THE PUBLIC EXHIBITION OF MOVING PICTURES BEFORE 1896

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Part 1: Choosing a different perspective

This article is an attempt to refresh our ideas of how moving pictures were invented and first seen. It is also an attempt to find one new way — of many possible ways — of discussing the earliest moving pictures, and in so doing to think again about which inventors or pioneers were significant in developing moving image culture.

A fresh look at the period of invention before 1896, particularly one that is frank and open about its assumptions and methodology, and one that incorporates recent scholarship from all of Europe as well as America, can help to illuminate the work of some figures who have been poorly served – or even wholly ignored – in the received version of the history of the invention of moving pictures. As an appendix to the main text, but as a crucial element of this recast narrative, a chronology noting specific moving picture exhibitions forms Part 3 of this essay.

Why is an article about the earliest public exhibition of moving pictures necessary? What new shapes does it bring to the story of the invention of the cinema as it is usually written? This story is usually conceived as a narrative about technology; indeed, the very use of the word “invention” popularly implies some ingenious arrangement of mechanical elements to produce a wholly new effect or process. In the received history of cinema invention, “patents of invention” issued by various countries have been the most prominent source of information. The first technical historians who wrote seriously about the invention of moving pictures were both civil servants in patent offices,[1] and their work privileged innovative mechanisms that had been accepted as patents. Within their engineering perspective, they were all-inclusive, turning the invention of moving picture apparatus into a set of mechanical Goldberg variations. They excluded from consideration any actual moving picture exhibition, any consideration of the films themselves, any private demonstrations or cultural practices, and any reduction to practise of the ideas put forth in the patents,

beyond the sometimes required patent model; they were concerned principally with mechanical devices and their abstract principles.[2] This early work turned the invention of moving pictures into a feat of engineering. From the beginning, the history of the invention of moving pictures had little to do with actually showing something in movement to an audience.

On this narrow foundation later historians began in the 1920s to construct an elaborate narrative of invention that sought consciously and manipulatively to take ownership of the invention story for a variety of purposes, including satisfying patriotic feelings, giving the new art a cultural pedigree, supporting a favourite pioneer, or privileging the activities of still-living figures.[3] Even though recent scholarship has started to correct some of the worst errors of the past, as well as to re-evaluate some previously ephemeral figures and to surprise us with work on entirely new pioneers who turn out to be important figures, very little of this scholarship has as yet been integrated into the master narrative of the invention of moving pictures. Somehow the sheer weight and complexity of our received history, with its Greek- or Latin- based nomenclature, its hidden assumptions and complex cultural politics, compounded by its often ill-expressed and shifting definition of just what constitutes a “moving picture”, seems to be immovable and mute, a huge edifice constructed by specialists and for specialists. Now that there is some very good new scholarship on several early moving picture exhibitors including Ludwig Döbler[4], Eadweard Muybridge[5], Georges Demenÿ[6], Thomas Edison[7] and Ottomar Anschütz[8] to do battle with the interpretations in the old-fashioned received history, it seems to be a good time to suggest some new ways of looking at the master narrative of the invention of moving pictures. A review of the earliest exhibitions of moving pictures is one of these possible new perspectives.

Defining public exhibition

John Staudemeier has suggested that “A design concept cannot be considered a true invention unless its significance has been recognized by the inventor and, more important, has been successfully communicated to an appropriate audience.”[9] He then suggests further that “If a potential inventor must demonstrate the value of a

new idea to an audience for recognition and validation, it follows that cultural congruence – or dissonance – is part of the story of the new invention."[10] Since the ordinary story of the invention of cinema has concentrated so narrowly on technology, this article is a first attempt to include the idea of communicating to an appropriate audience by concentrating only on one element of the many factors involved in developing an emerging technology: the public exhibition of moving pictures before 1896.[11] For the purposes of this article, "public" is defined as "exhibited before persons other than the inventor/s or the employees and family members of the inventor/s." In other words, public exhibition takes place outside the laboratory and outside the closed world of technicians and family. There are two principal types of "public" exhibition considered here. The first type of exhibition is that given to professional groups or meetings, where the audience is limited to either members or associated colleagues of some kind. In a few rare cases, such a group was comprised of both family and non-family guests, the important element here being the invited guests, the outsiders. This type of public exhibition has most often been called a "demonstration" of moving pictures in the literature, and it is frequently given to a group that has privately assembled for a specific purpose and does not pay an admission fee specifically to see the moving picture exhibition.

The second type of exhibition is that given to the general public at large, in other words, to groups assembled without any restrictions of association. This type of exhibition often takes place in an entertainment or social context, with or without a specific admission fee or viewing charge. The present article also uses a clear and simple definition of "moving picture". It includes all attempts to reproduce natural and continuous movement, principally through stroboscopic means, whether drawn or photographic. A corollary to the definition used in this article is that it also specifically includes "moving pictures" that were projected, or seen on a screen at a distance across space away from the reproducing apparatus, as well as those that were not projected but were seen either by one person at a time or by small groups of people who looked towards or into the originating apparatus itself.[12] A strip of photographic celluloid moving picture film (c. 1895 until today) is, of course, in its physical existence nothing more than a number of separate sequential images that rely on

stroboscopic effects for the smooth perception of movement by the viewer. The reason for taking up this particular definition, which might seem surprising in the context of how the story of “the cinema” has usually been written, is because a more limited definition that requires photographic images to be taken on bands of celluloid “film” presents a number of insurmountable difficulties, and arbitrarily excludes from discussion several significant figures who made clear contributions to the emergence of moving pictures, like Eadweard Muybridge and Ottomar Anschütz, amongst others. Once photographic images taken in series on individual plates, like those of Muybridge, Anschütz and Ernst Kohlrausch are included in the story, a very close relationship between stroboscopically represented photographed series and stroboscopically represented drawn series becomes apparent, and a second set of Scholastic dilemmas appears. As more and more angels appear to dance on the heads of pins, the broader and more inclusive definition used here, in the end, turns out to avoid building hidden political assumptions into the definition. It also turns out that there are few enough figures who qualify as exhibitors of stroboscopic continuous movement so that a definition which at first seems to be “all-inclusive” and unmanageable in fact reveals itself to be plain, simple, and direct. The attempt in this article is to highlight those figures who actually exhibited moving pictures in public, or as an essential part of their experimentation, and distinguish them from those many more numerous pioneers who were “at work” in private attempting to invent moving pictures but who never exhibited them in public in any way. Some of these latter figures made significant direct or indirect contributions to the cinema invention story, like the non-exhibiting Etienne-Jules Marey, for one example, while others have somehow inveigled their way into the story without leaving much of real substance behind. The received version of the overall grand narrative of the invention of the cinema is an elaborate structure that contains an intensely politicized theology of early cinema, including work that variously succeeded, failed, was partially successful, contributed an element of a later successful apparatus, or just documented dreams and hopes later fulfilled by others and therefore somehow prefigured the invention of the medium.

With the rise of interest in reception studies over the past twenty years or more,

choosing to shift the fulcrum of the master account of the invention of moving images from abstract mechanical or perceptual principles to actual occurrences of the use and communication of images in public makes a certain amount of sense. Indeed, a shift in emphasis is necessary if the history of the origins and invention of the cinema and its allied arts is to remain connected to contemporary media studies. Without conceptual reform, study of the invention of moving pictures risks – is fated, even – to forever chase its own tail of technological determinism and nationalistic fervour while remaining unable to escape the initial, incomplete, narratives compiled in the first decades of the 20th century.

Even for those like myself who think that they know the story of the invention of moving pictures reasonably well, the results of this exercise can be surprising. And it is clearly acknowledged that looking at the master narrative in this way does not tell the whole story. But I think that it does raise new questions about how the received story of moving picture invention has typically been structured, and it clears away a lot of the interstitial information which is packed inside an unreconstructed received history in ways that only add to the theological complexity of the story, instead of doing what it should: that is, increasing genuine knowledge about the earliest days of modern moving pictures. It is useful to know of the existence of these interstitial tidbits, for example that Georges Demenÿ evidently drew a sketch of a "Grande Projecteur" which he then may have shown to Louis Lumière during a visit to his studio in December 1894,[13] but when dropped into an unreconstructed received history, and used as glue to solidify a structure already constructed weakly through the use of unrevealed assumptions, the interpretation of these tidbits is all too often wildly distorted. What is interesting about the Demenÿ event is that it represents a direct contact between two key figures, a type of contact which although it is not often included in standard histories was in fact not at all uncommon between any number of the significant pioneers of the cinema in the mid-1890s.[14] What the event does not represent, even though it is sometimes implied by weak scholars that it does so, is a direct transfer of the inspiration for the Lumière Cinématographe from Demenÿ to Lumière, a kind of replacement of the dream about a sewing-machine by a hasty sketch, and – *Voila!* – the true, essential inventor of the cinema is revealed

as Marey's long-time assistant, with evidence lovingly and carefully preserved for a century by his family. This event is only one of many examples which could be produced of minor events or designs – the Maltese Cross intermittent movement is another good example here – that can be, and sometimes have been, fitted in between chunks of the received story of cinema invention so that they carry more significance than they should. This is only possible because the major chunks of the received story are so incomplete, so separated by unresearched elements, so awkwardly placed in the narrative, that it is possible for small, innocent islands between them to take on a disproportionate meaning. With a properly organised grand narrative, shaken loose from hidden assumptions, there would be no need, indeed, no place, for such mannerist elements. This article is an attempt to reassert the value of one element of the earliest days of cinema, an element that would seem to be essential but which has so far received too little attention: the public exhibition of moving pictures in the period before and during the invention of the cinema.

Magic lantern culture as an essential context

One caution is necessary. The background and the broad context to the specific topics taken up in this article, to the inventors, devices, and practises dealt with in some detail, is in the first instance the attempt to portray movement in magic lantern projections from 1659 onwards, followed by a variety of experiments with optical phenomena conducted by scientists early in the 19th century that led to the stroboscopic reproduction of movement and the development of "philosophical toys" to represent it. The first movements portrayed in the magic lantern used the limited motions or image transformations of mechanical lantern slides, whether manipulated by a lever, rack-and-pinion gears, a belt drive, or simply by slipping one painted glass across a second one. The history of these attempts to project movement begins at least in 1659, when Christiaan Huygens made a series of drawings of a skeleton in various poses that he intended to be projected in a magic lantern. There are both clear descriptions of mechanical moving slides in the 17th century as well as several descriptions of early lantern shows that suggest the use of mechanically transformed images.[15] By the end of the 18th century, the projecting lantern itself began to move in the phantasmagoria show that originated in Germany and was

established as a popular public exhibition by Etienne-Gaspard Robertson in Paris. Now a projected image — sometimes additionally using mechanical slides — could be enlarged or diminished by the movement of the lantern itself. Phantasmagoria shows brought dynamic new images to large public audiences, and quickly became a worldwide entertainment.[16] Early in the 19th century the dissolving view exhibitions that evolved from phantasmagoria practise became a staple of public lantern shows, eventually combining sequenced slides carefully painted to transform day into night, or winter into summer, or buds into flowers, and sometimes involving additional mechanically moved detail slides so that complex visual or narrative effects of motion or transformation could be achieved. Even today an audience will commonly gasp with delight at the “extra” and unexpected movement in a dissolving slide set; for one example in the widely popular set produced with a triunial lantern, *The Old Mill*, after watching the seasons change, the mill wheel again begin to turn, the pedestrians wandering along the side of the mill pond, and the family of swans paddling across the water, a sharp audience reaction is normally produced when the swans, swimming peacefully in formation across the mill pond suddenly dip their heads underwater to feed on their way across the water. Lantern exhibitions using five or more lanterns, a technological array which implies vigorous dissolves and intricately detailed movements, are known to have been given at the Royal Polytechnic Institution in London, by the Langenheim brothers in Philadelphia, by the Skladanowsky family, and by others in Berlin and elsewhere, but these shows remain largely unresearched. Some concentrated work on these specialist exhibitions, from the perspective of the nature and types of movements deployed, would bring to life a useful and most interesting background for the introduction of cinematic moving pictures, a kind of “missing link” without knowledge of which our understanding of the motivations and aspirations of early cinema pioneers is seriously depleted.

Although magic lantern culture is an extremely significant and still under-recognized predecessor of and parallel to the emergence of moving pictures and the cinema at the turn of the 20th century, it would be impossible here to trace even the smallest percentage of the lantern shows using these means of mechanical movement over a

period of more than two hundred years. For a particularly pertinent example, one element of moving magic lantern images that is often noted in the pre-cinema literature is the device called the Choreutoscope, invented by Lionel S. Beale in 1866, where drawn sequenced images on a notched circular disk with a revolving shutter were intermittently brought into a lantern's optical axis by turning a small crank with a pin that engaged the notches. A refinement, the Giant Choreutoscope, was patented by William Charles Hughes in 1884. These devices, with variants marketed by Alfred Molteni in Paris, J. H. Steward in London, and others, did use stroboscopic principles to approach natural movement, but they formed only a single element in magic lantern shows whose principle focus remained the exhibition of themed slide sets, dissolving views, chromatropes, and other visual components of the lantern showman's standard repertoire. To the best of my knowledge, no single lantern exhibition was organised and promoted to the public solely around the Choreutoscope, although a popular image like Beale's figure of the "dancing Chancellor" Sir Christopher Haddon was exhibited 177 times at the Royal Polytechnic Institution in London by January 1873.[17] The Choreutoscope, perhaps the most widespread of a number of inventive lantern accessories involving movement and image transformation, is a recognisable technological attempt at the projection of stroboscopic images but its few seconds of repetitive deployment in an evening's entertainment left it wholly embedded within magic lantern culture in a way that should not be (and, empirically, can not be) elevated to a decisive prominence in affecting the course of the public exhibition of moving pictures. Nonetheless, even if not discussed here in detail, it is the use of moving images across magic lantern culture, as well as the technical skills of lantern operators and slide designers, which form the essential background and context for the work examined in this article.

A few broad trends

The brief sketches that follow outline the work of those moving picture pioneers who were active in presenting public exhibitions before 1896, exhibitions that distinctively and specially involved the presentation of images in motion. All were consciously attempting to separate their exhibitions from ordinary magic lantern or phantasmagoria shows, and all sought to demonstrate a new and revolutionary

dimension of projected imagery. Since many of these pioneers are well known, readers can refer to the bibliographic notes for their wider careers; these brief paragraphs will discuss only the special context of their moving picture work. The idea of using projected images to extend beyond normative magic lantern culture and provide new visual thrills was one that was described frequently during the 19th century; these were the few pioneers who implemented what often seemed to be only impractical dreams.

A few broad trends are evident from the list of pre-1896 moving picture exhibitions. Across the entire period, there is no overlap between moving picture exhibitors; or, in other words, known exhibitions took place in a linear and sequential way so that no moving picture exhibitor had direct competition from any other. Setting aside a bit of egoism evidenced in Berlin in 1891, the only real overlap is between the lectures of Eadweard Muybridge and the Schnellseher of Ottomar Anschütz; by the time Anschütz came to commercialise his moving picture system in 1892-3, Muybridge had been relegated to a largely provincial lecture circuit, so there is only the most minimal and indirect competition over commerce or showmanship between them.[18] Virtually all of the Anschütz exhibitions had ended by the time the first Kinetoscope exhibitions began.

At the beginning of the period under examination stands the towering figure of Ludwig Döbler, one of the most famous and successful European showmen of the early 19th century. Welcomed by Royal families from London to Vienna to Petersburg and with a mass following amongst the middle classes across the Continent, Döbler uniquely combined the talents of a master showman and magician with the technical skills of an entertaining science lecturer and innovator. Although he drew large audiences to his moving picture exhibitions when they began in early 1847, he had been drawing packed houses to his shows for decades and it was not the idea of movement itself that was the main attraction: Döbler's well-known personality and consummate stage skill was the overarching draw for these performances late in his career. Döbler's Phantaskop was only that year's new trick, the innovation that brought the well-known magician back to some of his favourite theatres. Although it

would have had to have been operated skillfully and with panache to fit within the high standard of Döbler's shows, moving pictures were not in and of themselves a bold enough attraction to find their own existence outside Döbler's presentations. The fact that moving pictures did not "catch on" after Döbler's introductory exhibitions is suggestive; to use the vocabulary of particle physics, perhaps it is a result of visual movement being a kind of "weak force" which was not noticeable enough on its own to create momentum or lasting excitement amongst the mid-century public. In this context, it is important to notice that the most popular visual entertainments up to about 1860 all involved massive constructions of buildings or the elaborate outfitting of special premises: the phantasmagoria show, the panorama, the Diorama. Only with the rapid spread of stereoscopic imagery in the home (c. post-1860), of popular amateur photography (c. post-1870 and again after 1888), and of photographically illustrated mass produced magazines (c. 1875) did visual materials achieve an individual scale that could generate excitement without professionalised skills or grandiose buildings to reinforce their public perception.[19] Fundamentally, Döbler's exhibitions were self-contained within his reputation as a magician and a showman, and represented for him the same attitude that the Skladanowsky brothers brought to their Bioskop shows of 1895-6, which for them were that season's innovative stage trick, and could not be repeated the following season. The construction of their moving picture system, and their attitude towards performing with it during the 1895-96 season both underscore this similarity.

Three decades after Döbler, the exhibitions of Eadweard Muybridge had not moved all that far from mid-century practise. Setting aside for the moment the inexplicably flawed technology that prevented Muybridge from projecting his own photographs, he still fulfills the traditional role of the educational showman/lecturer, a category of populariser then familiar to the public for more than a century. Muybridge's energy, striking appearance and lurid biography meant that even his flawed stage trick gave him an entree to the well-established late 19th century lecture circuit. He began his lecture career at the top: invitations from leading intellectual societies, shows arranged by prominent artists and scientists. But Muybridge gave more or less the same lecture for two decades, with the same apparatus, and over time he moved

from large cities to small ones, from prominent to provincial societies. Notwithstanding his famous visit with Thomas Edison in 1887, Muybridge seems to have made no efforts to commercialise his moving pictures. When he was busy making new series photographs at Philadelphia, there were few lectures, and therefore no moving picture projections. Essentially, Muybridge did not exist as a public figure without the Zoopraxiscope, and his projected moving pictures were never seen without his tall, strikingly bearded figure at the lectern. He was wholly subsumed into the public lecture culture of his time. In the end, he was perfectly comfortable playing the role of Eadweard Muybridge: western photographer, correcter of art history, locomotion researcher, and public figure.

Only with the work of first Ottomar Anschütz and then Thomas Edison did the idea of moving pictures itself take centre stage. Neither of these very different men were lecturers or showmen; both attempted to set moving picture systems freely into the commerce of the world around them. Both the Schnellseher and the Kinetoscope were moving picture devices that had an existence apart from the ongoing professional concerns of their creators, and both devices began the process of creating a new space devoted to reproduced moving photographic images for leisure and information.[20] These two moving picture pioneers could not have had more diametrically opposed personalities. Edison was one of the great public figures of the late 19th century, a man whose personal fame equalled or surpassed his groundbreaking successes with imaginative and powerful technologies. Anschütz became a prominent society photographer but remained an essentially private figure whose life is still today a mystery. Edison had a famously robust involvement with popular journalism, where his gift for concise, easily understood explanations of arcane scientific works was legendary. Anschütz, when he spoke at all, did so only through meetings of the photographic societies; no journalistic interviews with him are known. Moving pictures were a minor, if appealing, tangent in the daily work of the Edison “invention factory” in New Jersey; for Anschütz they consumed a vast proportion of his energy and capital in the early 1890s, a passionate obsession which came to an end only when it seemed that moving picture work might make him bankrupt and seriously endanger his entire photographic enterprise and his social

standing in Berlin. Yet as different as they are, it is unquestionable that it was these two inventors alone who tried to establish photographic moving pictures as an infinitely reproducable independent technology (and medium) whose commercial success (or failure) would be distinct from their personal involvement as magician, lecturer, or entertainer, and which would simultaneously create new entertainment spaces apart from existing circuits and venues. In this vast, epic, unimaginably courageous and idealistic venture, both were ultimately failures, with Edison making a little money along the way and Anschütz making a huge debt. Nonetheless, it was on their shoulders that the next generation of moving picture inventors and pioneers stood, from Thomas Armat and C. Francis Jenkins to Birt Acres to the Lumière brothers, as they began to establish the cinematographic apparatus and practices which would ultimately succeed and would come to permeate the twentieth century.

Part 2: Notes on exhibitors of moving pictures before 1896

Leopold Ludwig Döbler (1801 - 1864)[21]
When Leopold Ludwig Döbler began to give moving picture shows late in his performing career, he was already a renowned magician and showman throughout Europe. Educated in his father's profession as an engraver but fascinated by magic and performance from an early age, Döbler toured constantly across Europe from the late 1820s, not only appearing before virtually all of the royal houses, including those of Russia, Sweden, Austria, Belgium, Spain and England, where he entertained for Queen Victoria at both Windsor and Buckingham palaces, but also booking long engagements in leading theatres. He entertained Goethe in Weimar, and at home in Vienna aroused the jealousy of the dramatist Franz Grillparzer for his close and cordial relationships with the Habsburg court. Döbler was always watching for a new technological or semi-scientific trick with which to headline his consummately skilled exhibitions, and he is widely considered the first performer to introduce dissolving view exhibitions to continental Europe, in 1843. He also pioneered the use of limelight projections in his shows, and was the first on the Continent to present "beautiful microscopic projections,"[22] with an oxy-hydrogen microscope.
It was Döbler's habit to introduce his new presentation each year at the Josephstadt Theatre in Vienna, and towards the end of his career in January 1847, he began

giving shows of “living pictures” by means of a projecting phenakistiscope that he had just patented.[23] Döbler’s Phantaskop was most likely inspired by the suggestion of T. W. Naylor that the phenakistiscope and magic lantern could be combined, and by the first apparatus of his acquaintance Franz Uchatius (see below). Döbler’s apparatus had twelve lenses at its front, each provided with its own phased image from a full set that comprised a simple motion. An additional internal pair of lenses was rotated by a crank, and directed powerful limelight illumination at each of the front lenses in succession. With this new instrument developed in his home laboratory outside Vienna at Klafterbrunn and with lenses made by the Vienna optician Wenzel Prokesch, Döbler gave his first public performance of stroboscopic moving pictures at the Josephstadt Theatre on 16 January 1847. The moving pictures were the second of three parts of Döbler’s performance, which opened with a series of dissolving views and ended with a display of chromatropes; the music used throughout the performance was specially written by the court composer Anton Emil Titl. Döbler projected eight sequences of movement using sequenced pictures painted by Hr. Geyling: “1. The Turkish Conjuror. 2. The Ring Jumper. 3. Small Parade. 4. The Woodcutter. 5. The Chinese Conjuror. 6. The Strutting Dancer. 7. The Tightrope Walker. 8. The Duellists.”[24] Döbler then took his new show on the road, travelling until Spring 1848 to Brünn, Prague, Hamburg, Breslau, Pest, Munich, and several other towns, returning intermittently to Vienna.[25] It is difficult to be certain which of these additional performances included the Phantaskop moving pictures; it would seem that the apparatus was sometimes inoperative and at other times in use. Given Döbler’s fame and skill, the reported sold-out venues and the extended runs in several cities are not in themselves enough evidence to support the conclusion that the Phantaskop was always in use.[26] At the end of 1849 Döbler retired from performing in public, sold all his apparatus in 1850, and became the mayor of the small town of Eschenau outside Vienna, where he spent his last decade producing impressive engravings and giving memorable parties.

Franz Freiherr von Uchatius (1811 - 1881)[27]
A career army officer and outstanding metallurgist, Uchatius began outfitting the new Vienna Arsenal in 1849 and travelled widely across Europe studying methods of artillery manufacture. He invented a significantly improved method for making hard steel which was just on the verge of mass manufacture in Britain and elsewhere when it was unexpectedly overtaken by Bessemer’s process. Uchatius was also an enthusiast of photography, and produced two different designs of projecting phenakistiscope in 1843 and 1853, both constructed by the Vienna optician Wenzel Prokesch. The first model used an oil lamp and gave weak and unsatisfactory results

with pictures only a maximum of six inches in diameter;[28] the second model was illuminated by limelight and was demonstrated for the Vienna Academy of Science, where Uchatius suggested building an apparatus with 100 pictures and 100 lenses which would allow a "moving tableau" of about 30 seconds to be shown.[29] It is often mis-stated in the literature that Döbler bought a Uchatius apparatus and toured with it, but this is not the case.[30] Not a showman, over the succeeding years Uchatius from time to time gave performances of his projection apparatus to his guests at home; we have the date of one such exhibition for a half-dozen or more persons (amongst them probably Döbler and his wife) in a surviving watercolour by the artist Georg Dill, which shows the projecting phenakistiscope on a table scattered with picture disks, projecting onto a pinned-up temporary screen on a nearby wall.

Henry Renno Heyl (1842 - ??)[31]
An engineer born in Columbus, Ohio who worked from 1863 in Philadelphia, Pennsylvania, Heyl developed a new method of binding books with wire instead of thread in 1870 that ultimately revolutionized bookbinding, and in 1877 invented and patented the first practical office stapler that inserted and clinched a wire staple in paper.[32] But he is best remembered for presenting in 1870 two public exhibitions of moving pictures with his Phasmatrope, a device using 16 photographs arranged around the edge of a revolving disk moved intermittently by a spur gear. There were three disks and three subjects: a couple dancing a waltz, a Japanese acrobat making a precipitous leap, and a brief speech by "Brother Jonathan," as the iconic US mascot figure of Uncle Sam was then known. The images of the dancing couple were posed in four positions, which were then printed four times each to make up the sixteen images for a disk. Heyl's moving pictures were exhibited twice: for an audience of 1500 persons at the Philadelphia Academy of Music during a church entertainment evening on 5 February, and for the Franklin Institute on 16 March. At the Academy of Music there were three showings of the Phasmatrope, each one using a different disk. The "Uncle Sam" disk was accompanied by a lecturer declaiming the represented speech, and the dancers (Heyl was the man) were synchronised with the evening's 40-piece orchestra playing a waltz.

Heyl clearly had both photographic and mechanical skills, and it would be most interesting to know more about him. He went to some trouble to design, build, register and exhibit the Phasmatrope, and he thought enough of it to keep it, so that the apparatus and one disk survive today. Was it really only used in public twice? Was this really the only optical or lantern innovation to which he turned his attention? What motivated the production (and the preservation) of the Phasmatrope? There is

a good research project here, but all that can be said at the moment is that Heyl's work remains an inexplicable intervention in the story of moving pictures.

Eadweard Muybridge (1830 - 1904)[33]
By 1870 a landscape photographer of growing reputation in the American west, the energetic former bookbinder and bookseller Eadweard Muybridge was a natural choice for Leland Stanford when he sought to apply photographic methods to improving the training regime of his racehorses. The results of their collaboration, begun in 1872 and ended in 1882, were historic. Sequenced photographs of Stanford's horses in various gaits revealed previously unknown aspects of locomotion while Muybridge's photographic technology became the basis for many new physiological and aesthetic experiments as he influenced figures as diverse as Etienne-Jules Marey and Thomas Eakins. Shortly after the public announcement of his successful photographic series, Muybridge began in 1879 to construct a projecting phenakistiscope that could be used to show moving pictures in his public lectures, at first called the Zoogyroscope and then the Zoopraxiscope.[34] Stephen Herbert is correct to emphasize that one principal motivation for Muybridge was to have a way to synthesize the movements depicted in his individual photographs, which were initially widely mocked by leading artists and intellectuals because they showed awkward and unfamiliar movements of the horses's legs, contradicting the ways in which the horse in motion had been depicted for centuries.[35]
Muybridge's apparatus affixed two counter-rotating disks mounted on the same axle to the front of a modified magic lantern. One disk held images painted in sequences derived from Muybridge's photographs, while the other disk was slotted and acted as a shutter. Oddly, because of a mechanical design where both disks rotated at the same speed although in opposite directions, Muybridge could not use his photographs in the device: the effects of optical compression meant that slightly elongated drawings were the only viable means of producing a natural image on the screen. It remains a mystery why Muybridge never modified his design according to very well known optical principles over the almost two decades while this machine (in two slightly different models, using picture disks of 16 and 12 inches diameter, respectively) was in use; or, indeed, why it was designed in this way in the first place.

Ottomar Anschütz (1846 - 1907)[36]
An ambitious and well-educated photographer from the Prussian town of Lissa in Posen (today Leschnow, Poland), Anschütz spent most of a decade attempting to construct and then implement a system for exhibiting series chronophotographs as moving picture loops with a device he named the Schnellseher ("Quick Viewer"), and

which was sometimes called the “Electrical Tachyscope”. The images were fixed around the circumference of a continuously spinning disk, and intermittently lit from behind by the flash of a Geissler tube. Early models from 1886 to 1890 were seen by 4 - 7 people at a time in a specially darkened room with the apparatus on the other side of a wall. The drum model of 1890 was a long cylinder that no longer required the special room or wall, and had five viewing apertures along its length. From 1891 the leading electrical and engineering firm Siemens & Halske built a free-standing coin-operated automat model in some 152 examples. There were also two “home” models operated by a crank rather than by an electric motor (although still using an electrical circuit for its Geissler tube illumination), and an elaborate projecting model in 1894 with continuous illumination but two large disks moved intermittently. Anschütz prepared about 60 different subjects for the Schnellseher from his established stock of chronophotographs, including series of athletes and horses and riders. He also made a few purely entertainment disks, including *Card Players*, showing three men in open air sitting around a small table playing skat; *Funny Journey*, where a worker transports a boy in a wheelbarrow through the streets; and *Man with Changing Expression*, a facial expression series. All of these entertainment disks, seen from 1890, anticipate later typical film subjects. Perhaps the most interesting of the Anschütz entertainment series is his own *Barber Shop Scene*; the production date of this disk is uncertain, but it seems likely that this was his response to seeing the very similar Kinetoscope subject.[37]

Georges Demenÿ (1850 - 1917)
Before turning cinema pioneer in 1894, at the small studio/laboratory in Levallois-Perret he had established two years earlier and where he made some exquisitely beautiful films, Demenÿ had spent most of his career as the laboratory assistant to Etienne-Jules Marey, where he was often the subject of Marey’s chronophotographs and where he made significant contributions to Marey’s photographic apparatus. It was due to an argument over the commercialisation of this apparatus that Demenÿ left Marey’s establishment in 1894. His first independent device was the Phonoscope, demonstrated in July 1891 and patented in March 1892,[38] which functioned either as a projector or as a peep-show device, and which used series photographs mounted around the circumference of a revolving disk. Intermittency was provided by a counter-rotating shutter and illumination by a magic lantern lamphouse. An example of the Phonoscope and several disks survive at the Musée Henri Langois of the Cinémathéque française.

Given Demenÿ’s prominence in the historical literature, where his Phonoscope is

ubiquitous, it is a surprise that he appears in the chronology here only three times: for two demonstrations in Paris and for a very brief attempt at commercial exhibition in Cologne under the auspices of Ludwig Stollwerck. It is unclear whether Demenÿ actually projected images with the Phonoscope at his first Paris demonstration in July 1891, but in December at the Conservatory of Arts he evidently showed 30 picture disks to an audience of 1200 people. The very small images (about 2,8cm high [1.1 inches]), however, were not really adequate for projection to very large audiences; instead, they were scaled for private homes or small rooms. Apart from Demenÿ's undoubtedly key work with Marey — another non-exhibiting figure prominent in the traditional story of cinema invention — and his own post-1894 experiments, which justify the attention given to him by historians, these three shows are in fact the only known public exhibitions of Demenÿ apparatus before 1896.[39] Demenÿ introduced his Phonoscope as a device to replicate movements that he called "portraits parlants" or "Speaking Portraits" and demonstrated it for scientists as a possible apparatus to help the deaf learn to speak. As the Phonoscope appeared some 17 months after Ottomar Anschütz had publicly demonstrated his "entirely new" chronophotographic series which he called "Sprechende Porträts", or "Speaking Portraits", it seems that there may have been a direct influence on Demenÿ's work on the Phonoscope.[40]

Emile Reynaud (1844 - 1918)[41]
Brought up in a middle-class technically-oriented household, Emile Reynaud was at one point apprenticed to a precision engineer in Paris, worked for the sculptor and photographer Adam Salomon, and was a longstanding assistant to Abbé François Moigno, an impressive advocate of audio-visual education who was known as "The Apostle of Projection". In 1877, while working with Moigno, Reynaud developed an optical toy called the Praxinoscope which used a ring of mirrors around its axle to reflect a revolving band of sequenced drawings placed against the circumference of its outer rim. A year later, he produced an improved model called the Praxinoscope Theatre which combined the reflected movements with printed scenery; a Projecting Praxinoscope followed. These immensely popular amusements were enlarged by Reynaud and transformed into his Théâtre Optique for professional exhibition. Using a small magic lantern to project a background scene and an intense lantern lamp to project moving images reflected from rotating mirrors, Reynaud's Théâtre Optique opened at the Musée Grevin in Paris in October 1892. The device utilised images painted on gelatin squares fastened between flexible leather bands 65mm wide and up to 40-45 metres long. Registration of the image to the face of each mirror was accomplished by sprocket holes reinforced with metal ringlets. As many as 700

images formed each band, which was manipulated by hand forwards and backwards during a show; through 1901, and using some filmed elements after summer 1896, about 12,500 performances primarily given by Renaud himself were seen by a half-million viewers.

Reynaud's Théâtre Optique is a particularly important pre-1896 moving picture technology, but not for the reasons usually noted, which include his "invention" of sprocket holes for the registration of the image band and his ability to produce 12 to 15 minute narratives from each painted story. Rather, the Théâtre Optique is a significant and successful example of a moving picture apparatus using a continuously-running image band and an optical intermittent system. And as a constant public exhibition across nine years beginning in October 1892, apart from a break of nine months taken to refurbish the apparatus and paint new picture bands between 1 March 1894 and 1 January 1895, the Théâtre Optique had an indisputable prominence that could not be avoided by any moving picture inventor. Yet apart from a very few experiments,[42] the idea of an optical intermittent technology using a continuously running film band was an option that was not taken by the majority of cinematographic apparatus after 1896. Why? The potential advantages were many, prominent amongst them the lack of wear and tear on the fragile celluloid image band, which was the most expensive recurring cost for early film exhibitors, plus the elimination of on-screen flicker, an exhibition problem with mechanical intermittent devices that was not solved until 1903.

On a moment's reflection, intermittently starting and stopping the film band itself by mechanical means for each and every image frame was a ludicrous enterprise. Not only was it the single most difficult technological problem facing inventors and pioneer exhibitors, but it also condemned uncountable audiences to watching murky shows using worn, scratched, torn, hastily repaired and bedraggled films with barely visible moving images. Yet even in the glare of Reynaud's successful example, which was followed up by the continuously running film loop in the Edison Kinetoscope, it was a mechanical technology that was adopted as the standard practise for film exhibition, which it remains today. This seems not only counter-intuitive, but indeed an absolutely perverse evolution of moving picture technology. Can there be any reason at all for this retrograde evolution? The answer is Yes, when it is put in the inclusive context of the whole projection apparatus. Briefly, what is necessary for a viable projection device is a clear optical path which runs from an illuminant, then through an image, and then through lenses which produce an

enlarged image on a screen. To make a portable (at the least moveable) projector, given the heat of the illuminant, requires both some skill and some knowledge in devising a proper and efficient optical path. Alternatively, producing an accurate optical path that was itself in motion, like Reynaud's spinning mirrors, was an immensely more complex matter of great precision and great expense. It is not surprising that most inventors concentrated on incorporating the highly efficient, practical and robust optical pathway developed for the magic lantern and then refined in practise over the preceding 240 years. By the end of the 19th century the magic lantern was already a commoditised product, and adding to its existing projection platform a mechanical device that would quickly and intermittently move the "slides", i.e. an image-carrying film band, seemed to be much the cheaper and easier option for making progress with photographic moving pictures. It was the existence of the magic lantern, with its highly experienced and widespread community of users who themselves formed a vast repository of sophisticated projection skills and abilities, that turned the invention of moving pictures into a narrowly-defined conceptual problem: how – and using what materials – to move the "slides" fast enough to achieve the stroboscopic illusion of natural movement.[43]

Thomas Edison (1847 - 1931)[44]

The development of the Kinetoscope viewer and its associated elements, particularly the Kinesigraph camera and the 35mm celluloid bands which became known as "Edison standard" widths, is now well researched and well published.[45] The viewer went through four distinct experimental stages between October 1888 and May/June 1893: 1) a design derived from Edison's own gramophone apparatus, 2) briefly, a design based on the Anschütz Schnellseher, 3) a narrow gauge design using 22mm film perforated on one side only, and 4) the final instrument with 35mm film perforated on both sides. Over the long period of its development it was eagerly anticipated, and there were several press notices of its imminent availability in successive years. Edison's unique business reputation, already prominent through the success of his light bulb, electrical, and telegraph work, and then reinforced by the wonder of the gramophone, meant that there were many eager syndicates and agents ready promptly to support the sale of the Kinetoscope and its films. The apparatus was expensive, though, and the actual number of exhibitors outside large cities – especially as opposed to the number of sales agents and syndicates directly related to Edison – who made substantial profits from the apparatus is difficult to determine. Charles Musser recently noted that the Kinetoscope had a relatively short commercial life and was a profitable enterprise only for about the first 18 months after April 1894.[46] Nonetheless the Kinetoscope received an ecstatic reception in the

press as the latest of “Wizard” Edison’s many inventions.

There are two anomalies about this instrument which are not often emphasized, but which are an interesting contribution to the discussion of early film exhibition. First, Edison (and his team) would seem not to have been in any great hurry to actually conclude their experiments on moving pictures. To be sure, its development was tangential to the main work at the laboratory on electrical batteries and mining apparatus. And neither Edison nor any of his group were oriented towards show business. At the same time, their casual attitude towards its timely completion seems quite odd in the face of both an excited press awaiting the public introduction of the machine and by comparison with other pioneers both before and after the Kinetoscope who went public immediately (too quickly?) with their moving picture machines. It is noteworthy that the five-year period of experiment came to an end in early May, 1893, but Edison did not order the first 25 Kinetoscopes to be built to fill an order of 2 May until June, 1893, and then did not take delivery of these first commercial models until March, 1894 — and this in the face of pressure from the World’s Columbian Exposition in Chicago (amongst many others), which wanted Edison’s latest marvel at the fair. The delays here seem quite lackadaisical and uncharacteristic of Edison’s other inventive work at West Orange.[47]

A second anomaly of the Kinetoscope is the number of attempts that were made to turn it into a projector, or to make it into a multiple-viewer apparatus. This seems to have been quite a substantial motivation communicated to people experiencing the Kinetoscope, except for Thomas Edison himself. In England, Cecil Wray patented an accessory that would allow a kinetoscope picture to be enlarged and projected onto a screen as early as 3 January 1895.[48] In November of the same year, Henri Joly in France patented a kinetoscope-type apparatus that allowed four viewers to see two different films running in 110 meter loops.[49] The Latham family were already Kinetoscope exhibitors, and dissatisfied with the commercial volumes achievable with the machine when they began work on their own projection device, evidently following the advice of their customers (see below). Thomas Armat was another early inventor inspired to make the translation from peep show viewer to projection. And then there was Edison’s principal investigator on the Kinetoscope, W. K. L. Dickson himself: it may well have been the same motivation that led him to work on projection with both the Lathams and the Biograph group, of which he was a founder. He seemingly never worked on projection apparatus at West Orange. What was Edison’s commitment to single-person peep-show viewing? It might have been

sheer ignorance of the entertainment industry. But there seems to have been no serious attempt at building projection apparatus at the Edison laboratory at all; the Vitascope was famously bought in from Armat and C. Francis Jenkins in 1896 – and brought to Edison by the Kinetoscope agents Raff & Gammon. Not at all someone to miss a commercial opportunity, especially with his own patent securely in place, this failure on Edison's part is highly unusual. What lies behind it? Was the whole moving picture project entirely motivated by W. K. L. Dickson, and did Edison simply accede to the interest of a most valued employee? Most writers on the Kinetoscope, even severe critics like Gordon Hendricks, have not sufficiently examined Edison's attitudes towards his invention and what they may mean both for its slow introduction and for its meaning within his inventive accomplishments.

Birt Acres (1852? - 1918)[50]
In early 1895 the middle-aged and middle-class Birt Acres quit a respectable job working as a production manager at the photographic firm of Elliot and Son in Barnet, north London, to devote himself entirely to pursuing his moving picture inventions. A brief and unhappy collaboration with the electrical engineer Robert W. Paul did produce the first celluloid films taken in Great Britain, intended for pirate Kinetoscopes being made by Paul. By June, after an acrimonious end to this partnership, Acres was working with Ludwig Stollwerck in Cologne, for whom he filmed the opening of the Kiel Canal, the first films taken in Germany. The Elektroskop, a small-screen viewer that allowed several patrons to watch a film simultaneously, was developed by Acres for Stollwerck specifically as an automat device that would overcome some of the perceived disadvantages of the Edison Kinetoscope, principally that the Elektroskop could be seen by several people at once. The apparatus exhibited two films consecutively, one running right to left in the machine while the second film rewound on a separate but parallel mechanism; after a mirror shifted the optical path of the rear-projection machine to the alternate film band, this second band ran from the left side of the machine to the right side while the first band rewound. Although the Elektroskop showed films that were considerably longer than the 42-foot loops of the Edison Kinetoscope, and had a larger viewing screen, it seems not to have been mechanically robust and was only rarely exhibited. Its name lingers on in some early technical literature, but the Cologne showing listed below is its only verifiable public exhibition. Simultaneous with this show, Acres was finishing the development of his Kinetic Lantern projection device, which was demonstrated for several photographic societies between 10 and 15 January, 1896 and then used in his own public exhibition at Piccadilly Circus, London.

Woodvill Latham (1837 - 1911), **Gray Latham** (1867 - 1907), and **Otway Latham** (1868 - 1906)[51]

Kinetoscope exhibitors from the summer of 1894, Gray and Otway Latham were interested in exhibiting boxing films, for which the capacity of the Kinetoscope was enlarged so that a machine could show a complete "round" of boxing almost a minute long. According to their father Woodville, his sons were following advice from their customers as they began to develop a machine to project films onto a screen; according to the brothers, the suggestion came from their father after they complained that they could not accommodate the crowds who wanted to see their Kinetoscope boxing matches. Their Eidoloscope projector,[52] developed with some help from W. K. L. Dickson and a former Edison mechanic, Eugene Lauste, made its debut in a press preview on 21 April 1895, the first known public projection of moving pictures on celluloid strips in America. Thomas Edison called the apparatus, which used 2 inch wide film and had no intermittent movement, nothing more than "a rearranged Kinetoscope" and threatened to sue. The Latham camera – and later the projector, when it acquired an intermittent movement in May 1896 – incorporated space for an extra loop of film to help reduce the tension on the long celluloid bands used in the apparatus, which was itself patented as an element of their invention, and the "Latham loop" later played a significant legal role in the work of the Motion Picture Patents Company beginning in 1908. Early films produced with their own camera included boxing films, a horse race, dancing girls, scenes of Niagra Falls and a film of waves breaking on the beach near Atlantic City, New Jersey.

The Latham film enterprise opened to the public in a small storefront theatre at 156 Broadway, New York, on 20 May 1895. One newspaper report noted that spectators at this projected entertainment acted much as they would at ringside of an actual fight.[53] The exhibition later moved to a storefront on Park Row; in late August they presented a week of films at the Olympic Theatre in Chicago and then moved to Kohl & Middleton's Clark Street Dime Museum before moving on to the Cotton States Exposition in Atlanta. Although a few further exhibitions lingered on into 1896, the Eidoloscope was not a successful apparatus, for reasons that have never been adequately explained. Both Charles Musser and Gordon Hendricks suggest that the company was under-funded and faced rising costs and debts. This may well be true, but given the vivid pictures of crowded Kinetoscope parlours – and, indeed, earlier Anschütz exhibitions – that inhabit the same era and cultural milieu it is hard to understand just why the Eidoloscope could not have earned enough money to be self-financing. Was the apparatus so technically poor that it was rejected by the

public? Not according to news reports of the earliest fight films shown in New York in Spring 1895. Was there some kind of profligacy behind the scenes in the production company? The reasons that the Latham apparatus did not find a more substantial role during 1895 are important, because a clear idea of why it failed to do so would cast a sharper and more penetrating light on how their colleague pioneers came to find a success that eluded the Lathams.

Max and Emil Skladanowsky (1863 - 1939; 1866 - 1945)[54]
Members of a family long involved in touring mechanical and optical shows, the Skladanowsky brothers developed an apparatus using two bands of film 54mm wide tht projected alternate frames from each band at about 8 frames per second to produce on screen a merged image apparently running at about 16 frames per second, which they called the Bioskop. The huge and solidly-constructed projector was booked as an attraction for the month of November 1895 at the Wintergarten Theatre in Berlin, and installed in the “kleine Bühne” of the Wintergarten, from where it was expected to move to major variety theatres in Paris and probably London. The only additional 1895 exhibition, however, was in Hamburg although the apparatus was used in several cities in Germany and Scandinavia in 1896.

The Skladanowsky family were magic lantern showmen, and were long used to touring mechanical theatres or optical attractions. The moving picture apparatus was developed as their novelty act for the 1895-96 season: it was large and bulky, a unique machine that was incapable of being easily replicated and manufactured. It was made to suit their own skills as showmen, and to introduce moving pictures to the audiences at the theatres where they had been known previously and to which they would return with a new act. Their film system, with its projection of alternate frames, was a hand-made operation equally incapable of commercialisation. With the Skladanowsky Bioskop of 1895 the story of pre-1896 moving picture projection closes a circular pattern and returns to the hand-crafted one-off presentations of the showman/magician Leopold Ludwig Döbler of 1847. Although the apparatus of Skladanowsky and Döbler is technologically quite different, both showmen conceived of their moving picture presentations in the same way: as that year’s new touring programme. There is no evidence in the design of the apparatus from either showman, and particularly not from the Skladanowskys, that any further use of the moving picture inventions was intended beyond their own touring season. Although the Skladanowskys were present in the midst of the rising tide of cinematographic projection apparatus and exhibitions, and much later exploited this to enlarge their vision of the Bioskop and its purposes, they initially had a very limited approach to

introducing public exhibitions of moving pictures.

Louis and Auguste Lumière (1864 - 1948; 1862 - 1954)[55]
Another attempt at moving pictures that was motivated by the Edison Kinetoscope was that of the Lumière brothers, responsible with their father Antoine for a large and successful business of making photographic plates and emulsions. Work on their Cinématographe was advanced enough to apply for a patent 13 February 1895,[56] and the first public exhibition of the apparatus came on 22 March of the same year, just eight days before a supplement to the original patent made some improvements in the mechanism. The Cinématographe featured a claw movement where a pair of pins inserted in perforations on both sides of the film pulled a single frame into place. The device was run by a crank, and the claw was regulated at first by being mounted on a circular plate, later on an ovoid cam inside a frame. Using celluloid films deliberately the same size as those found in the Kinetoscope, the Lumière moving picture apparatus was the first designed as a multipurpose device, capable of acting as a camera, printer, or projector. Even more remarkably, it was a tidy, elegantly neat and lightweight portable device, measuring just 13 inches high (including the upper film holder), 5 inches deep and 7 ½ inches wide. It weighed only 4 Kg. (8.8 pounds). The Lumières ordered the first group of 25 Cinématographes from the Paris mechanic Jules Carpentier on 14 October 1895, and the order was complete by the end of January, 1896, even though many details in the apparatus still needed modification for a production model. This was about a third of the time it took Edison to get the first 25 Kinetoscopes from an outside supplier.[57] One of the early films for the Cinématographe, *Partie d'ecarte*, presents the same subject as one of the entertainment sequences made by Ottomar Anschütz for the Schnellseher in 1891.

Perhaps the most noticeable dimension of the Cinématographe is how different it is physically and materially from all of the prior attempts at moving pictures in the 1890s. As noted above, it combined all of the functions necessary to have a complete moving picture system, and was very portable. Looking at the development of cinematographic apparatus after the Lumière Cinématographe, the invention from Lyon does not seem outstandingly remarkable; looking at all of the preceding moving picture machines and all of the contemporary 1895 apparatus, the Cinématographe is nothing less than astounding. In its day, it was the Swiss watch of moving picture machines, an iPod when everything else in sight was a 1950's living room console hi-fi. It is probably possible to narrow the original purposes behind the Lumière interest in moving pictures by comparing it to what we already know about their predecessors. The Cinématographe was not at all intended to be a new act for a

showman's next season like the Skladanowsky Bioskop: everything about the Lumière apparatus points to simplicity and ease of use by any amateur photographer and no Lumière family member was a professional showman.[58] The Cinématographe also was not intended to exhibit the artistic work of a single photographer, like the Schnellseher of Anschütz or the Zoopraxiscope of Muybridge; nor did it support the work of a single filmmaker or studio like the apparatus of the Lathams. Indeed, the plethora of contributors who made up the corpus of "Lumière films" across three years, and the ease with which the Cinématographe became an article of trade when it became available for sale are remarkable indications of the universality of its design and the advanced simplicity of its construction. The more one compares the Cinématographe to the contemporary devices of 1895 and earlier (and to many of those of 1896 and later) the more astounding and nonpareil the apparatus becomes.[59] It was in the true sense of the word an incomparable machine. Why? For what purpose was the Cinématographe developed? The pattern that was undoubtedly in the minds of the Lumière brothers was the extraordinary success that George Eastman achieved with his popular Kodak camera using a roll-film system. The Lumière Cinématographe was clearly intended for widespread use by the public as a picture taking and exhibiting device; its function as a picture printer bridged the technical gap between taking a film on a photographic negative and projecting it on a photographic positive print. The long-established Lumière business of devising photographic emulsions and manufacturing plates would then be extended to providing the raw film stock that would supply a new generation of filmmakers just as Eastman supplied a new generation of snapshot photographers with roll film and processing in the expanded market created by his Kodak system.[60]

Part 3: A Chronology of Moving Picture Exhibition Before 1896

This chronology is by definition incomplete. Not only because exhibitions of the Choreutoscope and its relatives in magic lantern culture are not recorded, embedded as they are in exhibitions where other visual elements were the dominant attraction, but also because very little research has concentrated on "moving picture" work before 1895. Nonetheless, this chronology usefully collates the known exhibitions from 1847 onwards, and provides at the least an outline of activity which can be a starting-point for further examination. It also provides something of a 'prequel' to the chronology of cinema invention and experimentation which I published a decade ago in *Film History*, Vol. 7 No 2 (Summer 1995).

[Add European Kinetoscope dates; esp. Stollwerck book]

1847:

16 January – 24 February: Leopold Ludwig Döbler, Josephstadt Theatre, Vienna. 36 performances of his Phantaskop.
ca. 7 March: Leopold Ludwig Döbler, the Theatre in Brünn. Two performances of his Phantaskop in this week.
22 March: Leopold Ludwig Döbler, Josephstadt Theatre, Vienna, with his Phantaskop. [Likely one week of performances.]
5 May: Leopold Ludwig Döbler, Royal Court-Theatre, Munich, with his Phantaskop.
Undated: Döbler performances likely with his Phantaskop in Olmütz, Hamburg, Budapest, Graz.

1848:
4 & 5 March: Leopold Ludwig Döbler, Bohemian National Theatre, Prague, two benefit performances with his Phantaskop.
Undated: Döbler performances likely with his Phantaskop in Prague, Brünn, Stuttgart, Vienna (private) and Klafterbrunn (private).

1853:
21 April: Franz Freiherr von Uchatius, at a meeting of the Naturwissenschaftliche Branch of the Imperial Academy of Science, Vienna, with his second model projecting phenakistiscope.
12 July: Franz Freiherr von Uchatius, at his home for a half-dozen or more guests, likely including Leopold Döbler and his wife Elise, with his second model projecting phenakistiscope.

1870:
5 February: Henry Heyl with his Phasmatrope, as part of the Ninth Entertainment of the Young Men's Society of St. Mark's Evangelical Lutheran Church at the Academy of Music, Philadelphia. Some 1500 persons saw three subjects, a couple dancing a waltz, a man making a speech, and an acrobat.
16 March: Henry Heyl with his Phasmatrope, at the Franklin Institute, Philadelphia.

1879:
late Autumn: Eadweard Muybridge, debut of the Zoogyroscope at the home of Leland Stanford. Over the next weeks the apparatus was exhibited several times for Stanford and his guests.

1880:
16 January: Eadweard Muybridge at the home of Leland Stanford with his Zoopraxiscope.
20 January: Eadweard Muybridge at the home of Leland Stanford with his Zoopraxiscope.
21 March: Eadweard Muybridge at the home of Leland Stanford with his Zoopraxiscope.
4 May: Eadweard Muybridge at the San Francisco Art Association with his Zoopraxiscope, the public debut of the apparatus, following a "press preview."
Undated: further Muybridge lectures in California and on the East coast, with his Zoopraxiscope.

1881:
26 September: Eadweard Muybridge in Paris, at a reception arranged by Etienne-Jules Marey with his Zoopraxiscope, the first exhibition of the apparatus outside the US.
26 November: Eadweard Muybridge in Paris, at a reception for around 200 guests including many artists, arranged by the painter J. L. E. Meissonier, with his Zoopraxiscope.
14 December: Eadweard Muybridge at the Cercle de l'Union Artistique, Paris, with his Zoopraxiscope.
Undated: Muybridge lectures with the Zoopraxiscope, San Francisco area, Spring 1881.

1882:
13 March: Eadweard Muybridge at 5 p.m. at The Royal Institution, Albermarle Street, London, for an invited audience including royalty and figures from the worlds of literature and science, with his Zoopraxiscope. Due to the intense demand, a second show was organized for the same evening.
16 March: Eadweard Muybridge at the Royal Academy of Arts, Burlington House, London, with his Zoopraxiscope.
18 March: Eadweard Muybridge at the Savage Club at Lansdown Hall, London, with his Zoopraxiscope.
4 April: Eadweard Muybridge at the Society of Arts, London, with his Zoopraxiscope.
5 April: Eadweard Muybridge at the South Kensington Science and Art Department [later Science Museum], with his Zoopraxiscope.

8 May: Eadweard Muybridge at The Royal Artillery Institution, Woolwich, with his Zoopraxiscope.
5 June: Eadweard Muybridge at the Liverpool Art Club, with his Zoopraxiscope.
8 June: Eadweard Muybridge at the private residence of John J. Atkinson, with his Zoopraxiscope.
30 July or 1 August: Eadweard Muybridge at the Casino Theatre, Newport, Rhode Island, with his Zoopraxiscope.
19 October: Eadweard Muybridge at the Society of Arts of the Institute of Technology, Boston, Massachusetts [later MIT] with his Zoopraxiscope.
23 - 24 & 26 - 28 October: Eadweard Muybridge at Union Hall, Boston, with his Zoopraxiscope. Daily shows for the public at 8 pm with matinees on Wednesday and Saturday, admission 50 cents, children 25 cents.
17 November: Eadweard Muybridge at the Turf Club, New York, with his Zoopraxiscope.
28 November: Eadweard Muybridge at the National Academy of Design, New York, with his Zoopraxiscope.
22 December: Eadweard Muybridge at the National Academy of Design, New York, with his Zoopraxiscope.
Undated: Muybridge lectures with the Zoopraxiscope: Eton College; additional American lectures.

1883:
9 January: Eadweard Muybridge at the Union League Club, New York, with his Zoopraxiscope.
12 February: Eadweard Muybridge at the Academy of Fine Arts, Philadelphia, with his Zoopraxiscope, for an audience largely of art students.
13 February: Eadweard Muybridge at the Franklin Institute, Philadelphia, with his Zoopraxiscope.
15 February: Eadweard Muybridge at the Academy of Music, Philadelphia, with his Zoopraxiscope.
16 February: Eadweard Muybridge at the Academy of Fine Arts, Philadelphia, with his Zoopraxiscope, for an audience of Philadelphia artists and socialites.
20 or 21 September: Eadweard Muybridge at the New Bedford High School, New Bedford, Massachusetts, for art pupils and local citizens, with his Zoopraxiscope.
Undated: Muybridge lectures with the Zoopraxiscope: Photography Section of the American Institute, New York; Cooper Union, New York; additional American lectures.

1884:
8 February: Eadweard Muybridge at Association Hall, Philadelphia, with his Zoopraxiscope.

1885:
April 30: Eadweard Muybridge at the Scientific Society of the University of Pennsylvania, Philadelphia, with his Zoopraxiscope.
Undated: Muybridge lectures on his work to students at the University of Pennsylvania.

1887:
19, 20, 21 March: Ottomar Anschütz at the mezzanine of the Culture Ministry, Unter den Linden 4, daily from 12 noon to 3 pm under the auspices of Culture Minister von Goslar, for invited audiences of scientists, politicians and photographers, with his Schnellseher. First public demonstration of the Schnellseher.
c. mid-June to mid-September: Schnellseher of Ottomar Anschütz exhibited daily to a paying public in small groups at Stadtbahnbogen No. 21 of the Exhibition Park (Ausstellungspark), Berlin.
September: Ottomar Anschütz at the convention of natural scientists (Naturforscherversammlung), Wiesbaden, with his Schnellseher.
September: Eadweard Muybridge with his Zoopraxiscope in Albany, New York.
3 October: Ottomar Anschütz at the Verein zur Pflege der Photographie und verwandter Künste, Frankfurt am Main, with his Schnellseher. Demonstrated twice, accompanied by a short lecture.
10 - 15 October: Schnellseher of Ottomar Anschütz exhibited to the public at the auditorium of the polytechnic, Frankfurt a. M.
December: Eadweard Muybridge with his Zoopraxiscope in Pittsburgh, PA, at the studio of sculptor and painter Thomas Shields Clark.
December: Eadweard Muybridge with his Zoopraxiscope at the Art Institute, Chicago.
Undated: Anschütz Schnellseher: Kunstgewerbehalle, Dresden.
Undated: Muybridge lectures: Union League Club, New York; the Studio of William Merritt Chase, New York; Milwaukee, WI; Madison, WI; Minneapolis, MN; St. Louis, MO; Denver, CO; others.

1888:
25 February: Eadweard Muybridge at the New England Society, Orange, New Jersey, with his Zoopraxiscope.
February: Permanent installation of the Schnellseher in a room at the photographic studios of Ottomar Anschütz, Charlottenstrasse 59, Berlin. Demonstrated frequently in 1888-1892, there seem to have been various models of Schnellseher in occasional use at Anschütz's studio headquarters until about 1902.
4 May: Eadweard Muybridge in Orange, New Jersey, with his Zoopraxiscope.
21 June: Eadweard Muybridge at Milwaukee College, Milwaukee, Wisconsin, with his Zoopraxiscope.
Undated: Anschütz Schnellseher: Photography Exhibition, Brussels; Photography Exhibition, Florence.
Undated: Muybridge lectures with the Zoopraxiscope:

1889:
8 May: Eadweard Muybridge at The Royal Society, Burlington House, London, with his Zoopraxiscope.
early August: Schnellseher of Ottomar Anschütz begins regular exhibitions at the premises of C. B. Richards & Son, photographic suppliers, at 3 East 14th Street, New York, New York. The exhibitions continued at least until the end of November.
15 August: Schnellseher of Ottomar Anschütz exhibited at the Photographic Exhibition at the Königlichen Kriegsakademie, Dorotheenstraße, Berlin.
between 19 and 24 August: Eadweard Muybridge at the Photographic Convention of Great Britain, St. James's Hall, London, with his Zoopraxiscope. One lecture as part of the convention series.
week before 27 September: Eadweard Muybridge at the Mayor's *Conversazione* and at The Art Gallery, Newcastle-on-Tyne, with his Zoopraxiscope. Two exhibitions.
28 October: Eadweard Muybridge at the Literary and Philosophical Society, Sheffield, at The Music Hall, Surrey Street, with his Zoopraxiscope.
7 November: Eadweard Muybridge at the Bristol Naturalists' Society, at The Victoria Rooms, Bristol, with his Zoopraxiscope.
21 November: Eadweard Muybridge at the Natural Science Society of Wellington College, Crowthorne, Berkshire, with his Zoopraxiscope.
27 November: Eadweard Muybridge at the Mechanics' Institution and Literary Society, Leeds, with his Zoopraxiscope.
2 December: Eadweard Muybridge at the Assembly Rooms, Bath, under the auspices of the Mayor and the Presidents and Officers of the local scientific and arts societies, with his Zoopraxiscope.
mid-December: Eadweard Muybridge at The Royal Institution, London, with his Zoopraxiscope.
Undated: Anschütz Schnellseher: Hunting, Fishing and Sports Exhibition, Kassel; Exhibition for Photo Dealers and Manufacturers, Boston, Massachusetts; Photography Exhibition, St. Petersburg; Philadelphia, Pennsylvania.

1890:
8 January: Eadweard Muybridge at St. George's Hall, Liverpool, with his Zoopraxiscope. As part of a day's programme of five divers lectures sponsored by some 20 societies.
16 January: Ottomar Anschütz demonstrates an improved model of his Schnellseher at the Photographic Association, Berlin. [This was the drum model.] He also demonstrated on the earlier Schnellseher an "entirely new" kind of chronophotograph, which he called "Sprechende Porträit", or "Speaking Portraits".
early January: Ottomar Anschütz gives a private demonstration of his new "Speaking Portraits" to the family of Kaiser Wilhelm.
3 February: Eadweard Muybridge at the Scientific Society, Ipswitch, at the Lecture Hall, Tower Street, with his Zoopraxiscope.
11 and 13 February: Eadweard Muybridge at the Belfast Natural History and Philosophical Society, at the Hall of the YMCA, with his Zoopraxiscope.
12 and 14 February: Eadweard Muybridge at the Royal Dublin Society, at Leinster House, Kildare Street, Dublin, with his Zoopraxiscope.
17 February: Eadweard Muybridge at the Photographic Society of Ireland, Antient Concert Rooms, Dublin, with his Zoopraxiscope.
27 February: Eadweard Muybridge at the Glasgow Philosophical Society, Queen's Rooms, Glasgow, with his Zoopraxiscope.
12 and 14 March: Eadweard Muybridge at the Natural History and Microscopical Society, Town Hall,

Birmingham, with his Zoopraxiscope. A course of two lectures.
21 and 22 April: The new drum-shaped Schnellseher of Ottomar Anschütz, which allowed five simultaneous viewers, demonstrated for Josef Maria Eder at the k. k. Graphischer Lehr- und Versuchsanstalt, Vienna.
13 and 20 October: Eadweard Muybridge at the Midland Institute, Birmingham, with his Zoopraxiscope.
November: Schnellseher of Ottomar Anschütz exhibited daily from 10 am to 8 pm for an admission of 30 kreuzer, in a local at Parkring 2, corner of Wollzeile, Vienna. Probably the drum-form model.
27 November: Eadweard Muybridge at Kinnaird Hall, Dundee, with his Zoopraxiscope, as part of a series of six Armistead Lectures.
Undated: Muybridge lectures with the Zoopraxiscope: Warrington Literary and Philosophical Society; Hull; Portsmouth; School of Military Engineering, Chatham; The Royal College or Surgeons, London; The Royal Geographical Society, London; The Royal Zoological Society, London; South Kensington Museum, London; University of Oxford, Charterhouse School; Cheltenham; Clifton; Eton School; Hailebury; Marlborough; Rugby; Tiverton; Uppingham; others.

1891:
21 March: Eadweard Muybridge at the Urania Theatre, Berlin, with his Zoopraxiscope.
May: Eadweard Muybridge in Munich with his Zoopraxiscope.
18 July - December: Schnellseher of Ottomar Anschütz at the Hall for Science and Medicine, daily from 10am to 9 pm, at the Electrical Exhibition, Frankfurt a. M. Debut installation of the automat model made by Siemens & Halske. Precise figures for 18 July to 25 August record 14,858 viewings at 10 Pf. each; over 17,000 viewings to 31 August.
27 July: Georges Demenÿ presents his Phonoscope at the Académie des Sciences, Paris. Main subject was a disk of a man speaking words and phrases.
July: Schnellseher of Ottomar Anschütz at the International Photography Exhibition, Brussels. [possibly drum-form Schnellseher.]
December 6: Georges Demenÿ demonstrates his Phonoscope at the Conservatory of Arts, Paris, before an audience of 1200 people. Thirty diapositives were shown.
Undated: Anschütz Schnellseher exhibitions and installations: Photography exhibition, Amsterdam; exhibition by Stanislaw Jurkowski in Warsaw; various exhibitions in Berlin.
Undated: Muybridge lectures with the Zoopraxiscope: French Academy, Rome; International Society of Artists, Rome; Naples; Turin; various universities in Switzerland and southern Germany; Berlin (July).

1892:
June and July: Schnellseher of Ottomar Anschütz returns in its automat model to Stadtbahnbogen No. 21 at the Exhibition Park, Berlin. 16,618 viewings in July and 17,271 in August.
Early June: two Schnellsehers of Ottomar Anschütz installed as a permanent attraction at Crystal Palace, south London. The installation fluctuated between 2 and 12 machines, and remained in operation until March 1894.
July: Two Schnellsehers of Ottomar Anschütz installed at the International Exposition of Photography, Paris.
8 August: Twenty-five Schnellsehers of Ottomar Anschütz arrive in New York City. Within a month, five were installed at the Eden Musee on 23rd Street, another at Koster & Biall's Music Hall at 34th Street and Broadway, 12 were in use at the Am. Inst. Dur. Prdkts., and two were shipped to Boston.
28 October: Emile Reynaud gives the first performance of his *Pantomimes lumineuses* at the Théâtre Optique of the Musée Grevin, 10, Boulevard Montmartre, Paris. The exhibition closed for renovations on 28 February 1894. See also: 1 January 1895.
22 December: A Schnellseher-Parlour with 12 Anschütz machines opens at No. 425, The Strand, London. The exhibition continued here and later at various Charing Cross addresses, until March 1894.
Undated: Anschütz Schnellseher installations, from shipping records: Hohenzollern Gallery, Berlin; Zoological Garden, Berlin (4 machines); Hamburg (2 machines); Leipzig Garden, Berlin (2 machines).

1893:
May - October: Schnellsehers of Ottomar Anschütz installed in the Electricity Building and in an open air passage to the Midway Plaisance at the World's Columbian Exhibition, Chicago, where there was no mention of the Schnellseher and the cases were labelled "Greatest Wonder of the World", leading to confusion with the Edison Kinetoscope, widely anticipated at the fair but not exhibited. This

installation was seen by a young Thomas Armat.
9 May: The Edison Kinetoscope makes its public debut in a demonstration at the Department of Physics of the Brooklyn Institute, Brooklyn, New York. Four hundred guests heard a lecture by George M. Hopkins and viewed the apparatus.

1894:
14 April: An Edison Kinetoscope parlour opened with ten machines by George and Andrew Holland, admission 25 cents to see a row of 5 machines, at 1155 Broadway, New York City.
17 May: An Edison Kinetoscope parlour opened with ten machines by George and Andrew Holland at the Masonic Temple, 148 State Street, Chicago. Two further parlours open in July, at 255 Wabash Avenue and 57 State Street.
1 June: Edison Kinetoscope parlour opens in the phonographic showroom of Peter Bacigalupi in San Francisco.
8 July: Edison Kinetoscope installed at the amusement park in Eagle Rock, New Jersey.
9 August to 23 September: Edison Kinetoscopes are installed on the excursion steamer "Republic" which runs from Philadelphia to Cape May, Delaware.
19 September: Edison Kinetoscope exhibited in the telegraph office of the Petit Parisien, 20 Boulevard Montmartre, Paris.
1 October: Edison Kinetoscope parlour with ten machines opened by Michel and Eugene Werner at 20 Boulevard Poissonnière, Paris.
6 October: Edison Kinetoscope parlour opens at the Columbia Phonograph Musical Palace, 919 Pennsylvania Avenue, Washington, D. C. The inventor C. Francis Jenkins sees the Kinetoscope here.
17 October: Edison Kinetoscope parlour opened by Edison's agents Maguire and Baucus at 70 Oxford Street, London.
3 November: Schnellseher of Ottomar Anschütz exhibited at the Swedish Photographic Exhibition, Stockholm. The Edison Kinetoscope was exhibited here on 4 February 1895.
10 November: Edison Kinetoscope parlour opened by Thomas Tally at 206 South Spring Street, Los Angeles.
10 November: Edison Kinetoscope parlour opened in Austin, Texas.
11 November: Edison Kinetoscope parlour opened by Charles Urban at 101 Woodward Avenue, Detroit, Michigan.
12 November - c. 1 December: The Phantoscope projector of C. Francis Jenkins opens at the Pure Food Exposition, Washington, D. C.
25 November: the Projecting Electrotachyscope of Ottomar Anschütz demonstrated at the Grand Auditorium of the Post Office Building, Artilleriestrasse, Berlin. The morning audience was invited by Culture Minister von Goslar, the afternoon demonstration was a benefit for the Photographic Association of Berlin.
26 November: Edison Kinetoscope parlour opens at 1436 Broadway, New York. In continuous operation from 10 am until Midnight. There are now at least five Kinetoscope locations in New York: 1155 Broadway, 39 Park Row, 144 East 14th Street, 158 East 125th Street, 1436 Broadway.
29 - 30 November: the Projecting Electrotachyscope of Ottomar Anschütz exhibited to the public at the Grand Auditorium of the Post Office Building, Atilleriestrasse, Berlin.
30 November - 29 January 1895: Edison Kinetoscope parlour opened by J. C. Williamson and George Musgrove, in association with the Macmahon brothers at 148 Pitt Street, Sydney, Australia.
5 December: Edison Kinetoscope parlour and sales office opened by Michel Werner at 6-8 Place de l'Opera, Paris.
13 December: Edison Kinetoscope installed by owner James Joyce at the Clarendon Hotel, Port Jervis, New Jersey.
16 December: Edison Kinetoscope opens in the Panorama of Lauritz Vilhelm Pacht in Copenhagen.
17 December: Two Edison Kinetoscopes open in the Panopticon of Oswald Stoll in Philharmonic Hall, St. Mary Street, Cardiff, Wales.
27 December: Edison Kinetoscope parlour opened by Karel van Egmond and H. F. Degens in the Reguliersbreestraat, Amsterdam.
28 December: Schnellseher of Ottomar Anschütz is exhibited by Karl Eisenlohr at the Exposicio Imperial in the Avenida Palace Hotel in Lisbon.
Undated: Edison Kinetoscopes shipped to 54 additional American and Canadian cities. See Hendricks (Note 45) p. 64.

1895:
1January: the *Pantomimes lumineuses* of Emil Reynaud reopens after renovation of the apparatus and the painting of new picture bands at the Théâtre Optique of the Musée Grevin, Paris. The exhibition continued until 1901.
20 January: Edison Kinetoscope opens in Mexico City, Mexico with a reception for President General Dias and his wife.
4 February: Edison Kinetoscope opens at the Palace of Industry, Valhalla Way, Stockholm.
22 February – 30 March: public exhibition of the Projecting Electrotachyscope of Ottomar Anschütz in afternoon and evening screenings for an admission of 1.- and 1.50 Marks in the auditorium of the old Reichstag Building, Leipziger Strasse, Berlin.
6 March: Edison Kinetoscope opened by George Georgiades at the Tabacaria Neves, Lisbon, Portugal.
13 March: Edison Kinetoscope opens at the rue Halodemande, Lausanne, Switzerland.
16 March - 8 June: Edison Kinetoscope parlour with five machines opened by the Macmahon brothers at the Haunted Swing Premises, Bourke Street East, Melbourne, Australia.
20 March: Edison Kinetoscope opens at the Centralhof concert hall, Münster.
22 March: Lumière Cinématographe demonstrated for the Société d'Encouragement pour l'Industrie Nationale, 44, rue de Rennes, Paris. One film was shown, *La sortie des ouvriers de l'usine Lumiere*.
23 March - c. 5 April: Edison Kinetoscope exhibited in Utrecht, The Netherlands.
17 April: Lumière Cinématographe demonstrated at the Sorbonne, Paris.
21 April: the Latham Eidoloscope (Panopticon) is demonstrated for the press at 35 Frankfort Street, New York.
21 April: Edison Kinetoscope opens at via Roma 2, Turin.
5 May: Edison Kinetoscope opens in a bar at the Place de Cataluna, Catalogne, Spain.
11 May - 13 October: thirty Schnellsehers of Ottomar Anschütz exhibited at the Italian Exhibition, Hamburg. There were 2348 viewings of the Schnellsehers in their first five days of exhibition, and 56,645 viewings during the exhibition.
16 May: Edison Kinetoscope parlour with 5 machines opens in a house at Gänsemarkt 2, Hamburg.
20 May: the Latham Eidoloscope projects their boxing film *Young Griffo - Battling Barnett* in a converted shopfront at 156 Broadway, New York City.
29 May: the Projecting Electrotachyscope of Ottomar Anschütz opens at Carl Henckel's Concert Hall, Hamburg.
30 May: Edison Kinetoscope opens at the Salon Edisson [sic.], Carrera de San Jeronimo, Madrid.
1 June: Edison Kinetoscope parlour opens at via Vittorio Emanuele 151, Palermo.
10 June: Lumière Cinématographe is demonstrated for those attending the Congres des Sociétés Françaises de Photographie at chez Berrier & Millet, Place Bellecour, Lyon.
11 - 17 June: Edison Kinetoscope exhibited by the Macmahon brothers at the Albion Chambers, View Street, Bendigo, Australia. 5 machines.
12 June: Lumière Cinématographe projects films taken at the Congres des Sociétés Françaises de Photographie for the closing banquet of the meeting at chez Berrier & Milllet, Place Bellecdour, Lyon.
July - August: twelve Schnellsehers of Ottomar Anschütz are exhibited at the Lubeck Exhibition, Lubeck. There were 10,152 viewings of the apparatus during the exhibition.
11 July: Lumière Cinématographe demonstrated for the *Revue général des sciences pures et appliquées*, Paris.
26 August - 21 September: Latham Eidoloscope opens for one week at the Olympic Theatre, then transfers to Kohl & Middleton's Clark Street Dime Museum for three weeks in Chicago.
24 August: Phonoscope of Georges Demeny is exhibited in Ludwig Stollwerck's new Automat Hall in Cologne. The exhibition may have lasted as long as a week.
21 September: Lumière Cinematographe demonstrated for family and friends by Louis Lumière at La Ciotat.
29 September – c. 15 October: Phantoscope of C. Francis Jenkins and Thomas Armat exhibited using Kinetoscope films at the Cotton States Exhibition, Atlanta, Georgia.
1 November - 30 November: Bioskop of Max and Emil Skladanowsky exhibited at the Small Stage (Kleine Bühne) of the Wintergarten Theatre, Martin Luther Strasse, Berlin.
10 November: Lumière Cinématographe demonstrated for the Association Belge de Photographie, Brussels.
12 November: Lumière Cinématographe demonstrated for members of the Cercle Artistique et Litteraire, Brussels.

13 November: Lumière Cinématographe demonstrated at the Musée de Physique of the University of Löwen, Löwen, Belgium.
18 December - 23 December: Bioskop of Max and Emil Skladanowsky exhibited at the Concerthaus Ludwig, Hamburg.
23 December - c. 31 December: Elektroskop of Birt Acres exhibited at the automat-parlour of the Deutsche Automaten-Gesellschaft, Königin-Augusta-Halle 17-21, Cologne. Two films by Birt Acres were shown, the 1895 *Derby* and a *Three-Part Serpentine Dance*.
28 December: Lumière Cinematographe exhibited to the public at the Salon Indien, in the cellar of the Grand Café, 14 Boulevard des Capucines, Paris.
Undated: Edison Kinetoscopes shipped to 64 additional American and Canadian cities; see Hendricks (Note 45), pp. 68-9.

NOTES

1. Henry Hopwood, author of *Living Pictures. Their History, Photo-Production and Practical Working* (London, 1899: The Optician & Photographic Trades Review) worked in the British patent office. His book had a second edition, revised and updated by R. B. Foster in 1915 and a reprint edition by the Arno Press in 1977. Dr. Karl Forch, who worked in the German patent office, was the author of *Der Kinematograph und das sich bewegende Bild. Geschichte und technische Entwicklung der Kinematographie bis zur Gegenwart*. (Wien und Leipzig, 1913: A. Hartleben's Verlag). Other early authors also frequently took an encyclopedic, nuts-and-bolts approach to their subject, for example Cecil M. Hepworth, *Animated Photography. The ABC of the Cinematograph*. (London, 1897: Hazell, Watson & Viney, Ltd.)[2nd edition, 1900; reprint edition, Arno Press, 1976].

2. In doing so, one of the potentially most valuable links between pre- and post-cinematographic practices was irretrievably lost, since these early authors (especially Hepworth) would have had direct contemporary experience of the content and techniques of magic lantern shows and early moving picture presentations, which, if included in the invention narrative would have set the writing of film history off on an entirely different course a hundred years ago.

3. A few examples, in a non-exhaustive survey of the literature, would include: the populist volume on *Le Cinéma* in the *Encyclopédie par l'image* of Librarie Hachette (Corbeil, 1925: Hachette), which valorises Lumière and turns the Mutoscope of AM&B into a Gaumont apparatus; Ernest Coustet, *Le Cinéma* (Corbeil, 1921: Librarie Hachette), which valorises Marey and Demenÿ on the way to Lumière, missing Stampfer while explaining Plateau and missing Anschütz but mentioning Muybridge; Joseph Gregor, *Das Zeitalter des Films* (Wien-Leipzig, 1932: Reinhold-Verlag), which opens with the sentence "Film is as old as mankind" in deploying an analysis of rhythm and movement in prehistoric cave paintings, Greek sculpture, Baroque painting, Mozart symphonies, etc., as precursors of cinema; Terry Ramsaye, A *Million and One Nights* (New York, 1926 Simon & Schuster), whose manuscript was generously checked for "errors" by none other than Thomas Alva Edison himself; F. A. Talbot, *Moving Pictures. How They are Made and Worked* (London, 1912: William Heinemann [second edition, 1923]), who talked extensively to Robert Paul but not to Birt Acres.

4. On Döbler, see both Werner H. A. Debler, *Leopold Ludwig Döbler, 1801 - 1864. Wiener Hoftaschenspieler und Zauberprofessor aus einem alten Schwäbisch Gmünder Geschlecht* (Schwäbisch Gmünd, 2001: Einhorn-Verlag Eduard Dietenberger GmbH) and Robert Kaldy-Karo, *Ludwig Döbler, genius des biedermeier* (Horitschon, 2001: Verlag novum [im Auftrag des Museums für Unterhaltungskunst und des Institutes Kadotheum, Vienna]).

5. In particular amongst several new studies of varying quality on aspects of Muybridge's work, see Stephen Herbert, ed., *Eadweard Muybridge. The Kingston Museum Bequest* (Hastings, 2004: The Projection Box).

6. The key works here are Laurent Mannoni, with Marc de Ferrière le Vayer and Paul Demeny, *Georges Demenÿ. Pionnier du cinéma* (Douai, 1997: Cinémathèque française, Musée du cinéma / Éditions Pagine / Université Lille 3), and Laurent Mannoni, "Glissements progressifs vers le plaisir. Remarques sur l'oeuvre chronohotographique de Marey et Demenÿ", in *1895*, No. 18 (Été 1995), pp. 11 - 52.

7. In particular the introductory essay in Charles Musser, *Edison Motion Pictures, 1890 - 1900. An Annotated Filmography.* (Washington, D. C. / Pordenone, 1997: Smithsonian Institution Press / Le Giornate del Cinema Muto).

8. This is my own work, and should not be characterized as "very good." Be that as it may, it contains much new information on pre-1896 exhibition: Deac Rossell, *Faszination der Bewegung. Ottomar Anschütz zwischen Photographie und Kino* (Frankfurt am Main / Basel, 2001: Stroemfeld / Roter Stern).

9. John M. Staudemeier, S. J., *Technology's Storytellers. Reweaving the Human Fabric*. (Cambridge, MA / London, 1985: The Society for the History of Technology / The MIT Press), p. 168. This useful and influential book is a thoughtful analysis of the articles published over twenty years by the Society for the History of Technology in its journal *Technology and Culture*.

10. *ibid.*, p. 168.

11. In fact, the very idea that the cinema was an "emerging technology" in 1895-96 is already something of a break with its tradition of being "discovered" or "invented" by Thomas Edison, Max Skladanowsky, the Lumière brothers, or (fill in here your favourite figure: Wordsworth Donisthorpe? Eadweard Muybridge? Victor von Reitzner?). A corollary to André Gaudreault's objection to lumping a variety of optical and showmanly devices into a bin called "pre-cinema" is of course the idea that the cinema evolved over a long period of time through the complex interaction, in fits and starts, of numerous separate strands of work, each with its own public, technical, optical and social interactions.

12. The entire issue of the "projection" of a moving image across space and, often, across the audience, versus the "illumination" of an adjacent surface which is then seen, often from outside the apparatus, like a peep-show through a lens or watched in the open, is one of several spurious distinctions which have crept unexamined into the historical lexicon. Contemporary moving image media, whether theatrical film, television, computer-based streaming video, Imax projection, or other platforms, provides innumerable examples of both "projected" technologies and "illuminated" technologies which share the same content with the same communicative purposes. With a moment's reflection, these current media forms should wholly dispense with the improbable distinctions brought to the idea of "projection" and "illumination" at the origins of moving pictures by early 20th century historians. When Bertrand Tavernier, who should know better, argued vociferously at a press conference for the coming Centenery of cinema at the 1991 Cannes Film Festival that Edison was the precursor of television, whilst only Lumière was the inventor of the cinema, he was not at all engaged in historical analysis, but rather in the most disruptive kind of international cultural politics. In fact, this was precisely the kind of pointless scholastic argumentation that has polluted and distorted the field of early cinema history for generations. Michael Frizot's recent attempt to valorize Marey as the essential inventor of cinema by logically deducing the essence of cinema from a small set of propositions related to his scientific work is another example of this kind of purposeless distortion of the historical record. See: Michel Frizot, "Les opérateurs physiques de Marey et la réversibilité cinématographique", in François Albera, Marta Braun, and André Gaudreault, eds, *Arrêt sur image, fragmentation du temps / Stop Motion, Fragmentation of Time* (Lausanne, 2002: Editions Payot), pp. 91 - 102.

13. The sketches are reproduced in Laurent Mannoni, *et. al.*, *Georges Demenÿ* [Note 6], p. 80. The meeting is discussed on pp. 78-9.

14. One of the oddities of the received narrative of cinema invention is its lack of any understanding of the concepts involved in technology transfer, and its rather astounding lack of use of the many contacts, both direct and indirect, between inventors c. 1885 - 1896. This is due in part to the atomised (nationalised) way in which traditional histories have been written. Even my own international chronology of activities published in *Film History* (V. 7, No. 2 [Summer 1995]) fails in this regard. It turns out, on examination, that not only major experimenters in large cities but even the most seemingly isolated figures were in touch with someone else in some way, or had direct access to work undertaken elsewhere. I will look at this topic thoroughly in a future essay.

15. For a brief introduction to early moving slides for the magic lantern, see Deac Rossell, "The Magic Lantern and Moving Images before 1800", in: *Barockberichte* 40-41 (2005), pp. 686 - 693. For a categorization of different types of mechanical lantern slide, see John Barnes, "Classification of magic lantern slides for cataloguing and documentation", in: *Magic Images. The Art of Hand-Painted and Photographic Lantern Slides* (London, 1990: The Magic Lantern Society of Great Britain), pp. 75-84.

16. A good introduction to the phantasmagoria show is found in Laurent Mannoni, *Le grand art de la lumière et de l'ombre. Archéologie du cinéma* (Paris, 1994: Editions Nathan), pp. 135-168 (English edition: *The Great Art of Light and Shadow* [Exeter, 2000: University of Exeter Press], pp. 136-175). See also Mervyn Heard, "Paul de Philipsthal & the Phantasmagoria in England, Scotland, and Ireland";

Part One: *Boo*!, *New Magic Lantern Journal* Vol. 8 No. 1 (October 1996), pp 2-7; Part Two: *Shoo*!, *NMLJ*, Vol. 8 No. 2, pp. 11-16; Part Three: *Phew!*, *NMLJ* Vol. 8 No. 4, p. 6-13. Also, Mervyn Heard, *Phantasmagoria: the Secret Life of the Magic Lantern* (Hastings, 2006: The Projection Box).

17. [Stephen Herbert], entry "Choreutoscope", in David Robinson, Stephen Herbert and Richard Crangle, eds., *Encyclopaedia of the Magic Lantern* (London, 2001: The Magic Lantern Society), p. 66. For brief but accurate background on the elusive Beale which supplements the above entry, see Gerard L'E. Turner, "Presidential Address. Scientific Toys", *British Journal for the History of Science*, 20 (1987), p. 392.

18. There is some evidence that both of the two figures themselves would disagree with this statement. Anschütz certainly thought that he was personally in competition with Muybridge, who remained a much more celebrated public figure, and he continually acted at the photographic societies as if he were in direct aesthetic and personal competition with Muybridge, particularly over his reputation as an artistic photographer.

19. A valuable recent article on the printed reproduction of photographs is Helena E. Wright, "Photography in the printing press: the photomechanical revolution", in: Bernard Finn, ed., *Presenting Pictures* (London, 2004: National Museum of Science and Industry). For a thorough survey, see Luis Nadeau, *Encyclopedia of Printing, Photographic, and Photomechanical Processes. A Comprehensive Reference to Reproduction Technologies.* Vol. I: A - L, Vol. 2: M-Z. (New Brunswick, Canada, 1989: *Atelier* Louis Nadeau [P.O. Box 1570, Station "A", Fredericton, New Brunswick, Canada, E3B 5G2]).

20. Interestingly, both also shared the same flaw of possessiveness about their work which ultimately led each of them, separately, to fail in establishing their otherwise viable moving picture systems. Anschütz was possessive about his images, as well as his public reputation as an established photographer, and failed to provide the kind of popular, action-filled images that would have helped establish his Schnellseher. Edison was not at all possessive about the photographic content of his Kinetoscope, but he was very possessive about its manufacture and about the necessity of it remaining a single-viewer peepshow apparatus, convinced that this was his only route to a profitable system with multiple sales of apparatus. He therefore failed to grasp the idea of projection and mass-audience performance, and his Kinetoscope system failed.

21. There are two recent studies of Döbler, see Note 4. They take slightly divergent views towards Döbler's Phantaskop and its exhibition, so both must be examined carefully. Neither book fully researches the Döbler exhibitions, which range across central Europe to St. Petersburg, and there is still significant work to be done on his moving picture projections.

22. Poggendorff, *Annalen der Physik und Chemie*, Bd. 40 (1837), p. 547.

23. Ludwig Döbler, patent application of 5 January 1847, *Beschreibung einer neuen Laterna magica, welche bewegliche Figuren an der Wand hervorbringt, genannt*. Archiv der Technischen Universität Wien. Döbler's patent was granted on 23 January 1847 and ran for two years. Privilegien-Register No. 4829 v. 23. Jänner 1847.

24. Theaterzettel [Josefstadt Theater, Wien], 1 Februar 1847, *cit. nach* Werner H. A. Debler (Note 4), p. 301.

25. *op. cit.,* pp. 309-12. See also: Robert Kaldy-Karo, *Ludwig Döbler, genius des biedermeier* (Horitschon, 2001: Novum Verlag), pp. 192-205.

26. Nonetheless, it is likely that in principle Döbler was touring with this apparatus in public use throughout the period January 1847 – late Spring 1848. Kaldy-Karo is too conservative in judging many of these shows to have been given without the Phantaskop. The case of Döbler's shows in Prague in February and March, 1848, is typical. A surviving programme for a special benefit performance at the Bohemian Court Theatre for the retiring theatre director Edouard Tauwitz clearly indicates the Phantaskop and its full programme in use. I have therefore included this show in the chronology at the end of this article, as I have also included another benefit for the choristers of the

same theatre given one day earlier. It would seem to me to take some very close reasoning to explain just why the Phantaskop would not have been used in the exhibitions Döbler gave in Prague that began on 4 February and ended with these March benefit performances, shows which were financially successful for both the theatre and Döbler. I have also included the Munich performance in the chronology since the reviewer for the sold-out show (Kaldy-Karo, *op. cit.,* p. 199), remarked that a closer description of Döbler's optical effects "would be left for one of our physicists". This implies to me the use of the Phantaskop since dissolving view technology would not need scientific explanation and was well understood by this date. More research is necessary here to clarify the situation.

27. The best material on the stroboscopic projectors of Uchatius is to be found in the two recent works on Döbler, as both are at pains to distinguish Döbler's invention and work from the misreported work of Uchatius. See Note 4. For a wider view of his career, but not a modern one, the standard biographical article is Erich Kurzet-Runtscheiner, "Franz Freiherr von Uchatius", in *Blätter für Geschichte der Technik* 4 (1938), pp. 40-65.

28. Franz Uchatius, "Apparat zur Darstellung beweglicher Bilder an der Wand", in: *Sitzungsberichte der kaiserlichen Akademie der Wissenschaften, Wien, Naturwissenschaftliche Klasse*, 1853, Bd. 10, pp. 483-4.

29. Franz Uchatius, *op. cit.,* (Note 28), p. 485.

30. Among many mistaken accounts of the relationship between Döbler and Uchatius can be counted F. Paul Liesegang in his *Dates and Sources* (London, 1986: Magic Lantern Society [orig: *Zahlen und Quellen*, 1926), p. 36, and myself in the entry on Uchatius in the *Encyclopedia of the Magic Lantern* (London, 2001: Magic Lantern Society), p. 313.

31. Heyl is definitely a subject for further research. The principal article remains Thomas Coulson, "Philadelphia and the Development of the Motion Picture", in: *Journal of the Franklin Institute* 262 (July 1956), pp. 1-16. Charles Musser is also good on Heyl; see *The Emergence of Cinema* (Note 44), pp. 45-48. This is one of the few places where Laurent Mannoni is in error in *The Great Art of Light And Shadow* (Note 16), p. 261-262; he describes six poses printed three times each for a total of 18 images on each disk. But the disk illustrated in Musser (p. 46) clearly has 16 images.

32. Henry R. Heyl, US Patent 195,603 issued September 25, 1877, *Improvement in devices for inserting metallic staples*. Heyl assigned his patent to George W. Heyl, and the patent was defended in the Federal courts a decade later against an infringer, George P. Crawford. See: *Crawford v. Heysinger*, 123 U. S. 589 (1887). Examples of the stapler survive in both public and private collections. The wire binding procedure was developed with August Brehmer, who returned to Germany and founded the business that today produces Heidelberg presses, whose managing director recently said of the work of Heyl and Brehmer: "The invention of the wire binding machine was to the book binding business what the flatbed cylinder press and the typesetting machine were to book printing."

33. The standard biographical works on Muybridge are Robert Bartlett Haas, *Muybridge, Man in Motion* (Berkeley and Los Angeles, 1976: University of California Press) and Gordon Hendricks, *Eadweard Muybridge. The Father of the Motion Picture* (New York, 1975: Grossman Publishers), who between them cover many of the American lectures. For Europe, the only source is Stephen Herbert's essay "Projecting the Living Image" in his catalogue of the Muybridge materials at the Kingston Museum, see Note 5. Herbert is also far better on the Zoopraxiscope than any previous author, and this book reproduces a portion of every surviving Zoopraxiscope disk. Working mostly with these sources, and also some others, is a reminder that a modern biography/study of Muybridge is badly needed.

34. The term Zoogyroscope was used only between Autumn 1879 and Summer 1880. This was only a change of name and not a change of design or construction in the apparatus.

35. Stephen Herbert, *Eadweard Muybridge. The Kingston Museum Bequest* (Note 5), p. 110-111.

36. Here, the essential reference to the work of Anschütz is my own, see Note 8. Previously unpublished material from my research notes has also been used for this article and the chronology.

37. Anschütz was always ready to “prove” that his own images were of higher quality (i.e., showed more detail with better gradations of exposure) than those of anyone else, which is why the photographic associations almost always saw series of horses or athletes so that they could be compared with — and pronounced superior to — the images produced by Muybridge, Marey, or others. It is logical that Anschütz would be one of the first people to see, either in Germany or England, a Kinetoscope, in which the Edison *Barber Shop Scene* was regularly one of the earliest subjects shown. But the trouble with dating the Anschütz series later than the Edison production, which is consistent with Anschütz’s personality and form, is that this Edison subject was first photographed in late 1893; Anschütz made no verifiable series photographs after 1890-91, and later claimed that his camera was damaged in its move from Lissa to Berlin. Given the striking similarity of his series to the very well known Edison film (re-photographed in January 1895), I am loathe to date this Anschütz series before the Edison film. At the same time, it is without doubt that the Anschütz *Skatspieler* (*Card Players*) predates both the early Lumière and Méliès films, and it would put a rather different complexion on this early Edison title if indeed the Anschütz disk was made first. We do not yet know the subjects of the disks which were shipped to the US with the Schnellseher in 1892.

38. Georges Demenÿ, French patent 219,830, *Appareil dit Phonoscope reprodusant l’illusion des mouvements de la parole et de la physionomie par vision directe ou par projection au moyen d’une Lumière*. Application 3 March 1892.

39. The Phonoscope was also displayed at the International Exposition of Photographhy at the Palais des Beaux-Arts in Paris from 20 April 1892, in an exhibit on the work of the Station Physiologique which included a Marey single-plate chronophotographic camera, a Marey film camera, and examples of the Station’s photographic work. It is indeterminate whether the Phonoscope was actually operated, or was just installed as an exhibit. In either case, Demenÿ reported that this display resulted in “an avalanche of propositions” from various “Barnums” wanting to exploit his invention. See Laurent Mannoni, ”Glissements progressifs vers le plaisir. Remarques sur l’oeuvre chronophotographique de Marey et Demenÿ” (Note 6), p. 22.

40. The Anschütz “Sprechende Porträts” somehow disappeared from the secondary literature in the 20th century. Apart from two datable presentations in January 1890, they were evidently demonstrated elsewhere because press reports appeared in the same period in the Berlin newspapers. The technical differences between the two systems – intermittent illumination with a Geissler tube for Anschütz and intermittence through a shutter for Demenÿ, a simpler option – are not decisive in separating a line of descent between these two devices. With Demenÿ’s known interest in commercialising chronophotographic movement, it seems most likely that he would have been well aware of the work of Anschütz and his many exhibitions. For more information on the Anschütz “Sprechende Porträts”, see Deac Rossell, *Ottomar Anschütz* (Note 8), pp. 56-58.

41. The most comprehensive (and very beautifully designed) work on Reynaud is Dominique Auzel, *Emile Reynaud et l’image s’anima* (Paris, 1992: Du May [& Centre National des Lettres]).

42. A successful early optical-intermittent projector was designed and sold by John Nevil Maskelyne from 1896; it was still in use for specialist scientific purposes in 1905. Other apparatus was suggested by Paul Mortier (1897) amongst many others. The apparatus of Emil Mechau (1912) was produced in over 500 examples through 1934. The idea of optical-intermittent projection with a continuously moving film band is currently used in the Imax system, introduced in 1967, where once again the lack of strain and wear on the film band was the principal motivation for its revival.

43. Perhaps the most surprising element of this influence of existing magic lantern technology (and, ultimately, practise) on cinematographic technology (and practise) is the almost complete absence of any discussion about the relationship between the magic lantern and early cinema in the historical literature ---- at least until very recently. Is this because much of the first work in the revitalised field of “early cinema” looked to other, more easily digested, narrative predecessors? John L. Fell’s seminal publication *Film and the Narrative Tradition* (University of Oklahoma Press, 1974) finds significant

imports into early cinema from the theatre, Victorian melodrama, comic strips, photographic records, and sheet music, but does not discuss magic lantern culture. In his equally significant edited work, *Film Before Griffith* (University of California Press, 1983), amongst 29 articles from 28 authors, only two make extended forays into pre-1896 practices, as the writers imply with unanimity that there was no precedent influence worth discussing before the invention of the cinema itself. Indeed, as recently as 1996 Jens Ruchatz published an entire monograph arguing precisely this point; see *Zur Kritik der Archäologie des Kinos* (Universität Siegen, MuK, Heft 101/102).

44. For the work of Edison and his colleagues on the Kinetoscope, Charles Musser is excellent in both *The Emergence of Cinema. The American Screen to 1907* (New York, 1990: Charles Scribner's Sons [= History of the American Cinema, Vol. 1]) and *Edison Motion Pictures, 1890 - 1900* (Washington, D.C./Pordenone, 1997: Smithsonian Institution Press/Le Giornate del Cinema Muto). A good modern general biography of Edison is Paul Israel, *Edison: A Life of Invention* (Sydney, London, etc., 1998: John Wylie & Sons, Inc.).

45. See the work of Charles Musser, Note 44. Also see Gordon Hendricks, *The Kinetoscope* (New York, 1966: The Beginnings of the American Film). On the development of the celluloid image carrier, see Paul Spehr, "Unaltered to Date: Developing 35mm Film", In: John Fullerton & Astrid Soderbergh Widding, eds., *Moving Images: From Edison to the Webcam* (Sydney, 2000: John Libby Co.).

46. Charles Musser, "Kinetoscope", in: Richard Abel, ed., *Encyclopedia of Early Cinema* (London and New York, 2005: Routledge), p. 358. The commercial risk of exhibiting the Kinetoscope is supported by the experience of Ludwig Stollwerck, who controlled the apparatus in Germany; his enterprises could make no profit from the machine, largely as its initial price was too high. See Martin Loiperdinger, *Film & Schokolade. Stollwercks Geschäfte mit lebenden Bildern* (Frankfurt a. M./Basel, 1999: Stroemfeld/Roter Stern [=KINtop Schriften 4]).

47. This is the case even when the problems with the workman contracted to make the machines, and an illness of W. K. L. Dickson, is taken into account. For details, see Hendricks, *The Kinetoscope* (Note 45) pp. 28-36.

48. Cecil Wray, *Improvements in or relating to the Kinetoscope*, British Patent 182 of 3 January 1895. Wray was an electrical engineer and cinema pioneer who later developed the widely-used Kineoptoscope accessory which could be mounted in the normal slide stage of a magic lantern and was marketed by Riley Brothers.

49. Henri Joly, *Photozootrope à un ou plusieurs oculaires*, French patent 251,549 of 8 November 1895. Joly was a cinema pioneer responsible for several early cameras and projectors, including the Cinématographe Joly-Normandin which was in use at the Bazar de la Charité during the disastrous fire of 4 May 1897.

50. Birt Acres has been poorly served by film historians. The extensive material on his early work with Robert W. Paul in the writings of John Barnes has several errors and must be read with great care, although it is essential. See John Barnes, *The Beginnings of the Cinema in England, 1894 - 1901* (5 volumes; Exeter, 1998: Exeter University Press). The Stollwerck material is excellently and uniquely examined in Martin Loiperdinger, *Film & Schokolade. Stollwercks Geschäfte mit lebenden Bildern* (Frankfurt a. M./Basel, 1999: Stroemfeld/Roter Stern [=KINtop Schriften 4]); see esp. pp. 71 - 108.

51. The work of the Lathams is well-described in Charles Musser, *The Emergence of Cinema* (Note 44) and Gordon Hendricks, *The Kinetoscope* (Note 45).

52. At first called the Panoptikon.

53. *New York World*, 28 May 1895, p. 30, *cit. nach:* Musser, *Emergence of Cinema* (Note 44), p. 99.

54. The most detailed, if verbose, treatment of the Skladanowsky work is Joachim Castan, *Max Skladanowsky oder der Beginn einer deutschen Filmgeschichte* (Stuttgart, 1995: Füsslin Verlag). Castan is particularly good on the later politics of the Skladanowsky legacy in Europe in the 1930s and

1950s. An accurate concise account is in Deac Rossell, *Living Pictures. The Origins of the Movies* (Albany, 1998: State University of New York Press).

55. The Lumière work has not been well-treated by historians, and despite a vast literature hardly any book can be recommended without reservation. A good early account is Georges Sadoul, *Histoire général du cinéma. 1: l'Invention du cinéma 1832 - 1897* (Paris, 1946: Éditions Denoël). A modern compilation is Bernard Chardère, *Le roman des Lumière* (Paris, 1995: Éditions Gallimard). An excellent study of the films is Michellle Aubert and Jean-Claude Seguin, *La Production cinématographique des freres Lumière* (Paris, 1996: Bibliothéque du film [BIFI]/Éditions Memoires de cinéma). A proper theoretical framework for the ideas expressed here is found in Deac Rossell, "Die soziale Konstruktion früher technischer Systeme der Filmprojektion", in: *KINtop* 8 (1999), pp. 53 - 82.

56. Louis and Auguste Lumière, *Appareil servant à l'obtention et à la vision des épreuves chronophotographiques*, French patent 245,032 of 13 February 1895.

57. And througout the modification process Louis Lumière at the factory in Lyon was continually reminding Carpentier in Paris of the urgency of completing the order. Before all 25 machines had been delivered, Lumière ordered 200 more Cinématographes from Carpentier. The entire process is well-documented in Jacques Rittaud-Hutinet, ed., *Letters. August and Louis Lumière* (London / Boston, 1995: faber and faber).

58. Further, the way in which the Cinématographe travelled around the world taking films and exhibiting them under the hand of assorted employees from the Lumière factory and by family friends from Lyon in 1896 - 1899 is thoroughgoing evidence of not just its ease of use but also of its purpose as a moving picture system to be used by anyone.

59. Further devices that form the context surrounding the Lumière Cinématographe include the Kinesigraph of Wordsworth Donisthorpe, a large floor-standing machine operated by long levers derived from textile machinery; a camera with sixeen lenses and various separate projectors of Louis Aimé Augustin le Prince; the massive first model chronophotographic camera and separate projector of Ernst Kohlrausch; several models of semi-portable boxlike Marey chronophotographic apparatus; a bulky combined camera and projector by Victor von Reitzner; the Demenÿ Phonoscope, which stood on a wooden stand 172cm high and was itself 70cm wide and 70 cm deep.

60. I have written elsewhere in more detail from this perspective on the business purposes of the Lumières and their Cinématographe. See the works in Notes 54 and 55.