Royal Society. On the night the stereoscope was shown pioneer photographer Antoine Claudet was present. He must have realised the potential of the instrument at once and was the very first person to advertise in the press the making of stereoscopic portraits for the daguerreotype (Figure 5).

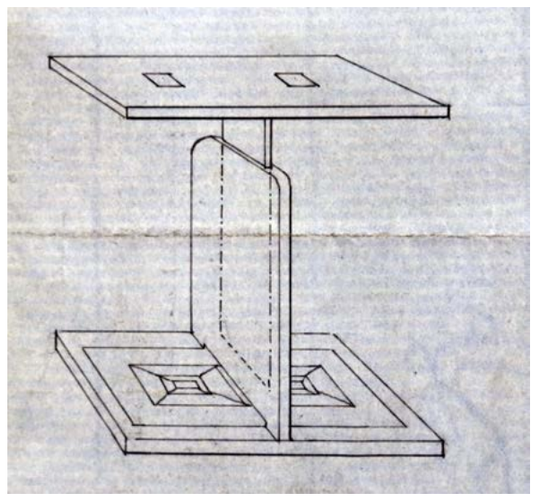


Figure 2. Diagram of a lenticular stereoscope which accompanied

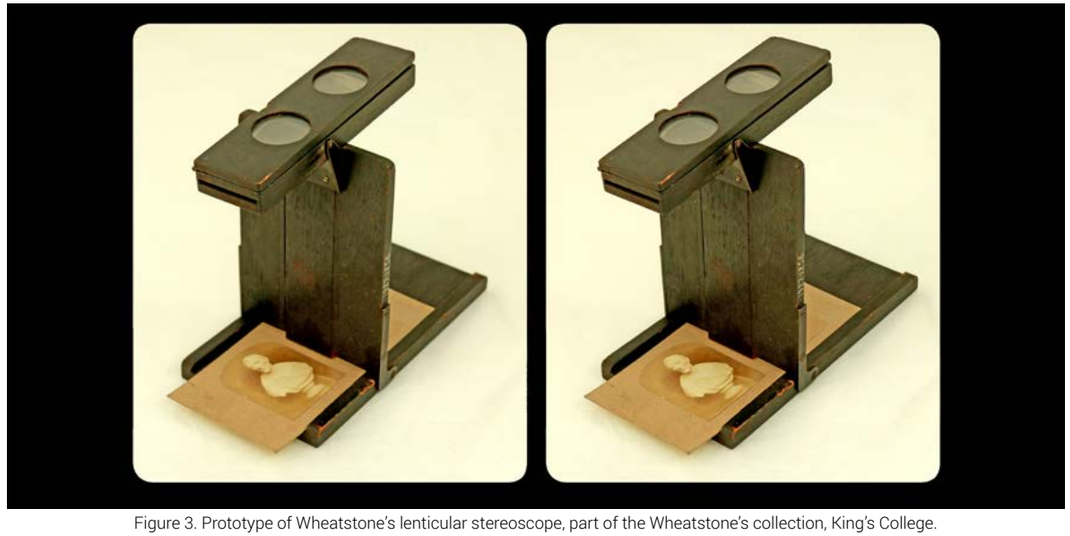


Figure 3. Prototype of Wheatstone's lenticular stereoscope, part of the Wheatstone's collection, King's College.

Among Claudet's first photos were some of the interior of the Crystal Palace which caught the attention of Queen Victoria, Prince Albert, and of the Czar of Russia who, not having had the opportunity of seeing the exhibition in person, expressed his satisfaction at having visited it through the medium of the stereoscope by offering Claudet a diamond ring which is still in the family.

Reviewers were soon ecstatic and lyrical when it came to describe the "optical wonder of the age" or "the magical instrument" – as it was soon called. One of the first articles to be published in 1851 about Brewster's instrument appeared in the *Literary Gazette* and was shortly afterwards reprinted in *The Scotsman.* Its anonymous author concluded his piece with the words:

> [Mr. Claudet] has obtained Daguerreotype pictures of the Great Exhibition, which, when viewed in the lenticular stereoscope, reproduce the scene which all remember with so many feelings of delight. In the revival of the beautiful scene, we have every minute detail reproduced. By the same instrument groups of living objects or statues can be obtained. We have seen some beautiful family groups, which, when surveyed in the stereoscope, appear reproduced in the mimicry of life. *Motion alone is wanting to complete the wonderful picture upon which we gaze. [my italics]*

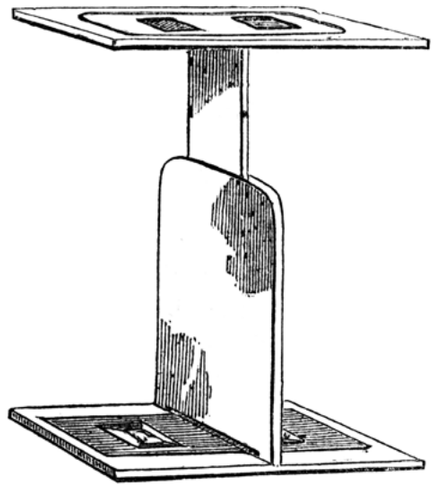
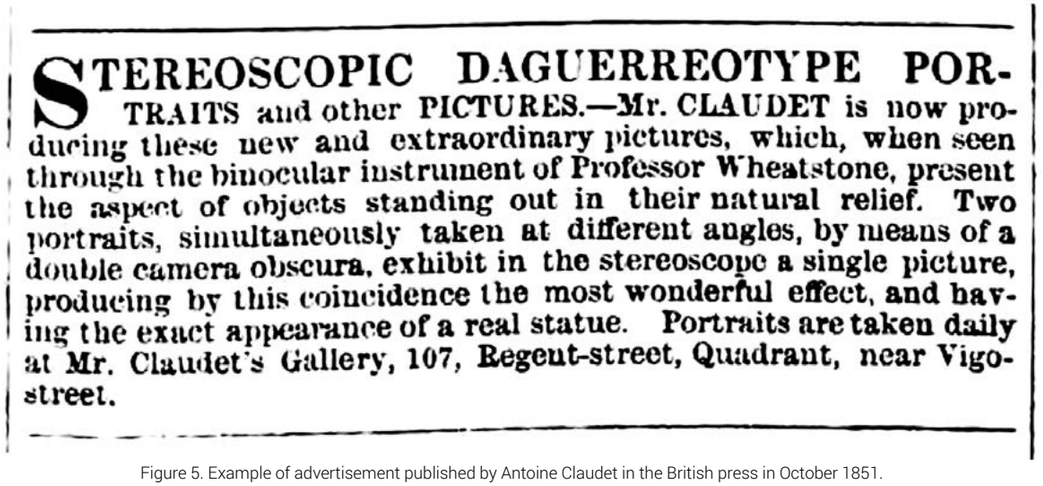


Figure 4. Woodcut from The Illustrated Exhibitor (April 1852) showing Wheatstone's lenticular stereoscope.



STEREOSCOPIC DAGUERREOTYPE PORTRAITS and other PICTURES.—Mr. CLAUDET is now producing these new and extraordinary pictures, which, when seen through the binocular instrument of Professor Wheatstone, present the aspect of objects standing out in their natural relief. Two portraits, simultaneously taken at different angles, by means of a double camera obscura, exhibit in the stereoscope a single picture, producing by this coincidence the most wonderful effect, and having the exact appearance of a real statue. Portraits are taken daily at Mr. Claudet's Gallery, 107, Regent-street, Quadrant, near Vigo-street.

Figure 5. Example of advertisement published by Antoine Claudet in the British press in October 1851.

Wishful thinking? Flight of fancy? Not really! Just over six months after the lines above were printed, an unsigned article appeared in the French Photographic Journal *La Lumière* announcing that both Claudet and Wheatstone had been working on applying motion to the stereoscope :

> M. Claudet informs us that he has constructed a stereoscope in which one can see a person moving, for example a lady working with a needle and making all the necessary movements, a smoker with his cigar moving in and out of his mouth while exhaling smoke, people who drink and toast one another in the English way, steam engines in motion, etc. M. Wheatstone, on his side, without knowing about the device proposed by M. Claudet, seeks to resolve the same problem, and in a few days the mechanisms proposed by the two physicists will be published. M.Wheatstone and the inventor of the phenakisticope (Plateau) have been struck for several years by the possibility of applying stereoscopic principles to the effects of the phenakisticope, but at present have not been successful.

Unfortunately for us, historians, the promised publications of the two physicists never saw the light of day. However, since patents were taken out and at least one sample of each process survived to the present day we can form a rather clear idea of what the two men had to offer.

As is often the case in Victorian's descriptions of new inventions, there is a part of exaggeration or over-enthusiasm, which can often be misleading. If we take Claudet's attempt at stereoscopic animation, the "making all the necessary movements" part of the description is a bit far fetched as only *two* movements were illustrated: pushing the needle and thread into the fabric and pulling them. The same apparently applied to the other pictures described and definitely so to the one showing "a smoker with his cigar moving in and out of his mouth while exhaling smoke". The smoker is none other than Claudet himself and the surviving image (a daguerreotype) is now in a private collection (Figure 6).

Figure 6. “Moving daguerreotype” showing Claudet smoking a cigar.

We know from an article published in the *Belfast Mercury* that “the stereoscopic views of the moving daguerreotype of Monsieur Claudet attracted great interest” when they were exhibited at a *soirée* of the British Association for the Advancement of Science that was held in Bedford Street, Belfast, on September 4, 1852, a soirée which was attended, among others, by Sir David Brewster.

Claudet took out a patent (No. 711, March 23, 1853) for his “Improvements in stereoscopes” one of which was described as “the producing of pleasing and novel optical illusions by means of a peculiar construction and arrangement of some of the parts, which are made moveable so as to impart to the picture the appearance of moving figures.” The moving part alluded to was

> a slide, adapted to the eye pieces, [which] moves backwards and forwards, and thus opens and closes each eye piece alternately. The pictures are made differently, so that the objects are not similarly placed (but differently viewed) in each, as in the case of ordinary stereoscopic views. One view shows a person with his hat on, for instance; the other the same with his hat off; by the action of the slide it appears that the figure is taking off his hat.

The effect and number of movements could be further increased

> by combining a number of pictures together in the form of a cross, so arranged as to exhibit alternately under each eye from different positions, so that the observer may, in succession, see eight different pictures, all in different attitudes.

> Two crosses are used ; they are mounted on horizontal axles in the body of the stereoscope, and are rotated by a coiled spring, free to act by the movement of the slide.

I must confess that I have not seen any example of this latter improvement and cannot therefore advance an opinion as to whether or not the illusion of movement was convincing. It is however interesting to note that Claudet’s technique was revived some eight years later by two prolific French stereo photographers, Charles Louis Furne and his cousin Henri Alexis Omer Tournier, under the name “Epreuves à Mouvement” (Moving Pictures). Furne and Tournier applied for a patent (No. 46340) on August 14, 1860 for a “stéréoscope animé” (animated stereoscope) which was described as “a stereoscope used like a phenakistiscope” and made use of an obturator that dispensed the observer with closing and opening one eye after the other in rapid succession. Furne and Tournier secured copyright for 35 different moving pictures on March 22, 1861, two samples of which can be seen in figures 7 and 8. They advertised 36 in their 1861 Catalogue (Figure 9), specifying that new photos were constantly being added. I think that might have been an overstatement. These photos are not very common and cannot have been very popular, being at the border between stereoscopy and animation. If you look at them through a stereoscope with both eyes open they are stereoscopic on the parts of the subject which haven’t moved; if you watch them by successively closing one eye then the other in rapid succession, or using some sort of obturator, persistence of vision creates the illusion of movement but the stereoscopic effect is lost.

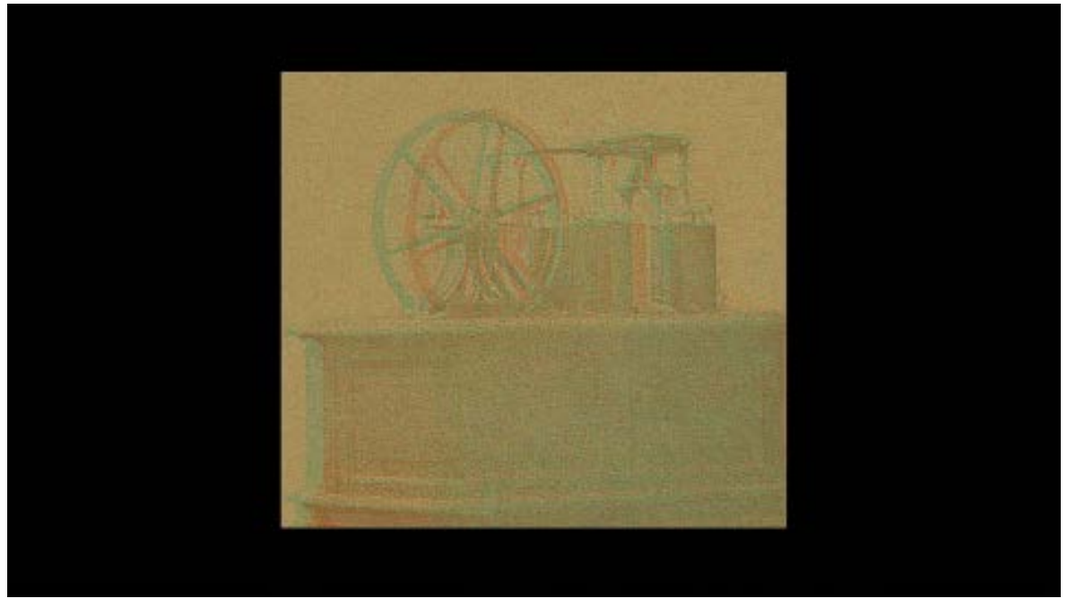
Figure 7. Furne and Tournier. “Epreuve à Mouvement”. No. 24.
Man sawing and other man whittling down the end of a stake to a sharp point with an axe.

Figure 8. Furne and Tournier. “Epreuve à Mouvement”. No. 26. Woman churning milk into butter.

If Wheatstone never published a description of the system he had come up with, someone did. And that someone was none other than French optician Jules Duboscq who, on November 12, 1852, filed a third addition to his February 16 patent No. 13069. In it he described his “stereo-fantascope” or “bioscope”, a combination of Plateau’s phenakistiscope (to provide the movement) and of a stereoscope (for the 3-D effect). The idea had actually been suggested as early as 1849 by Wheatstone to Joseph Plateau himself who, in turn, had relayed it to Duboscq. The French optician did build a few bioscopes – which are unfortunately only known through a drawing from an advertisement – and at least one disc has escaped destruction. It features twelve above-and-under stereoscopic pairs of a steam engine and is now housed in the Plateau collection at the University of Ghent, Belgium (Figure 10). With a little help from Photoshop and a high res scan kindly sent by the Belgian university I managed to recreate the “movie”. It will certainly never win an Oscar, a Golden Globe, or a BAFTA award, and it is more a “loop” than what we would now call a movie but it shows a machine in motion captured by a camera and can therefore be considered the first moving picture ever. And it is definitely in 3-D !

There are, alas, no real description of any other bioscope discs made by Duboscq (if any), but the stereo-fantascope was alluded to in an article published in the *Bulletin de la Société Française de Photographie* in 1857 where “machines in motion and full sets of operations executed in a continuous way” are mentioned, and once more, in 1865, in a piece entitled “Moving Photographic Figures”, which appeared in the *Photographic Journal* under the signature of Antoine Claudet:

> He [Jules Duboscq] had fixed two series of binocular photographs on two zones of the revolving disc of the phenakistiscope one above the other, and by means of two small mirrors, placed each respectively at the inclination capable of reflecting the two zones, on the same horizontal line, from whence the images could each separately meet the axes of each of the two prismatic lenses of the stereoscope, each eye, during the revolution of the disc, had separately the perception of one of the series of photographs, each showing the perspective of one eye, and the stereoscopic effect of figures in motion was consequent.

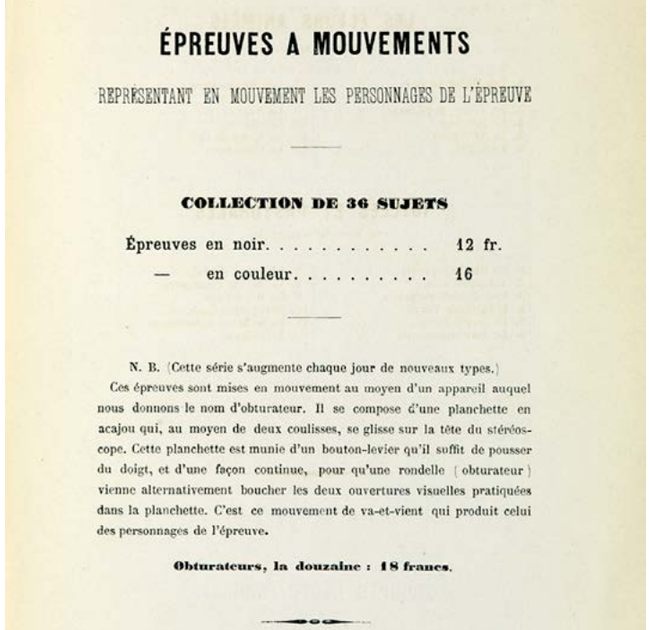


Bioscope anaglyph video by Denis Pellerin

In the same article Claudet described another system imagined by Duboscq, using this time a vertical cylinder not unlike the zoetrope. Despite the imperfections inherent to both methods, namely distortion caused either by a difference of velocity or the cuvature of the vertical cylinfer, Claudet concluded his paragraph with the following congratulary words:

> Mr. Duboscq’s contrivances are very ingenious, and in his attempt he has succeeded at all events in proving the possibility of solving the problem.

It is beyond the scope of this article to describe every other attempt made to animate stereo pictures but I think it is important to mention that, despite the lack of success of Duboscq’s bioscope, which was partly his brainchild, Charles Wheatstone kept working on the idea of developing an instrument capa-



ÉPREUVES A MOUVEMENTS

REPRÉSENTANT EN MOUVEMENT LES PERSONNAGES DE L’ÉPREUVE

COLLECTION DE 36 SUJETS

Épreuves en noir. . . . . 12 fr.
— en couleur. 16

N. B. (Cette série s’augmente chaque jour de nouveaux types.)
Ces épreuves sont mises en mouvement au moyen d’un appareil auquel nous donnons le nom d’obturateur. Il se compose d’une planchette en acajou qui, au moyen de deux coulisses, se glisse sur la tête du stéréoscope. Cette planchette est munie d’un bouton-levier qu’il suffit de pousser du doigt, et d’une façon continue, pour qu’une rondelle (obturateur) vienne alternativement boucher les deux ouvertures visuelles pratiquées dans la planchette. C’est ce mouvement de va-et-vient qui produit celui des personnages de l’épreuve.

Obturateurs, la douzaine : 18 francs.

Figure 9. Furne and Tournier. “Epreuves à Mouvement” from their 1861 catalogue.

Figure 10. Half of Duboscq's only surviving bioscope disc. University of Ghent, Belgium.

ble of combining depth and movement. Around 1870 he designed, but did not patent, a sort of drum stereoscope consisting of a binocular eyepiece on top of a round wooden chamber (Figure 11) inside which an endless band of 14 picture was fastened on the outside of a toothed wheel. Without any shutter the motion effect could never have been smooth but the whole thing was further spoiled by the fact that out of the three existing strips in existence the two I have examined show that the fourteen stereo pairs were not arranged in any logical order. Using the same technique I applied to the bioscope disc, I was unable to obtain any movement other than a very jerky one. The two strips I examined and photographed show a soldier presenting arms on the one hand (Figure 12) and the same soldier (the very first actor to appear in a moving picture?) doing a bayonet drill on the other. There is no telling who is to blame of the photographer or of the model but in both cases the movements were almost completely random and did not show any of the continuity necessary for a smooth animation. The third strip shows a steam engine similar to the one photographed for Duboscq's disc (Figure 13) but in the absence of the curator during my visit to Bradford, where the Wheatstone Drum Stereoscope now resides, I could not study it as it was the strip that was fastened round the inside wheel of the instrument. If this strip is in any way like the other ones I would not be surprised Wheatstone – through no fault of his – got disappointed in the result and dropped the whole project as a total waste of his precious time.

The first projection of a 3-D movie (*The Power of Love*) officially took place at the Ambassador Hotel Theater, Los Angeles, in 1922, but we should not forget that as far back as 1852 (that is some forty-three years before the first public projection of a film by the Lumière brothers and thirty-five years prior to Louis Le Prince's two-second long Roundhay Garden scene) French optician Louis Jules Duboscq had, with some help from British scientist Charles Wheatstone and Belgian physicist Joseph Plateau, put together a photographic loop that combined depth and smooth movement. It can be considered not only as the very first successful 3-D movie but also as the very first non-animated movie. There was really nothing impossible for the Victorians!

Figure 11. Wheatstone's "drum stereoscope", c. 1870.

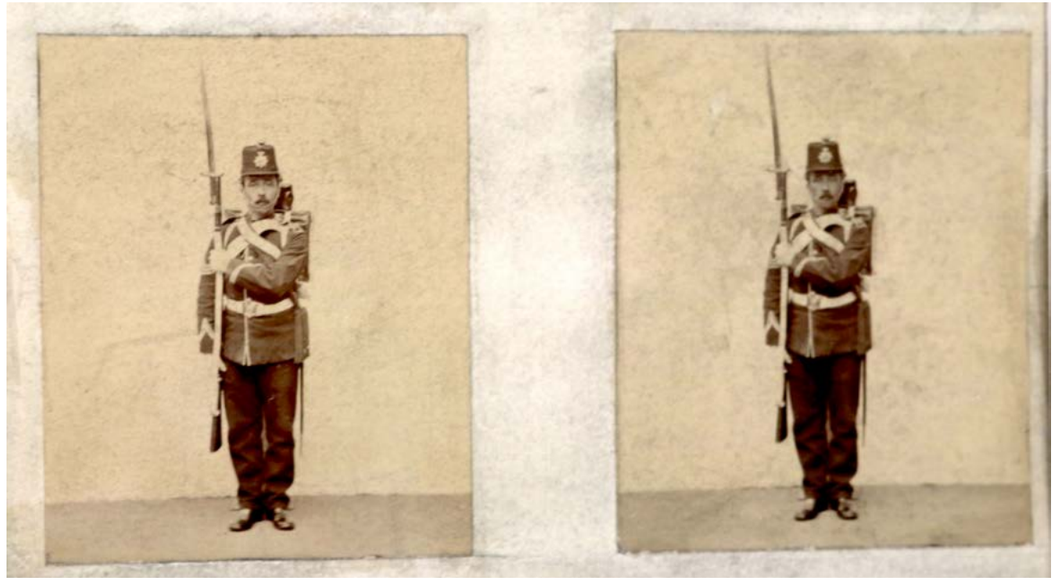


Figure 12. Stereo pair from one of the "drum stereocope" strips showing a soldier presenting arms.

Figure 13. One of the stereo pairs from the strip inside the “drum stereocope” showing a steam engine in motion.