JOHN R. CONNON OF ELORA, ONTARIO AND HIS 360-DEGREE PANORAMIC CAMERA

by

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ABSTRACT

John R. Connon (1862-1931) was a photographer and inventor who lived in Elora, Ontario, Canada during a time of remarkable innovations in the medium of photography. In 1886, Connon began to develop one of the earliest cameras to be capable of a full 360-degree photographic panorama using a single exposure. His early dedication to the use of flexible roll film, introduced by the Eastman Dry Plate and Film Company in 1885, allowed Connon to invent a camera that was ahead of its time. Through an agreement with C. P. Stirn, of C. P. Stirn's Patent Photographic Concealed Vest Cameras, Connon's design was transformed into the Wonder panoramic camera, further inspiring a succession of full-circle panoramic cameras including the Kodak Cirkut cameras. This thesis explores the history of Connon and his invention while acknowledging the history of this little-known Canadian inventor's important contribution to the history of photographic technology.

ACKNOWLEDGMENTS

Certain institutions and individuals were instrumental in the research and construction of this thesis. George Eastman House, Archives of Ontario, and most importantly the Wellington County Museum & Archives all house collections crucial for this research and provided me with excellent assistance accessing their materials. Faculty and staff at Ryerson University, including my first and second readers Robert Burley and Todd Gustavson, Technology Curator at George Eastman House, as well as Film & Photography Preservation & Collections Management programme director David Harris all deserve credit for encouraging and supporting me with my academic pursuits. I send a special thank-you to Brian Polden and Martin Magid for their valuable contributions to my research. Finally, I would like to recognize Robert Lansdale, editor for the Photographic Historical Society of Canada's publication *Photographic Canadiana*. His guidance, patience and enthusiasm kept me focused, excited and motivated to continue and promote this research into Canadian photographic history.

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INTRODUCTION

John Robert Connon (1862-1931) of Elora, Ontario, patented a full-circle panoramic camera in 1887. This was the first revolving panoramic camera made to use a roll of newly released flexible film, allowing it to capture a full 360-degree image in a single exposure.

The late nineteenth and early twentieth centuries represented a transitional and innovative period in the field of photography. Prior to Connon's invention, photographers had been limited to using metal or glass photographic plates to capture fine detail in their subjects. While they also had the option of using the paper negative process, this was considered an inferior method as it resulted in a lower resolution image. After its invention in 1851, the collodion process was preferable because of its reproducibility and clear results, but the use of glass plates made it cumbersome to carry out, particularly when photographing outside of the studio. Panoramic photography was affected by the same restrictions. Photographic panoramas made by a single exposure involved the use of a curved emulsion support and usually entailed large, unwieldy view cameras incapable of capturing a view of more than 150-degrees. Overcoming these physical limitations of the materials while striving for a reproducible and high quality photographic process was a challenge for many panorama photographers. Although a variety of innovative solutions were patented, it was the invention of flexible film that truly solved the issue of photography's materiality which had hindered development of panoramic photography.

Flexible roll films, first largely marketed by George Eastman, were not initially accepted by photographers. Early versions had inconsistencies and were unable to match the image quality of the glass plate. However, John Connon had been an enthusiast for this new method of making negatives and had already experimented with semi-transparent sensitized paper as an assistant in

his father's (Thomas Connon 1832-1899) traditional photography studio business. John Connon's early dedication to this new material was a key factor in the design and development of his full circle panoramic camera. Following the invention of Eastman's flexible film, his camera offered a new, unique and compact solution for creating 360-degree panoramic negatives. Ahead of its time, photographers and consumers were not yet aware of the possibilities for the panoramic format and Connon's camera never enjoyed great commercial success or historical recognition. Soon the camera was outdone by similar and improved versions patented by other inventors. Because of this, John R. Connon has had little attention for his contributions to the field of panoramic photography and most of what is known about him lies tucked away in numerous archives across Ontario. This thesis examines these collections to uncover the story of John Connon's 360-degree panoramic camera and explores how his invention contributed to the field of panoramic photography.

There is little published material available about the history of photography in Canada and I was hard pressed to find any mention of Connon and his contributions. As a result my research for this thesis employed many primary sources, dating from 1852 to 1956. I first heard about John Connon from a member of the Photographic Historical Society of Canada who had written a short article about him and had suggested there was more research to be done. I was intrigued by Connon's story and made my first visit to the Archives of Ontario in September of 2013, where a large collection of his textual records are kept. My objective was to investigate his life history as well as the unique qualities of his camera and why he was only rarely mentioned in published texts on the history of photographic cameras. What I found was a vast collection of letters, prints, negatives and other records that described a detailed story about this Canadian inventor who it appears has either been overlooked or forgotten in photography's history. My

research expanded to collections at other institutions across Ontario and New York State as I discovered how far Connon's invention had actually taken him.

My investigations have focused on the development, significance and context of John Connon's invention. Throughout this process I have come across a number of other important Canadian contributors to the field of photography that went unrecognized in existing written histories. This thesis aims to construct an account of one of those contributors, John R. Connon and his invention of the 360-degree panoramic camera. In this paper I analyze the factors that prevented Connon's historical acknowledgement by investigating the photographic industry at the time of his invention. By providing a background of the panoramic format, the Connon family and their involvement with photography, a description of related cameras, and an evaluation the factors that affected Connon's success, my goal is to not only reveal the story of John Connon but also explore his relationship to a fascinating time in photography's history.

Although little has been published that is specific to the invention of John R. Connon's panoramic camera, a survey has been conducted of relevant texts related to the history of panoramic photography and photographic technology, and the photographic industry during the late nineteenth century. The first section begins with a review of existing literature on the history of the panoramic format and camera technology, which examines panoramic painting and the history of panoramic cameras. The next section focuses on the photographic industry in North America during the late nineteenth century, including texts that refer specifically to the time period Connon was working in, in order to provide greater context for topics covered in this thesis. Following this is an examination into related published materials, such as newspaper and magazine articles. Each section pays particular attention to texts specifically referencing the Connons and photography. Finally this survey provides an overview of the primary source material located at various archival, library, and private collections that was referenced for this thesis.

The History of the Panoramic Format and Camera Technology

First, this section will investigate the history of popular optical illusions and spectacles beginning in the eighteenth century and continuing through the twentieth, focusing primarily on the panorama. As described in *Panoromania!*, this history begins with the invention of the panorama¹ in painted form by Robert Barker (1739-1836) in 1787, and is further explained by Comment,² Oettermann³ and Huhtamo⁴ who highlight its international popularity and begin to describe its integration with photography. In Daguerre's manual (1839), a new interpretation of the large-scale version is described in the format of the

¹ Ralph Hyde with introduction by Scott B. Wilcox, *Panoromania! :The Art and Entertainment of the "All-Embracing" View* (London: Trefoil Publications, 1988).

² Bernard Comment, *The Panorama*, trans. Anne-Marie Glasheen (London: Reaktion Books, 1999).

³ Stephen Oettermann, *The Panorama: History of a Mass Medium*, trans. Deborah Lucas Schneider (New York: Zone Books, 1997).

⁴ Huhtamo, Erkki, *Illusions in Motion: Media Archeology of the Moving Panorama and Related Spectacles* (Cambridge, MA: MIT Press, 2013).

diorama, an earlier invention by Daguerre that combined elements of image, light and three-dimensional space and contributed to his later invention of the daguerreotype⁵. This was the earliest link between the phenomenon of photography and the panoramic format I was able to find. Together, these sources provide a history of the panorama and an explanation of the desire to combine it with the medium of photography.

Books focusing on the history of cameras, such as those by Lothrop⁶, Gustavson,⁷ Coe,⁸ and Auer⁹ provide useful timelines describing historical cameras used to create panoramic photography. None examine Connon's camera, but they do illustrate the capabilities of most panoramic cameras during the time Connon was working on his invention, demonstrating where his invention fits into this history. These books all include the Wonder panoramic camera, a camera based on Connon's design, but descriptions of its history are inconsistent. Lothrop states:

“Designed by J.R. Connon, and patented by Carl P. Stirn, New York, N.Y. (U.S. Patent 418,343, December 31, 1889). Manufactured by Rudolf Stirn, Berlin, Germany, and marketed in America by Stirn & Lyons, New York, N.Y... The Wonder Panoramic Camera is another example of the collaboration of Carl P. Stirn, New York, as patentee, though not always as inventor, and his brother, Rudolf Stirn, Berlin, Germany, as manufacturer of a camera.”⁶

Gustavson's description of the origins of this camera is more general, solely crediting its creator as “made by Rudolf Stirn in Berlin, Germany.”⁷ Coe states that “on 6 May, 1887, the American J.R. Connon was granted an English patent for a rotating-camera design; his apparatus had a cord drive for turning the film rollers as the camera rotated. Carl P. Stirn patented an improved version of Connon's design in England on 25 April, 1889. Manufactured by Stirn of Berlin, it was sold as the Wonder Panoramic camera.”⁸

However, Connon was in fact a Canadian, not an American. Michel Auer reiterates this statement.⁹

⁵ Louis Jacques Mandé Daguerre, *An Historical and Descriptive Account of the Various Processes of the Daguerreotype and the Diorama*, (1839, repr., New York: Winter House, 1971) 81-86.

⁶ Eaton S. Lothrop, *A Century of Cameras from the Collection of the International Museum of Photography at George Eastman House* (Dobbs Ferry New York: Morgan & Morgan, 1982), 56.

⁷ Todd Gustavson, *500 Cameras: 170 Years of Photographic Innovation* (Toronto: Sterling Publication Co., Inc., 2011), 318.

⁸ Brian Coe, *Cameras: From Daguerreotypes to Instant Pictures* (Gothenburg, Sweden: A.B. Norbrook, 1978), p. 169-176.

⁹ Michel Auer, *The Illustrated History of the Camera from 1839 to the Present* (Boston: New York Graphic Society, 1975), 261.

This section concludes with an examination of literature dedicated to the history of panoramic photography and its variant formats. Panoramic photography is often briefly noted in general photographic history texts. Rosenblum¹⁰ provides the most detailed account of the genre, with reference to well-known photographers such as Friedrich von Martens and Eadweard Muybridge. Harris¹¹, in looking at the works of Eadweard Muybridge, describes the techniques of creating panoramic photographs using multiple images. Through 2002 to 2004 Brian Polden wrote a series of five short essays for *Photographica World* that outline the history of panoramic cameras. The most relevant is the fourth essay, which mentions Connon and Stirn's camera designs in relation to other similar cameras. Together the articles create an overview of the development of panoramic photography by means of examining specific examples of camera technology beginning in the 1860s and throughout the 1990s. Continuing this history, McBride¹² discusses the development of the No. 10 Cirkut camera up to the 1940s. The sources in this section provide a description of the history of panoramic camera technology and help to contextualize Connon's camera, however none discuss the connection between Connon and Stirn, or suggest that his ideas may have been misappropriated.

The Photographic Industry in North America During the Late Nineteenth Century

In his book *Early Photography in Canada*¹³ Ralph Greenhill neglects to mention Connon, however in a later publication from 1979 by Greenhill and Birell two paragraphs are included which describe the photographer's invention, stating:

“Eastman's paper stripping film was used by John Robert Connon (1862-1931) of Elora, Ont. in his ‘whole-circle’ panoramic camera, which he patented in 1887 in Britain and the United States (it was patented a year later in Canada). This camera was marketed in 1890 by Stirn & Lyon of

¹⁰ Naomi Rosenblum, *A World History of Photography* (New York: Abbeville Press, 2007), 97-98.

¹¹ David Harris, *Eadweard Muybridge and the Photographic Panorama of San Francisco, 1850-1880* (Montreal, Quebec: Canadian Centre for Architecture, 1993) 38-51.

¹² McBride, Bill, “Evolution of the No. 10 Cirkut Camera” *Graflex Historic Quarterly* 4, no. 4 (fourth quarter 2009), 4-7.

¹³ Ralph Greenhill, *Early Photography in Canada* (Toronto: Oxford University Press, 1965).

New York (famous for their ‘Concealed Vest Camera’, for which, incidentally, Connon made sample photographs) and was advertised by them as ‘The Wonder Camera’.¹⁴

Although brief, it is a relevant description of Connon and his panoramic camera and is followed by a short history of the Connon family. The text also briefly introduces business relationships Connon developed with George Eastman and C.P. Stirn.

Jenkins provides a particularly useful background on the history of the photographic industry in the late nineteenth and early twentieth centuries in his book *Images and Enterprise*¹⁵. This source provides an overview of the most successful photography companies at the time while also outlining major developments contributing to the evolution of the medium. Collins¹⁶ history of the Kodak Company complements and expands upon that described by Jenkins, while Brayer¹⁷ and Ackerman¹⁸ portray the story from Eastman’s point of view. These texts help to situate Connon’s invention during a time when photographic technology was changing at breakneck speed.

Additional books to note in this section include MacKay’s *America by the Yard: Cirkut Camera Images from the Early Twentieth Century*¹⁹, which provides a detailed history of the evolution of Kodak’s Cirkut camera through the eyes of a panorama photographer. Also, Mina Hammer Fisher, niece of David H. Houston (1841-1906), one of the first patent holders for a roll film holder, provides a unique perspective of the Kodak Company from another inventor from Connon’s time.²⁰

Related Newspaper and Magazine Articles

In a number of contemporary articles found in un-refereed publications John R. Connon does

¹⁴ Ralph Greenhill and Andrew Birell, *Canadian Photography 1839-1920* (Toronto: Coach House Press, 1979) 116-117.

¹⁵ Jenkins, Reese V. *Images and Enterprise: Technology and the American Photographic Industry, 1839 to 1925* (Baltimore: John Hopkins University Press, 1975).

¹⁶ Collins, Douglas, *The Story of Kodak*, (New York: H. N. Abrams, 1990).

¹⁷ Brayer, Elizabeth, *George Eastman: A Biography*, (Baltimore: John Hopkins University Press, 1996).

¹⁸ Ackerman, Carl W., *George Eastman* (Boston: Houghton Mifflin, 1930).

¹⁹ Robert B. Mackay, *America by the Yard: Cirkut Camera Images from the Early Twentieth Century* (New York: W. Norton, 2009), 8-24.

²⁰ Mina Fisher Hammer, *History of the Kodak and its Continuations: the First Folding Panoramic Cameras* (New York: The House of Little Books, 1940) 34-35.

receive some mention suggesting his story has caught the attention of collectors, enthusiasts and amateur historians. Writers Steve Thorning²¹, Charles Long²², Claire Champ²³ and Robert Lansdale²⁴ have all written short articles about John R. Connon, in order to highlight his achievements as a Canadian photographer, inventor and historian in the Ontario area. One article in *The Photo-Miniature*²⁵, discusses a timeline of the development of the panoramic camera and Connon's camera is listed amongst other panoramic cameras of the time, however his name has been misspelled as "Cannon,". *Focus: A Journal of Photographic Interest*²⁶ featured an article that attempts to defend Connon's claim to the kind of panoramic camera that he had patented, demonstrating an early acknowledgement of Connon's originality and of how he lost out to improved versions of his camera patented shortly after his own.

Summary

The source material listed above suggests strong interest in the topic of the panorama historically, but there are few published sources which look at panoramic photographic technology. There are many sources that discuss the No. 10 Cirkut camera, some that mention the Wonder panoramic camera, few that mention John R. Connon and even less that mention his 360-degree panoramic camera. The sources that approach the subject of Connon's camera tend to be brief and factually inconsistent. Direct references to Connon's involvement with the Wonder panoramic camera occur less often. A void of information about Connon and his panoramic camera invention has been identified through the examination of secondary sources on the history of panoramic camera technology.

²¹ Steve Thorning, "Connon became a full-time photographer after European trip," *Elora Sentinel and Fergus Thistle*, (March 22, 1994).

²² Charles Long, "In the Round," *Beaver* 80, no. 2 (April-May, 2000): 28-33.

²³ Claire Champ, "Connon, Thomas," *Dictionary of Canadian Biography Online*, vol. 12, (University of Toronto/Université Laval, 2003–) accessed 23 September 2013, http://www.biographi.ca/en/bio/connon_thomas_12E.html.

²⁴ Robert Lansdale, "Shean Collection Includes History," *Photographic Canadiana* 28, no. 5 (March-April, 2003): 7.

²⁵ "Panoramic Photography," *The Photo-Miniature*, vol. 7 (October 1905): 1-12.

²⁶ "Photography's Advances," *Focus: A Journal of Photographic Interest*, vol. 3 no. 4 (April 1913, Montreal): 10-14.

Archival Collections

Most of the cited material has come from collections of primary sources that include textual records, photographic records, and pieces of photographic technology. The collections are housed at Archives of Ontario (Toronto, Ontario)²⁷, Wellington County Museum & Archives (Elora, Ontario)²⁸, Guelph University Library (Guelph, Ontario)²⁹, Library and Archives Canada (Ottawa, Ontario)³⁰ and George Eastman House (Rochester, New York)³¹. Some elements of private collections have also been included, such as the last known existing piece from John Connon's panoramic camera.

The Connon family fonds is housed at Archives of Ontario and is made up of textual records, photographic slides, prints and negatives divided into six different series. Particularly important to this research are the twenty-six files of textual records that include letters, receipts, personal memoirs, and sketches that illuminate the story of John R. Connon's invention. The letters are a combination of both personal and professional correspondence that provide documentation about the design and manufacture of the camera. There are also records and receipts which clearly illustrate how the camera was made, modified and operated. The photographs in this collection are very relevant to this thesis as there are both photographs of Connon's panoramic camera as well as photographs made with the camera. Also significant to the Connon family fonds are the original Canadian, American, and British patents taken out by John Connon in 1887 and 1888.

Another collection of Connon material can be found at the Wellington County Museum and Archives and includes: correspondence, prints and negatives. Most of this is personal and family correspondence, but some does refer to the camera invention as well as Thomas Connon's move to Canada and his decision to become a photographer by trade. Of particular importance is the collection of original panoramic prints and negatives, made by John R. Connon using both paper negatives and

²⁷ Connon family fonds, 1887-1967, fonds 286, panoramic prints and negatives, Archives of Ontario, Toronto, Ontario.

²⁸ Wellington County Museum & Archives, Connon correspondence, prints and negatives, record group A1977.67.

²⁹ University of Guelph Library, Connon Collection.

³⁰ Library and Archives Canada, Charles T. Corke Collection, R10027-0-9, John R. Connon fonds, MG30-D336.

³¹ George Eastman House, Technology Collection, Panoramic cameras.

nitrocellulose transparent negatives. Additional photographic prints and negatives created by the Connon Studio in Elora can also be found at Guelph University Library, as well as Library and Archives Canada. Guelph University Library also holds a vast collection of material related to John R. Connon's later professional pursuit as a historian for the village of Elora. While I quickly reviewed this material I discovered it was not relevant to this thesis and therefore, it is not referenced in this paper.

1. THE PANORAMA AND ITS ORIGINS

History of the Panoramic Format

Prior to the first public announcement of photography's invention in 1839, the panorama was a new and exciting format that had only recently been patented as an improvement on painting by Englishman, Robert Barker, in 1787. This idea grew out of the Age of Enlightenment, a time of a new interest and experimentation with optics and colour which led to the development of numerous amusements combining light, image, movement and sound. The panorama's ability to portray reality and successfully incorporate three-dimensional elements in a way never seen before made it a spectacle that attracted large crowds³² comparable to that of the modern day motion picture. The fact that the panorama was deemed patentable at all suggests the idea was unique, marketable, and had monetary value.

The type of panorama that Barker had patented was made with pre-photographic methods such as painting and engraving. Often the initial concept for the panorama would be drafted using the medium of engraving. Because of the large scale of the painted panorama, these engravings are the primary surviving documents that illustrate many of the spectacular panoramas built during the late eighteenth and nineteenth centuries.³³ The completed panorama, as outlined by Barker's patent, was in the form of a large-scale painting that usually portrayed a landscape of a far-away place, or a scene from a recent event, war, or fictional story. Its exhibition required that the spectator enter a cylindrical room with a raised platform to become completely surrounded by the painting. The upper and lower margins were hidden, and skylight illumination fell onto the painting from behind an overhanging canopy, preventing shadows from interfering with the audiences' view of the image.³⁴

³² Huhtamo, Erkki, *Illusions in Motion: Media Archeology of the Moving Panorama and Related Spectacles* (Cambridge, MA: MIT Press, 2013) 3-4.

³³ Scott B. Wilcox, introduction to *Panoramania! : The Art and Entertainment of the "All-Embracing" View* by Ralph Hyde (London: Trefoil Publications, 1988) 16.

³⁴ Scott B. Wilcox, introduction to *Panoramania! : The Art and Entertainment of the "All-Embracing" View* by Ralph Hyde (London: Trefoil Publications, 1988) 17-21.

Figure 1. Unknown,
Section of the
Rotunda, Leicester
Square, in which is
exhibited the
Panorama. 1801.
Hand-coloured
aquatint etching ;
3.21 x 4.67 cm. © The
Trustees of the
British Museum.

In 1789, Mr. Barker's *Interesting and Novel view of the City and Castle of Edinburgh, and the whole adjacent and surrounding country* was exhibited in Barker's home but with little success, as it was of smaller scale and did not portray a full 360-degree circle. In order to fully recognize his vision, Barker erected a 250m² rotunda at Leicester Square in London, U.K. (see figure 1), where he exhibited *London from the Roof of Albion Mills*, which was an immediate success with the crowds. The format soon became an international craze, reaching New York by 1795 and Paris by 1800.³⁵ The panorama remained popular throughout the nineteenth century and soon included new elements from other amusements like the diorama and the magic lantern, adding theatre, light, and movement to create a magical experience for the viewer. Alternative versions, such as the moving panorama, used a long roll of painted canvas advanced across a stage adding the illusion of seeing the image from a moving vehicle.³⁶ As each new version was introduced the panorama quickly established itself as a form of entertainment which attracted large audiences as well as an opportunity for profit. This fascination with light and image created the perfect atmosphere for photography's introduction, by means of the daguerreotype, the first commercially successful photographic process announced in 1839.

³⁵ Ibid., 13.

³⁶ Huhtamo, Erkki, *Illusions in Motion: Media Archeology of the Moving Panorama and Related Spectacles* (Cambridge, MA: MIT Press, 2013) 5-7.

Louis Jacques Mandé Daguerre (1787-1851), trained as painter and patent-holder for the daguerreotype was engrossed in a lifelong pursuit of optical amusements involving light and image. He had already contributed to this field of entertainment with his invention of the diorama in 1822, which like the panorama, was viewed in a specially designed auditorium to show the audience a standard painted landscape in a fresh and original way.³⁷ Scenes hand-painted on linen were lit through coloured screens with natural light creating the illusion of depth and atmosphere in the scene. Showings of the diorama would present multiple scenes by rotating the audience platform to reveal a new scene.³⁸ His announcement of the daguerreotype, a photograph captured on a surface of silver-plated copper, created an even larger phenomenon, as never before had such an image been captured on a two-dimensional plane.

The Incorporation of the Panorama into Photography

With the public so entranced by both the larger-than-life panorama and the intricate photographic image of the daguerreotype, it is not surprising that a desire to combine the two arose immediately after photography was first introduced. The concept of a panorama had already proven itself complicated for painters, not only because of its large-scale and complicated construction, but also due to complex issues related to perspective. The artist was challenged to find a methodology that provided a believable image with accurate perspective on a curved canvas support. However, the photographer attempting to create a panoramic image was even more limited by his or her materials, especially during the nineteenth century. Early photographic processes capable of sharp and clear images included the daguerreotype and collodion wet-plate process, both of which required the use of inflexible emulsion supports of metal and glass respectively. Paper processes allowed for flexibility to bend the material and eliminate image distortion, but could not provide the detail of the preferred processes mentioned above. These particular qualities of

³⁷ Helmut and Alison Gernsheim, *L.J.M. Daguerre (1787-1851): The World's First Photographer and Inventor of the Daguerreotype* (New York: World Pub., 1956) 15-18.

³⁸ Louis Jacques Mandé Daguerre, *An Historical and Descriptive Account of the Various Processes of the Daguerreotype and the Diorama*, (1839, repr., New York: Winter House, 1971) 81-86.

photography presented additional challenges as artists and photographers attempted to create the panorama in photographic form.

The available photographic processes seriously challenged anyone wanting to capture a panoramic image on a single plate. To make a photograph that is wider than the average focal plane without distortion, the camera lens needs to rotate while remaining an equal distance from a controlled area of the sensitized surface of the photographic plate (see figure 2). This rotation must

Figure 2. Rotating-lens panoramic cameras. From: Polden, Brian. "Photography at Length, Part 1." *Photographica World* 100 no. 2 (2002): 9.

occur at a specific pivot point to preserve the perspective of the final image.³⁹ This point is particularly difficult to find in a photographic lens which features multiple components precisely arranged and hidden within the lens barrel. In 1889, military engineer Paul Moëssard described a method for making a study of a photographic lens using an instrument called the "Tourniquet" that eased the construction of a panoramic camera. The method can be used to find the focal length and pivot point of the lens, as well as the ideal width of the exposure slit and the length and curvature of the arc.⁴⁰ Prior to this date most photographers were working with the silver plated copper support of the daguerreotype, or glass plates sensitized with silver nitrate on collodion. Without knowledge of Moëssard's "Tourniquet" identifying the ideal specifications for a panoramic camera lens while condoning to the restrictions caused by the rigid support of the photographic emulsion posed multiple obstacles that made combining the panorama with photography complicated, and with most camera systems, impossible.

Methods for making photographic panoramas advanced with the photographic technologies available. Prior to the invention of any sort of specialized panoramic cameras, photographers seeking to create a panoramic image would do so by making separate exposures to create a sequence of individual images. The most basic version of this is exemplified by those made using the daguerreotype process, as

³⁹ Brian Polden, *Photography at Length - The Authentic History of Panoramic Cameras*, (Unpublished manuscript, received March 25, 2014): 61-62.

⁴⁰ Paul Moëssard, *Etudes des lentilles et objectifs photographiques*, (Paris: Gauthier-Villars, 1889): 24-27.

can be seen in the 1848 panorama of Cincinnati, made by Charles Fontayne and William Porter (see figure 3). Using a standard camera on a tripod, after each exposure the photographer “would turn the camera a predetermined amount before exposing the next plate, so that each image would maintain a continuous horizon line and overlap slightly with the image of the preceding plate.”⁴¹ After development, these images could be cropped, trimmed, and mounted as desired, but with the daguerreotype format, the opportunity for editing was minimal. The daguerreotype, being a direct-positive process, also posed the issue that the captured images appear reversed. This meant that minor changes to the camera angle when attempting to take consecutive images would often result in a panorama that did not line up consistently. Yet, when done well, these segmented images would be displayed side by side, each with an individual frame, in a presentation often compared to looking through a window.

Figure 3. Fontayne and Porter, *Daguerreotype View of Cincinnati*. September 1848. 8 full-plate daguerreotypes; 16.5 x 21.6 cm. Public Library of Cincinnati and Hamilton County.

As glass plate negatives and paper prints (typically albumen) became popular throughout the 1860s, the technique of making segmented panoramas continued with different methods of display. In his panoramas of San Francisco, photographer and inventor Eadweard Muybridge employed the segmented

Figure 4. Eadweard Muybridge, *Panoramic San Francisco from California Street hill*. 1877. 1 photomechanical print in booklet ; unfolds to 12.7 x 146 cm. Library of Congress.

photographic panorama and adapted it to new processes. Using a process that made it easier to reproduce photographs, and no longer limited by the boundaries of a rigid metal support, many of Muybridge’s views used the same method as the daguerreotype panoramas. However, with paper prints Muybridge’s

⁴¹ David Harris, *Eadweard Muybridge and the Photographic Panorama of San Francisco, 1850-1880* (Montreal, Quebec: Canadian Centre for Architecture, 1993) 40.

final presentations were realized as foldout sections of books and albums⁴² (see figure 4). This new process also allowed Muybridge to experiment with overlapping prints and/or negatives, cropping and rephotographing them to create continuous images pasted together to appear as a single panorama with a view capable of exceeding 360 degrees in a single print (see figure 5). This still took time and skill, as the photographer needed to be aware of light, shadow, angle, and spacing of the exposures. Although Muybridge went on to further expand the possibilities of photography in his time and motion studies, his panoramas remain noteworthy as examples of a photographer pushing the medium's limits using early photographic technologies.⁴³

Figure 5. Eadweard Muybridge, *Panorama of San Francisco from California Street - Hill*. c. 1877. 1 photographic print : albumen silver ; image and sheet 19.2 x 28.2 cm. Library of Congress.

Assembling a number of negatives to create a single image was a labour intensive process and photographers continued to seek more efficient methods to create a photographic panorama in a single negative. The first concept to accomplish this required the use of a curved plate or support for the photosensitive emulsion with the use of a specialized panoramic camera. These cameras worked as

scanning cameras, where the curved sensitized plate was placed inside a stationary camera box while the lens was made to swivel around the camera's centre of perspective (see figure 6).

Figure 6. Plan view of the design principle. From: Poldeen, Brian. "Photography at Length, Part 1." *Photographica World* 100 no. 2 (2002): 9.

⁴² David Harris, *Eadweard Muybridge and the Photographic Panorama of San Francisco, 1850-1880*, 48-51.

⁴³ Robert Bartlett Haas, *Muybridge: Man in Motion* (Berkeley: University of California Press, 1976): 84-88.

Left: Figure 7. Megaskop Panoramic Camera, ca. 1854. From: Auer, Michel. *The Illustrated History of the Camera*. (Boston: New York Graphic Society, 1975): 262

Right: Figure 8. Josef Puchberger and Wenzel Prokesch. *Ellipsen Daguerreotype*. Austrian Patent no. 42086, issued June 16, 1843. From: Polden, Brian. "Photography at Length, Part 1." *Photographica World* 100 no. 2 (2002): 12.

Above: Figure 9. Thomas Sutton, *View Camera*. c. 1861. Panoramic camera ; 28 x 35 x 31 cm. Museum of Victoria, Australia.

This concept is exemplified by the Megaskop Panoramic Camera (see figure 7)⁴⁴ and the Ellipsen Daguerreotype (see figure 8)⁴⁵ panoramic camera. The daguerreotype image support used in both examples was flexed into a curved, circular shape so that the image would remain an equal distance from the lens as it turned, keeping it in focus. Another camera that featured the use of a curved and rigid emulsion support was Thomas Sutton's View Camera of 1861 (see figure 9). Sutton's camera used specially made collodion glass plate

negatives and rather than a swinging lens it instead used a unique globular water-filled lens to compensate for altered perspective. However, these efforts for creating photographic panoramas fell short of expectations due the limits of the camera and film technology of their time. Specifically, each of these

⁴⁴ Brian Polden, "Photography at Length, Part 2: Martens, the Megaskop and beyond," *Photographica World* 102 no. 4 (2002): 33-36.

⁴⁵ Brian Polden, "Photography at Length, Part 1," *Photographica World* 100 no. 2 (2002): 11-16.

cameras did not rotate with the lens and thus, achieving a full circle was not possible making it rare to find a device that could capture more than 150 degrees.⁴⁶

As the popularity of the collodion glass plate negative process increased, new concepts for capturing a panorama on a flat support appeared. The Pantoscopic (see figure 10) allowed for multiple focal lengths, but could only capture images up to 110 degrees. The Gem Panorama (see figure 11), a later example not patented until 1889, had a clever design that was capable of capturing a view of up to 360-degrees⁴⁷ Yet it still had the issue of being large and cumbersome requiring the use of heavy glass plates half a meter in length, inconvenient for any photographer using recently introduced dry plates, hoping to travel with the camera to capture a landscape view.

Figure 10. Johnson and Harrison, Pantoscopic Camera No 32. 1862. National Media Museum, Bradford, United Kingdom.

Despite the introduction of many cameras that attempted to combine the mediums of

Figure 11. Benoist brothers, Gem Panorama. Made by M. Molteni, 1889. From: Polden, Brian. "Photography at Length, Part 3: Curved images on flat plates." *Photographica World* 104 no. 2 (2003): 18.

panorama and photography, the photographic processes available prior to the 1880s prevented the successful realization of any full-circle panoramic camera. However, during this decade, advancements to the photographic medium provided photographers with new opportunities for making photographs, particularly panoramas. Flexible roll films produced by the Eastman Dry Plate and Film Company of Rochester, New York, soon to become the Eastman Kodak Company, allowed for small format cameras,

⁴⁶ Brian Polden, "Photography at Length, Part 3: Curved images on flat plates," *Photographica World* 104 no. 2 (2003): 11-12.

⁴⁷ Ibid. 13-19.

such as the Kodak, that could be easily transported to capture any desired view,⁴⁸ beginning the ‘snapshot’ movement. Ultimately, this new development would revolutionize photography, and the timeline of its improvements closely mirror the invention of what may be considered the first 360-degree panoramic camera for use with flexible film (see figure 12), by John R. Connon of Elora Ontario.

Figure 12. Thomas or John R. Connon, [John Connon's whole circuit panorama camera, patented in Britain and the United States in 1887 and Canada in 1888. Camera set up on a river, likely the Elora Gorge.], ca. 1887. Whole circuit panoramic camera file, Prints, tintypes and documentary art series, Connon family fonds, C 286-5-0-9, Archives of Ontario.

⁴⁸ Reese Jenkins *Images and Enterprise: Technology and the American Photographic Industry, 1839-1925* (Baltimore: John Hopkins University Press, 1987): 96-122.

2. THOMAS & JOHN CONNON: EARLY PHOTOGRAPHIC INVOLVEMENT

Thomas Connon's Arrival in Canada

Thomas Connon (see figure 13), the father of John Connon (see figure 14), was born on the farm of Tillyeve, in the Parish of Udny, Aberdeenshire, Scotland on September 14, 1832. At the age of 8, Thomas moved to the farm of Elfhill, near Stonehaven, which was where he received his education. While serving an apprenticeship in the City of Aberdeen at a wholesale grocery he dreamed of visiting Niagara Falls – his son John later described him as having “that love of adventure which has peopled the earth with Scotsmen”⁴⁹. Thomas immigrated to Canada in 1852, first arriving in Beamsville, Ontario, and later settling in Elora in 1853 where he continued to pursue a merchant's career, going in and out of partnerships with other grocers in the area⁵⁰. Eventually Connon resolved to set up his own business, operating a general store in Elora. The original building located at the corner of Mill and Metcalfe Streets still stands today (see figure 15).

Figure 13. [Portrait of Thomas Connon], ca. 1880. A1954.16.43, ph485, Wellington County Museum and Archives.

⁴⁹ John R. Connon, *The Early History of Elora, Ontario, and Vicinity*, (Elora ON: Elora Express and Fergus News Record, 1906) 188-190.

⁵⁰ Elizabeth Connon to Thomas Connon, 14 September 1852 - 28 September 1861, Connon family correspondence 1852-1930, Wellington County Museum and Archives, Elora, Ontario.

Figure 14. [Portrait of John Robert Connon], ca. 1880. A1954.154.2, p3344, Wellington County Museum and Archives.

The transition from citizen of populated Scotland to early settler of Upper Canada was difficult for Thomas. The village of Elora, made up primarily of other immigrants from the Scottish council area of Aberdeenshire, was then “on the edge of civilization”, situated northwest of the small hamlet of Guelph, about equal distance from both Toronto and Hamilton, both rapidly growing cities at the time. He relied heavily on loans from his Aunt Elizabeth to help establish his business, and also kept in close contact with her for updates about his father and brothers still residing in Scotland. Despite his struggles, Thomas became an officer of the Elora Rifle Company and an active member of the community. In his early years,

painting and drawing were his favourite hobbies and Thomas considered pursuing a career as an artist – but later decided against this path having been warned about his poor prospects for income.⁵¹ Some of his landscape paintings are held in the collections of both the Wellington County Museum & Archives and Archives of Ontario. In an 1851 issue of *Art Journal*, Thomas had read about the Great London Exhibition of 1851 where advertisements for the latest improvements in photography caught his eye. He first began to experiment with the medium shortly after his arrival in Elora.⁵² During this time, Thomas also met Jean Keith (1835-1909), who was described as the “first white child born on the West side of

⁵¹ Elizabeth Connon to Thomas Connon, 12 January 1853, Connon family correspondence 1852-1930, Wellington County Museum and Archives, Elora, Ontario.

⁵² John R. Connon, *The Early History of Elora, Ontario, and Vicinity*, 189.

the Grand River⁵³ and the daughter of John Keith, a carpenter who had also emigrated from Scotland.

Jean and Thomas were married on November 4, 1854.

Pursuing an Artist's Dream through the Medium of Photography

In 1859 Thomas began to make photographs for profit while running his general store. His top-floor studio was located in the back of the building and looked out over the Grand River of the Elora Gorge, an attraction of Elora that had drawn Thomas to settle there. He was the first photographer in the area and work from his studio is today referenced as significant documentation of the village's early history. In part of his regular correspondence from the spring of 1864 with his Aunt Elizabeth, Thomas described building this new studio as well as his intention to embark upon on the new trade full-time in the coming years.⁵⁴ In August of 1867 Thomas left his wife and children in Elora and returned to

Figure 15. Thomas Cannon, [The Cannon Photography Studio in Elora], ca. 1863. Shop fronts file, Lantern slides series, Cannon family fonds, C 286-3-0-16, Archives of Ontario.

Aberdeenshire for the last time.

During his visit he spent time

photographing his family before

traveling to Paris, where he attended

Figure 16. John Robert Cannon fonds, [Thomas Cannon family home and studio], ca. 1872. Photographic print. Library and Archives Canada, accession number 1984-007NPC, MIKAN no. 3716059, R1872-0-5-E.

⁵³ Gerald Noonan, Introduction to *The Early History of Elora, Ontario, and Vicinity* by John R. Cannon, reprint, (Waterloo, Ontario: Wilfrid Laurier Press, 1975) viii.

⁵⁴ Thomas Cannon to Elizabeth Cannon, 21 June 1864, Cannon family correspondence 1852-1930, Wellington County Museum and Archives, Elora, Ontario.

the Paris Exhibition. When finally returning to Elora, Thomas ended his career as a merchant, and dedicated himself to photography. The last letter that Thomas would ever receive from his father, in March of 1872, describes another request from Thomas for financial aid.⁵⁵ Thomas was saving \$400, which was the amount that he would need to build his own gallery, “a building erected for the purpose at the corner of Geddes and Moir streets.”⁵⁶ It was completed in the spring of that same year (see figure 16). Meanwhile, as his photography business grew, so did his family. His marriage to Jean produced three children (see figure 17), Elizabeth Connon Grant (1855-1925), John Robert Connon (1862-1931), and Thomas George Connon (1869-1936).

Figure 17. [Connon family portrait], ca. 1880. A1978.154.1, ph3343, Wellington County Museum and Archives.

⁵⁵ Thomas Connon to Thomas Connon, 20 March 1872, Connon family correspondence 1852-1930, Wellington County Museum and Archives, Elora, Ontario.

⁵⁶ John R. Connon, *The Early History of Elora, Ontario, and Vicinity*, 189.

John R. Connon Adopting the Family Trade

Whilst his eldest and youngest children went on to pursue their own professions, Thomas Connon's eldest son, John R. Connon, took up an interest in the photography trade at a young age (see figure 18). As John grew up he watched his father's business expand and actively assisted in the picture room, making portraits of and getting to know many individuals from the local community (see figure 19). Living in an early

Canadian settlement with the nearest photography supplier hours away in Hamilton, Ontario, Thomas learned to be self-sufficient while developing an in-depth knowledge of his tools and trade. This was

evident in the numerous cameras that Connon either built or modified for use in his studio. As out-sourced developing and printing practices were expensive, Thomas also had to be very proficient in

Figure 18. Thomas Connon, [Two images of John R. Connon, aged five], 1867. Connon family - portraits and family home file, Prints tintypes and documentary art series, Connon family fonds, C 286-5-0-1, Archives of Ontario.

Figure 19. [Group of people standing on steps and looking out at photographer John Connon], ca. 1915. Portraits – informal file, Lantern slides series, Connon family fonds, C 286-3-0-12, Archives of Ontario.

carrying out his own darkroom procedures. The elder Connon trained John in the popular photographic processes of the time, including daguerreotype and wet-plate collodion. Soon, John was accomplished enough to become a valuable asset to the family's photography business, and the studio stamps on the cabinet card portraits from the Connon studio changed from "T. Connon, Photographer" to "Elora Art Studio" (see figure 20).

Like his father, John had an artistic eye and an appreciation for the Canadian landscape. In his

free time he would spend time travelling throughout Ontario, on trips both with and without his father, to make pictures (see figure 21). Between the time John first took an interest in photography as a child and his development into a professional, the medium of photography had advanced and grown at an overwhelming pace. New chemical processes, improved photographic products and innovations in lens and camera technology all contributed to photography's explosive growth as art form, application and enterprise in the latter part of the nineteenth century. For example, when John first took an interest in his father's photographic business,

Figure 20. [Connor studio cabinet], ca. 1870. Private collection, Ontario.

a newly introduced dry-plate process allowed him to hike down into the Elora Gorge and capture views of the local scenery. Using new photographic papers available through a number of recently established companies - he would sell these pictures as novelty items or postcards, eventually becoming acquainted with other photographers and manufacturers across the province. By the time John had taken up his full-time role in the studio he had already created a method that combined both dry plate and a new camera shutter technology. This enabled the Connor studio to begin offering outdoor group portraiture (see figure 22) – a service that had been previously unavailable due to photography's earlier technical

Figure 21. John or Thomas Connor [Winter scene of Irvine River, Elora], ca. 1875. A1961.8.3, ph636, Wellington County Museum and Archives.

limitations. As Thomas had followed photography's evolution from the cumbersome and complex daguerreotype to the easy-to-use dry-plate, John continued to follow the field's endless series of advancements and incorporate them into the family business.

Figure 22. John or Thomas Connon. [Young men in Elora Gorge], ca. 1880. A1957.18.1, ph636, Wellington County Museum and Archives.

3. CHALLENGING THE LIMITATIONS OF THE PHOTOGRAPHIC MEDIUM

Cameras & Roll-holders

Prior to the success of the Eastman Kodak Company, the photographic industry was comprised of a number of moderately successful manufacturers and suppliers that shared the bulk of the market. It was a time of innovation and many inventors were acquiring patents for any idea which might prove successful in this rapidly growing market. During a time when photography was limited to professionals with the requisite equipment and understanding of chemical processes, both Thomas and John were optimistic that they might find additional ways to profit from their knowledge of photography, often times thinking beyond the scope of their small-town studio business. Noted in many letters between father and son were various ideas and inventions for their practice.

A story told multiple times in the Connon family fonds⁵⁷ is how, while building a stereoscopic camera, Thomas often spoke of painting photographic emulsion onto something like a spool of ribbon instead of a metal or glass plate. Thinking that a flexible film support would solve a number of the problems with his stereo camera, Thomas drew up a roll-holder design (see figure 23) and in 1881 mailed it to acquaintances at Lyon & Alexander of Toronto, Ontario, Canada, asking if it might be an idea worth pursuing. He received a reply stating that it was too expensive to manufacture with at the time. Some years later, shortly after reading an article in the October 17, 1885 issue of *Scientific American* about a new roll-holder being manufactured by the Eastman Dry Plate and Film Company, Thomas contacted them again,

Figure 23. Thomas Connon, [Roll holder design], ca. 1881. Drawings and descriptions file, textual records series, Connon family fonds, C 286-6-0-23, Archives of Ontario.

⁵⁷ Archives of Ontario, series 286-6, Connon family fonds, textual records, 1832-1967.

asking if they still had his letter.⁵⁸ He received a reply from Alexander, stating that he recalled the letter, but that it had gone missing from their records.⁵⁹ To his death John Connon insisted that this letter did not go missing accidentally, and that the idea was stolen for the Eastman-Walker roll-holder.⁶⁰ He and Thomas are quoted as saying it was an invention “lost to Canada from want of means not brains.”⁶¹ However, many other inventors, such as Leon Warnerke, proposed similar concepts that also did not achieve the success of George Eastman.

As John continued to work in the studio, he watched his father’s ongoing work to improve upon the business he had built. He acquired the entrepreneurial traits of his father and by watching his father’s dedication to his work; John was motivated to contribute to their common passion for photography. Because of his own feeling of loss with the roll holder, Thomas strongly encouraged John to pursue his own ideas and inventions rather than settle into the life of a small town photographer.

Shutters & Other Experimentation

As Thomas continued to operate the studio in Elora, John began experimenting with the possibilities of photography while assisting his father. During the transition from wet to dry plate photography, in 1882 John began photographing group portraits outdoors by the river. However, he needed a method for making exposures while also keeping an eye on the group to ensure they remained still and in position. In a time when film

Figure 24. Thomas Connon, [John R. Connon posed in studio with camera], ca. 1885. Portraits file, Glass plate negatives series, Connon family fonds, C 286-1-0-11-9, Archives of Ontario.

⁵⁸ Thomas Connon to Mr. ’s Lyon and Alexander, 21 October 1885, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁵⁹ Lyon and Alexander to Thomas Connon, 25 October, 1885, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁶⁰ John R. Connon, *The Early History of Elora, Ontario, and Vicinity*, 189.

⁶¹ Thomas Connon to W. A. Lyon, 10 November 1886, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

lacked high sensitivity and required long exposures photographers had to uncap the portrait lens to make a long time exposure. This method frustrated John who found he could not watch the group and take the photograph simultaneously because he was busy with the lens cap. He resolved this problem by creating a shutter using a single blade that “opened and closed the small opening between the lenses, which was the shortest distance to move”. He used this style of shutter in his work for three years before building a set of shutters into a pair of lenses to use with a stereoscopic camera, the same camera Thomas had been

working on when he conceived of his roll-holder idea (see figure 24). In 1891, John was issued an American patent (see figure 25)⁶² for the idea he had been using for almost a decade, but he never expected this invention to be profitable outside of his own practice because it required that he make a customized shutter to fit each separate lens, meaning it could never be adapted to widespread use.⁶³

The story of John’s shutter continued into September of 1885, when he took his stereoscopic camera with the new lenses to Rochester to visit his friend

Figure 25. John R. Connon, Slide Shutter for Photographic Camera. American Patent no. 451027, filed Jun. 13 1890, and issued Apr. 28 1891.

⁶² John R. Connon, 1891, Slide Shutter for Photographic Cameras. American Patent no. 451027, filed June 13 1890 and issued Apr. 28, 1891.

⁶³ John R. Connon, “History of the Panoramic Camera,” April 1913, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

James Inglis, who was then employed as a dry plate manufacturer. During John's visit, Inglis had been working with a German optician, Mr. Ernst Gundlach, a well-known lens designer at the time who oversaw the development of the microscope division of Bausch & Lomb⁶⁴ as well as the Gundlach Optical Company that later became the Rochester Lens Company. Inglis shared with John some photographs taken as part of his own experimentation. One image had been with a newly designed focal plane shutter that successfully stopped the motion of a bicyclist – the resulting photograph capturing the spokes of his moving wheels with almost perfect clarity. John was eager to try it out for himself, and after his return to Elora anxiously searched for an ideal opportunity. It soon came in the winter of 1886, when he learned the old wooden bridge over the Irvine River was to be replaced with a steel one. On the day of its demolition, John had prepared his own shutter and set-up his camera, ready to fire at the perfect moment. John was very pleased with the results (see figure 26), stating “when shown with a magic lantern and greatly enlarged there is no sign of movement during the exposure.”⁶⁵

John had begun to successfully expand the Cannon studio's photographic products and services as he familiarized himself with the progress of the photographic industry. He was positive and self-assured by his accomplishments and continued to explore what else could be achieved with the medium. Supported by his father, John found himself on a path of photographic discovery.

Figure 26. John R. Connon, [Construction of bridge over Elora Gorge in winter], February 26, 1886. Bridges file, Glass plate negatives series, C 286-1-0-1-6, Archives of Ontario.

⁶⁴ “Edward Bausch,” *The Optical Society*, accessed 3 July 2014, <http://www.osa.org/en-us/history/biographies/edward-bausch/>.

⁶⁵ John R. Connon, “History of the Panoramic Camera,” April 1913, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

Conceiving 360-Degree Panoramic Camera

Engrossed in the medium of photography and excited by the field's progressive nature, John proceeded to test the boundaries of what he could capture in a photograph. In an account of his experience

conceiving the idea for his most notable invention, a panoramic camera that could capture a full-circle in a single exposure, John described his frustration with the limitation of the standard frame sizes available to him. "It was late in the summer of 1886 that I tried to secure a satisfactory picture of Elora

from the hill overlooking the village from the east. The negative was quite good, what there was of it, but it only showed part of the village and it would

require three such pictures to take in all that should be

shown. This was the picture that set me thinking about the panoramic camera." The tallest building in the area at this time was a store that belonged to Lt. Colonel Clarke, a friend of John's. Having previously photographed from

this location, Clarke had stated to John that "there is no use taking a picture from the top of this place until you can make one the whole way 'round.'"⁶⁶

John then began investigating the possibility of capturing a panoramic image (see figure 27). At first, as Moëssard's "Tourniquet" method was not yet published, Canonon was

Figure 27. Top right, top left, bottom right, bottom left: John R. Canonon, [Four sketches for the panoramic camera], ca. 1885. Drawings and descriptions file, textual records series, Canonon family fonds, C 286-6-0-23, Archives of Ontario.

⁶⁶ John R. Canonon, "History of the Panoramic Camera," April 1913, series 286-6, Canonon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

uncertain if the lens could be rotated around a pivot point without jeopardizing the image. “A few experiments showed that if the centre of rotation coincides with that point in a lens, or lenses where the light crosses, it does not matter how fast the lens may spin around, the picture remains quite still.”⁶⁷ With this new understanding about where the centre of rotation for his camera should be, John further described his first attempts at making a photograph. “Taking an empty box that had once been used to hold tins of Keen’s Mustard, I arranged a support against which to place some bromide paper in the shape of half a circle and in the centre of the semicircle was placed the lens, between which and the paper a narrow box, like a hollow door swung on centres above and below the lens.”⁶⁸ Based upon this description it can be understood that John had made a camera comparable to the Megaskop or the Ellipsen Daguerreotype, both swivel lens type cameras,⁶⁹ as well as the Kodak Panoram which was introduced at a later date. The lens of the camera swung in unison with the narrow slit box (the hollow door) while the curved bromide paper remained stationary in the camera. As the lens and slit box rotated, a tall, narrow image moved across the sensitized paper, making an undistorted exposure (see figure 28). Although John had yet to achieve a camera capable of capturing a full-circle image, with this camera he was able to achieve his first successful panoramic negative during the summer of 1886 (see figure 29), which gave him the confidence to pursue further panoramic experiments. “Having loaded [the camera] up I tried a picture with it in the centre of the village [of Elora]. It was quite as good as a paper negative would make it and worked perfectly. The negative...shows by the vacant lots where buildings now stand, the date of it---1886.”⁷⁰

Unsatisfied with the capabilities of his simple revolving mustard box camera, which was incapable of capturing a view much greater than 150-degrees,

Figure 28. Formed by the narrowed end of the fishtail, the vertical scan line ‘wipes’ the image round the cylindrical focal surface. From: Polden, Brian. “Photography at Length, Part 1.” Photographica World 100 no. 2 (2002): 10.

⁶⁷ Ibid.

⁶⁸ Ibid.

⁶⁹ As discussed in Chapter 1.

⁷⁰ John R. Connon, “History of the Panoramic Camera,” April 1913, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

John established a goal to capture a full circle with a single exposure. He considered the swinging hollow door of his first camera to be like the focal plane shutter and determined that he would need to find a way to feed the film past the barrel of the lens at the same rate it would take to make an exposure. In doing so, he would be able to capture a continuous 360-degree image on a single negative. Familiar with his father's concept for the roll-holder, as well as the similar Eastman-Walker model, conceiving a way to do this wasn't difficult for John. Finding an effective way to construct it proved more challenging. He first tried using rubber rollers, about an inch in diameter, which he had custom made by the Toronto Rubber Company for \$3.00 (75 cents each).⁷¹ But due to inconsistencies in the material and manufacturing, the rubber was not ideal and ultimately unsuccessful. He then tried to substitute the rubber with paper rollers. He described stringing the paper onto steel centres like washers after being clamped tight. John acknowledged a young man, Jamie Lister, who was learning the machinist's trade in Elora at the time John was making his camera. Lister helped John with the lathe work he needed to do to ensure that his paper rollers were perfectly circular. These rollers worked effectively⁷² and were used in the making of his first full-circle panoramas, but they were later substituted for custom brass rollers made by a company in Guelph for \$7.10⁷³ that John found to work even better.

Figure 29. John R. Connon, [Elora], 1886. Elora? file, Panoramic prints and negatives series, Connon family fonds, C 286-4-0-2, Archives of Ontario.

⁷¹ Canadian Rubber Company of Montreal to John R. Connon, receipt for custom rollers, 5 January 1887, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁷² John R. Connon, "History of the Panoramic Camera," April 1913, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁷³ Guelph Sewing Machine and Novelty Works to John R. Connon, receipt for custom brass parts, 3 March 1887 Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario..

John designed his fixed-focus camera to advance the roll of negative paper (purchased from a J. R. Moodie & Sons in Hamilton, Ontario)⁷⁴ as the camera was turned around its optical centre on a tripod. With the assistance of Donald C. Ridout of Donald C. Ridout & Company, Engineers & Solicitors of Canadian, United States, and Foreign Patents⁷⁵, Connon obtained American⁷⁶, British⁷⁷ and Canadian⁷⁸ patents issued throughout 1887 and 1888.

Figure 30. [Original lens from panoramic camera], ca. 1886. Private collection, Port Colborne, Ontario.

The patented model used four rollers, one for holding the unexposed roll of film, one for holding the exposed film, and two used as friction-rollers that kept the exposed film held taut and at the proper distance from the lens. It used a crank-handle that connected to the bottom of the camera and was fixed to a worm-pinion that attached to a spur-wheel forming the top of the tripod stand. Hence, when turning the crank, the camera would be made to rotate at the pivot point of

Figure 31. John R. Connon, [Whole circuit panoramic camera invented by John R. Connon], ca. 1887. Elora file, Panoramic prints and negatives series, Connon family fonds, C 286-4-0-4, Archives of Ontario.

⁷⁴ J. Moodie & Sons to John R. Connon, receipts for rolls of negative paper, 12 March 1887 and 5 April 1887, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁷⁵ Donald C. Ridout to J. R. Connon, re: cost of procuring patents for Canada, the United States and England, 7 December 1886, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁷⁶ John R. Connon, 1887, Photographic Instrument. American Patent no. 369165, filed Apr. 2, 1887 and issued Aug. 30 1887.

⁷⁷ John R. Connon, 1887, Photographic Instrument. British Patent no. 6673, filed Dec. 9, 1886 and issued May 6, 1887.

⁷⁸ John R. Connon, 1888, Photographic Instrument. Canadian Patent no. 30143, filed Jan. 1, 1888 and issued July 11, 1888.

the lens. The top of the tripod stand, made up by the spur-wheel, featured a groove in which a cord was passed around and through pulleys that were attached to the spindles of the rollers. This caused them to revolve and advance the film with the rotation of the camera. John used a fishtail lens barrel (see figure 28) to control the amount of light reaching the sensitized surface and ultimately prevent distortion. He did this by creating a narrow vertical passageway of a specific width that, like the hollow door, allowed the light to travel through in a scanning motion before meeting with the film as it passed by, exposing the image (see figure 32).

The final version of his camera shows some modifications to that illustrated in the patents. As opposed to using a handle-crank, John has replaced the spur-wheel with a clockwork system. There is now a wind-up key at the top of the camera used to begin the rotation and start the exposure. A complete model of this camera is yet to be discovered, but the lens shown in figure 30 is suspected to be original to Connon's camera, and features grooves that Connon would have used to slide it into place on the camera body before taking a photograph. On a sunny day in February of

Figure 32. John R. Connon, [Photography equipment], ca. 1887. Miscellaneous file, Glass stereograph negatives series, C 286-2-0-7, Archives of Ontario.

1887 John had procured some negative paper from the Eastman Dry Plate and Film Company, the only company making it at the time, and went back to the top of his friend's store where he made his first full-circle panoramic exposure with his newly built camera (see figure 31). John did some further experimentation to determine exposure and its relationship to camera rotation and once he solved these issues, was ready to take action with his invention and seek out a manufacturer.⁷⁹

⁷⁹ Archives of Ontario, series 286-6, Connon family fonds, textual records, 1832-1967.

Figure 33. John R. Connon, 1887, Photographic Instrument. American Patent no. 369165, filed Apr. 2, 1887 and issued Aug. 30 1887.

(No Model.)

J. R. CONNON.
PHOTOGRAPHIC INSTRUMENT.

No. 369,165.

Patented Aug. 30, 1887.

Witnesses.

J. Edw. Mayhew
J. M. Jackson

Inventor.

John R. Connon
Small, C. Reid & Co.
Atty

UNITED STATES PATENT OFFICE.

JOHN R. CONNOR, OF ELORA, ONTARIO, CANADA.

PHOTOGRAPHIC INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 369,165, dated August 30, 1887.

Application filed April 2, 1887. Serial No. 233,422. (No model.)

To all whom it may concern:

Be it known that I, JOHN ROBERT CONNOR, of the village of Elora, in the county of Wellington, in the Province of Ontario, Canada, 5 photographer, have invented certain new and useful Improvements in Photographic Instruments, of which the following is a specification.

The object of the invention is to arrange a 10 photographic instrument by which a continuous panoramic view of any scene within a circle or portion of a circle may be produced; and it consists in the peculiar combinations and the novel construction, arrangement, and 15 adaptation of parts, substantially as hereinafter more particularly explained.

Figure 1 is a perspective view, partially in section, showing an instrument constructed in accordance with my invention. Fig. 2 is a 20 sectional plan of the instrument.

The first point which must be observed is that the instrument A must be pivoted at *a*, which represents exactly the optical center or axis of the lens. It is also necessary that the 25 sensitive film, whether it be placed on paper, B, glass, or any other substance, be placed on a radius struck from the optical center *a*.

In the drawings I show the sensitive paper, B, passing around the two rollers C D, which 30 are located so as to hold the paper, B, at the proper distance from the optical center *a* mentioned. This paper, B, I store on the roller E, and as it leaves this roller, as hereinafter described, I wind it on the roller F, as hereinafter explained. The rollers G are merely 35 friction-rollers for the purpose of holding the paper, B, against the rollers C D, as shown.

A spur-wheel, H, is fixed to the circular top I of the stand. A crank-handle, J, is jour- 40 naled on the bottom of the instrument A, and has fixed to it a worm-pinion, K, which meshes with the spur-wheel H, as shown. Consequently the revolving of this crank-shaft J will cause the instrument A to revolve upon its pivot *a*. 45 The circular top I is grooved, so as to receive the cord L, which passes around the circular top I and around pulleys M, fixed or attached to the spindle of the rollers C D. Consequently

the said rollers must necessarily revolve with the instrument A, causing the paper B to leave 50 the roller E, pass between the rollers C D, and be wound upon the roller F, this latter roller being provided with a suitable spring, so as to cause it to take up the slack paper, bringing into the focus of the lens a continuous supply 55 of the sensitive film, so that a continuous panoramic image is produced on the sensitive paper as the instrument is revolved on its axis.

In order that only a small portion of the sensitive film shall be exposed to the action of 60 the lens, I form a narrow vertical passage-way, N, located between the lens and its focus. As it may be sometimes desirable to reduce the width of this passage-way, I provide a slide, O, to fit into the passage-way N. In this slide 65 I make a narrow vertical slit representing the exact width of the space on the sensitive paper which I wish to be exposed at any one time to the action of the lens.

From this description it will be seen that by 70 arranging a photographic instrument as I have just described a complete panoramic and continuous view may be secured at one exposure of the entire country embraced within a circle.

What I claim as my invention is—

1. The combination, with the stand I, provided with spur-wheel H and groove, as described, of the photographic instrument pivoted at *a* to said stand, the rollers C D, crank 75 J, worm-pinion K, and cord L, all substantially as and for the purpose specified.

2. The combination, with the stand provided with spur-wheel and groove, as described, and the photographic instrument pivoted at *a* to said stand, of the crank J and pin- 85 ion K on said instrument, the rollers C D E F, the pulleys M on the spindles of the rollers C D, and the cord L, passed around said pulleys and seated in the groove of said stand, substantially as and for the purpose specified. 90 Elora, March 21, 1887.

JOHN R. CONNOR.

In presence of—

EDWARD S. SHEPPARD,
ANDREW SPALDING.

4. MANUFACTURING THE PANORAMIC CAMERA

The Photographic Industry during the 1880s

The timeline of John Connon's panoramic camera is fascinating in relation to the invention of George Eastman's first flexible roll films, both paper and nitrocellulose. It was Eastman's innovations with flexible films and a newly designed camera system that ultimately changed the course of the photographic medium. Eastman's Kodak camera introduced an inexpensive and easy to use photographic system that democratized the technology making it available to all. Because John was so interested in this type of film, he was one of the first photographers to use it instead of the more common photographic glass plate. This important timing and history made John's panoramic camera one of the first to use flexible film and it could be argued that his invention contributed to the later development and introduction of the Kodak Camera by the Eastman Dry Plate and Film Company in 1888. Already familiar with the ideas his father had proposed for the roll film holder, John had been considering the possibilities of a flexible film base for his panorama camera. The release of early Eastman flexible films allowed him to incorporate this technology into his own photographic invention at a time when most other photographers could not yet see the future possibilities of Eastman's innovations. It should be noted that Eastman's first versions of his flexible films were developed for professional view cameras that used the Walker-Eastman roll film holder – and that these films were plagued with numerous problems that most professionals found unappealing.

George Eastman (1854-1932), was born to the owner and administrator of a successful business school, the Eastman Commercial College, in Rochester, New York. As the result of his father's sudden and unexpected death while he was still a boy, Eastman grew up watching his mother struggle to maintain the lifestyle their family had been accustomed to. After some years of both private and public education, Eastman found work as a clerk in an insurance office and later as an assistant bookkeeper in a bank. He

first began practicing photography in 1877 and quickly became a serious amateur.⁸⁰ Inheriting the entrepreneurial spirit of his father, Eastman began the production of gelatin dry plates, soon gaining the financial backing of Henry A. Strong (1838-1919), a successful buggy-whip manufacturer.⁸¹ The professional experience and ambition of Eastman combined with the support of Strong are important factors that led to their ultimate success in the photography industry as the Eastman Kodak Company.

Having achieved success as the Eastman Dry Plate Company, Eastman sought a replacement for the glass support of his gelatin dry plates. In 1881 the Eastman Dry Plate Company introduced gelatin-bromide printing papers, a product Connon had mentioned using. Meanwhile, Eastman continued to seek more efficient manufacturing methods and higher quality products, while competing against new manufacturers.⁸² By 1885, in collaboration with William H. Walker, and after studying the Warnerke roll holder (a similar device invented circa 1875), the duo was issued a patent for the Walker-Eastman roll holder. With this system, a film consisting of a paper strip coated with regular dry plate emulsion was produced.⁸³ “This negative paper film was not nearly as satisfactory as a transparent film because the printing had to be done through the base of the paper, giving the prints a washed-out, faded, or even grainy appearance. Treatment of the paper with light oils prior to printing helped increase the transparency, but the paper film was never popular.”⁸⁴ Despite its lack of popularity, this description of Eastman’s early negative paper best matches the first panoramic negatives produced by Connon (see figure 34), many of which have yellowed from apparent oiling (see figure 34). Another type of film, stripping film or American film, had also been introduced in 1885, but was delicate and required a complicated developing process, preventing Eastman from actively promoting it for use with the roll-holder system. “The company policy was to persuade photographers to purchase the roll holder and

⁸⁰ Ackerman, Carl W., *George Eastman* (Boston: Houghton Mifflin, 1930). 25-28.

⁸¹ Reese Jenkins *Images and Enterprise: Technology and the American Photographic Industry, 1839-1925*, 71.

⁸² Reese Jenkins *Images and Enterprise: Technology and the American Photographic Industry, 1839-1925*, 82.

⁸³ *Ibid.*, 108.

⁸⁴ *Ibid.*, 109.

acquaint themselves with its operation using negative paper and then hope to introduce them to American film later, when they already knew how to use the roll holder.”⁸⁵

Figure 34. John R. Connon, *[View of the Village of Elora?]*, ca. 1887. A1977.67.213, ph2763, Wellington County Museum and Archives.

Because all of Connon’s existing early negatives⁸⁶ are on a paper base, it can be presumed that prior to the release of nitrocellulose films, Connon had only used rolls and sheets of Eastman’s negative paper and not Eastman’s American stripping film. The complex process of American stripping film is explained by Douglas Collins in the following passage:

“American film was a three-ply film, consisting of an ordinary paper support and a layer of gelatin emulsion, which were separated by a middle layer of water-soluble gelatin. After the film was photographically exposed, the negative was taken from the camera and placed emulsion-side down upon a glass plate. Hot water was poured over the film, which melted and dissolved the inner layer of soluble gelatin. Paper and soluble gelatin were then carefully stripped away, leaving only the thin layer of exposed gelatin emulsion on top of the glass plate. Once the film had been peeled down to its thin emulsion layer, another piece of wet, sticky transparent gelatin was squeegeed on top of the emulsion. After this double layer had dried, the emulsion skin could be lifted from the glass and printed in the usual way.”⁸⁷

⁸⁵ Ibid., 109.

⁸⁶ Examples of Connon’s paper negatives can be found at the Wellington County Museum & Archives, Archives of Ontario, and Library and Archives Canada.

⁸⁷ Collins, Douglas, *The Story of Kodak*, (New York: H. N. Abrams, 1990) 52.

None of Connon's negatives exist on either glass plates or the separately purchased⁸⁸ gelatin skins described for carrying the emulsion layer after the excess paper and gelatin had been stripped away. Although American film provided a more transparent alternative to Eastman negative paper, Connon chose not to use it when it was the only roll film available to him during a shortage of their later nitrocellulose transparent non-stripping film, released first in 1888.⁸⁹ This choice may have been because of its complicated development process that would have been made even more so when processing larger panoramic images. However, despite Connon's preference for paper and nitrocellulose films, it was the availability of flexible films was what allowed Connon to design, build and continue to develop his panoramic camera.

Correspondences, Advice and Negotiations

After completing the final touches and experiments to perfect his camera in order to determine additional details such as exposure and speed of camera rotation, John Connon needed to seek out a manufacturer. He was wary of his father's loss with the roll-holder idea and knew he needed to act fast if he wanted to find a market and receive recognition for his invention. Throughout the 1850s, 60s, and 70s, Scovill Manufacturing Company maintained its position as one of the top North American producers of photographic materials.⁹⁰ "Yet, the leadership of Scovill and Anthony companies continued to depend upon external sources of invention. When an improvement was created, the managers of Scovill and Anthony sought to acquire it outright through purchase or to control it through a sole agency for its sale."⁹¹ This strategy resulted in a dramatic increase in the number of photographic patents issued in the United States throughout the 1880s and 1890s,⁹² which was likely observed by Connon and part of his motivation for pursuing profit from his invention after he received his patent. It was no surprise then that

⁸⁸ Eastman Dry Plate and Film Co, *Photographic Materials and Apparatus*, (Rochester NY: Schlicht & Field Co., January 1888) 14.

⁸⁹ Eastman Company to John Connon, 17 February 1890, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁹⁰ Reese Jenkins *Images and Enterprise: Technology and the American Photographic Industry, 1839-1925*, 46-54.

⁹¹ *Ibid.*, 61.

⁹² *Ibid.*, 62.

Scovill was the first manufacturer Connon approached about his panoramic camera, immediately after receiving his American patent.

From September of 1887 to March of 1888 John, under the guidance of his father, was in contact with a man named Mr. Fuller at Scovill. At first the correspondence was hopeful, and negotiations for a began almost immediately. The question of expectations for a royalty was met with an eager reply. A letter from Thomas Connon dated September 28, 1887 stated “Being the value on which to seek royalty at the cost of the Camera written plus lens and tripod [John and I] think twenty percent a reasonable figure for the American patent. Plus a camera whose wholesale price is twenty-five dollars from you would yield twenty to [Scovill] and five to the patentee.”⁹³ Scovill was interested because of the potential advantages of the camera for use in landscape work; however, in the months following these negotiations, letters from Mr. Fuller described an increasing number of delays preventing the camera’s manufacture. First Scovill needed to confirm the market for such a camera and then they needed to build a sample. The construction of this sample was again delayed because the company was so busy. In March of 1888 Mr. Fuller still had not been able to discuss constructing this sample model with his superintendent. While waiting to hear the results of this discussion, John and Thomas Connon were notified that Mr. Fuller was on leave for bereavement, another delay.⁹⁴ Once Mr. Fuller had returned, he informed the father and son that the decision on his camera had been deferred again due to a snowstorm that had shut down their factory for a week.⁹⁵ Finally, after several months of increasingly discouraging replies regarding the plans for his camera, John requested it be returned so that he could seek a manufacturer elsewhere. A receipt dates the camera’s return to John Connon as March 21, 1888.

After his disheartening experience with Scovill, J. R. Connon sought the help of acquaintances in the field to assist him with the business aspects of marketing his camera. He discussed his invention with

⁹³ Mr. Fuller to John Connon, 28 September 1887, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁹⁴ R. I. Lewis to John Connon, 9 December 1887, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁹⁵ Mr. Fuller to John Connon, 16 March 1888, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

friends who were involved in some successful North American photography companies at the time. These individuals included: James Inglis, Scottish born photographer and dry-plate manufacturer, as well as former photographer of St. Catharines, Ontario and Montreal, Quebec, who by then had settled in Rochester; Maurice Gennert, successor to the G. Gennert Company, Importer, Exporter and Manufacturer of Photographic Materials, located in New York City; and Joseph Platt, Special Agent, Berkshire Life Insurance Company in New York and active member of the New York Camera Club.⁹⁶ Although none agreed to manufacture the camera themselves, Platt did put Connon in touch with an adventurous businessman, Carl P. Stirn, who owned a shop on Park Place and was interested in Connon's camera.⁹⁷ John Connon soon travelled from Elora to New York City to meet Stirn and pursue further negotiations (see figure 35).

Figure 35. John R. Connon, *[Panoramic print of men standing on a ferry looking at the Brooklyn Bridge]*, ca. 1890. New York City file, *Panoramic prints and negatives series*, Connon family fonds, C 286-4-0-5, Archives of Ontario.

⁹⁶ Information based upon Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁹⁷ J. B. Platt to Mr. Connon, 10 October 1888, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

New York. February 22nd 1889
No. 20 Park Place

I the undersigned hereby agree in consideration of Mr J R Connon of Elora Ontario, granting me the sole right to Manufacture, and Sell the so called Panorama Photographic Camera under his latter Patents No 369,165 of the United States and No 6673 of the United Kingdom of Great Britain, and also the Canadian Patent to pay him the following Royalties for all cameras sold here or abroad viz
Cameras sold at \$25.00 or less a Royalty of 50[¢]
Cameras " " 35.00 " " Royalty of 75[¢]
Cameras " " 50.00 " " Royalty of 1.00

and for all cameras sold at a higher price than 50[¢] an additional Royalty of 1[¢] for every addition of 10[¢] to the retail price to be added, an accurate account of all Sales to be rendered quarterly on the 1st of May 1st of August 1st of November and 1st of February of every year. It is understood that I will push the cameras
Witness J R Connon

Carl P. Stirn

I hereby accept the above terms, and grant Mr Carl P Stirn of the City of New York the sole right to Manufacture and Sell the Panorama Cameras above mentioned for a period of Five years with a privilege of renewal if accounts are mutually satisfactory.
Witness J R Connon

J. R. Connon

Figure 36. John R. Connon, [Agreement with C. P. Stirn], 1889. Agreements file, Textual records series, Connon family fonds, C 286-6-0-10, Archives of Ontario.

John's Camera Becomes the Wonder

A telegram sent by John Connon from New York to his father in Elora on February 4 of 1889 excitedly exclaimed, “Successful, Stirn to manufacture for Germany, Britain, America.”⁹⁸ The agreement, signed by Stirn & Connon on February 25, 1889 (see figure 36) was the first glimmer of hope Connon saw in the success story of his panoramic camera. It outlined that Connon would grant Stirn the sole right to manufacture panoramic photographic cameras under his patent for a royalty relative to the cost of the camera sold. Satisfied that his camera was finally going into production, John returned to Elora, where he continued work in the studio with his father. During this time he regularly prepared batches of panoramic prints and enlargements that he would send to Stirn to sell in his shop. He regularly received updates from Stirn's builder, a German mechanic named Max Juruick. Juruick was assigned with the task of building a model from John's patent that would be more marketable. Meanwhile, Connon started to sell some of Stirn's Concealed Vest Cameras⁹⁹ for commission in the Canadian market.

Throughout 1889 Connon received regular updates from Stirn regarding Juruick's progress on the panoramic camera. Stirn began advertising the remodeled version of Connon's camera as “The Wonder

Figure 37. Todd Gustavson, [Wonder panoramic camera], ca. 1889. Digital image, 2014. Technology collection, George Eastman House.

Camera”, despite the fact that he had no stock and the finished model was far from ready for the market. Stirn had hoped to introduce the camera at the renowned Boston Exhibition that year but delays related to streaky image results prevented the camera from arriving in time.¹⁰⁰

Another delay was created as the result

⁹⁸ John Connon to Thomas Connon, 4 February 1889, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

⁹⁹ Todd Gustavson, *Camera: A History of Photography from Daguerreotype to Digital*, (New York: Sterling Publishing Co., Inc., 2009) 113.

¹⁰⁰ C. P. Stirn to John Connon, 26 July 1889, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

of the factory receiving an order of the wrong size of lenses¹⁰¹, but Connon was comforted to know that his invention was in production and would soon be available for sale in an open market (see figure 37). Although originally designed by Connon, and built by Juruick, C.P. Stirn was issued the American patent for the camera on

Figure 39. Carl P. Stirn, ca. 1890, C.P. Stirn's patent photographic concealed vest cameras, panoramic cameras, enlarging apparatus and photographic materials for use with C.P. Stirn's patents. 5-8.

December 31 of the same year (see figure 38).¹⁰² Perhaps, it was this development

that that led to the many inaccuracies

and exclusions of Connon in historical accounts of the camera.¹⁰³

Marketed to landscape photographers, tourists, surveyors, explorers and military men (see figure 39), the camera was sold for

\$30.00 pre-loaded with a roll of film long enough for five whole circuit pictures, a folding tripod, and a carrying case. Additional spools of film were sold for \$1.00 and folding tripods \$2.00 each.

Instructions for use state:

Figure 38. Carl P. Stirn, 1889, Photographic Camera. American Patent no. 418343, filed April 15, 1889 and issued Dec. 31, 1889.

¹⁰¹ C. P. Stirn to John Connon, 4 November 1889, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

¹⁰² Carl P. Stirn, 1889, Photographic Camera. American Patent no. 418343, filed April 15, 1889 and issued Dec. 31, 1889.

¹⁰³ See literature survey page 8.

“In the dark room a roll of sensitive film is placed inside the camera. When you wish to take a picture, the Camera attached to the tripod is set up in the position desired; then, pull the string which causes the camera to revolve. The sensitive film being brought to the focus of the lens as required to receive the picture of everything that the camera points at.”

Four different lengths of exposures could be made: a quarter circuit, producing a negative 4 ½ inches in length; a half circuit, producing a negative 9 inches in length; a three-quarter circuit, producing a negative 13 ½ inches in length; and a full circuit, for which the negative would measure 18 inches. The spring catch, located on the base of the camera, had four corresponding settings to select the desired format. Once ready to take the picture, the user would then uncap the lens and pull a string to revolve the camera and advance the film, using the same principles as Connon's original design.¹⁰⁴ The string was directed through the camera and featured a ring from which different weights could be hung to ensure an evenly paced exposure (see figure 40).

Based upon examinations of the Wonder camera at the George Eastman House, the changes made to John's camera appear to improve upon its functions making it easier for both amateurs and

¹⁰⁴ Carl P. Stirn, *C.P. Stirn's patent photographic concealed vest cameras, panoramic cameras, enlarging apparatus and photographic materials for use with C.P. Stirn's patents*, (Santa Barbara, California: National Directory of Camera Collectors, 1973. Reprint. Originally published: New York: Stirn & Lyon, [189-?]) 5-8.

professionals to use. It is much smaller, measuring only 4x4x6 inches and the lens has been moved inside the camera. The spring catch mechanism on the base of the camera allowed the user to stop the exposure at different points in the 360 degree circle. A puncture device was also added to the back of the camera that would allow the user to mark each exposure on the film. It was made for use with 3-¼-inch American Stripping Film. Also, the weighted string was an alternative method to a wind-up key or crank designed by Connon. In Stirn's opinion these modifications were significant enough to justify an application for his own patent, though Connon questioned them. In a letter to Connon, Connon Sr. suggested his own improvements were superior to those in Stirn's patent asking, "Do you think the camera is any improved by the movement as you describe it over the old? Of course it is out now and if it is in such a way that any intelligent person can work it perhaps it is just as well to let it be all that for a time, but I think I can make an automatic movement that will do the whole business in a very simple way without cogs."¹⁰⁵

While there was some additional discussion about the best way forward, Connon ultimately accepted the modifications to his original camera design and January of 1890, moved to New York to go into business with Stirn.

Figure 40. [Wonder Panoramic Camera], ca. 1890. Miscellaneous file, Glass plate negatives series, Connon family fonds, C 286-1-0-10-6, Archives of Ontario.

¹⁰⁵ Thomas Connon to John Connon, 14 February 1890, Connon family correspondence 1852-1930, Wellington County Museum and Archives, Elora, Ontario.

A Short-Lived Success Story

It was only a few short months before prospects for the Wonder panoramic camera began to fade. Around the time of its release in February of 1890, Eastman had also begun to sell transparent celluloid film. This revolutionary film was a material that had long been sought out by photographers, as it had the flexibility of paper combined with the clarity of glass. Unfortunately, it was just $\frac{1}{8}$ to $\frac{1}{4}$ of an inch too wide to fit within the flanged edges of the Wonder's roll holders. In order to use this new and much sought after material, Connon would need to modify his camera once again. "From the edge of the film which I used when making sample pictures with the new camera in New York during February and March 1890, I cut a strip with scissors. Of course, this had to be done in the dull red light of the dark room"¹⁰⁶ (see figure 41). Even with this unfortunate modification that was necessary to be able to use transparent film with the Wonder, the new and popular material was still not readily available, making prospects for the camera less and less promising.

Figure 41. John R. Connon, [New York City], 1890. New York City file, Panoramic prints and negatives series, Connon family fonds, C 286-4-0-1-2, Archives of Ontario.

In a letter to his sister Lizzie, Connon described his plan to leave Stirn and return to Elora, "owing to scarcity of film for this panoramic camera because of a patent lawsuit which the Eastman Co. [had] got into; there [would] not be any film for a few months anyway. Without that the cameras [were]

¹⁰⁶ John R. Connon, "History of the Panoramic Camera," April 1913, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

useless.”¹⁰⁷ In fact, Eastman had been working on this new transparent film throughout the time that the Wonder was manufactured, yet due to the patent infringement issues that had arisen from the historic Hannibal B. Goodwin¹⁰⁸ case, Eastman had “cloaked the new film and its production in secrecy.”¹⁰⁹ Once it was first available for public sale in August of 1889, production was slow and the film was hard to come by. Any requests John made for the film were met with replies from the Eastman Company stating there was a shortage and asking if John would have them ship American film instead.¹¹⁰ However, by the time the Wonder was ready for sale in February of 1890, the new celluloid-based film was popular enough to take over the market. Combined with the introduction of the Kodak box camera, the Wonder was both unusable and undesirable. After discussing the matter with Stirn, John took some time to visit the sites before again returning to Ontario. He went back to work in his father’s studio, and continued selling prints and enlargements to Stirn and other acquaintances, as well as occasionally selling a camera.

Despite the discouraging roll film situation, Stirn was not ready to give up on the Wonder and continued to market the product, placing ads in both European and North American photography journals. However, in 1893 his optimism died down. In a letter of that year just a month after their agreement had expired, Stirn wrote Connon for help stating:

“I am very sorry to say that the outlook for our Panoramic Camera is not very encouraging; I would like myself to make something out of it, as I invested several thousand dollars in it, and do not see any prospects of making one cent out of the invention. The Cameras which Mr. Max. Juruick made for me are entirely worthless, unless somebody takes hold of them, and makes them all over, as they are now, it is impossible for an amateur or even an expert photographer to work with them. I wish you could find some way of making them over, so that we could sell them.”¹¹¹

¹⁰⁷ John Connon to Lizzie Connon, 17 May 1890, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

¹⁰⁸ See page 57 for more about Hannibal B. Goodwin.

¹⁰⁹ Reese Jenkins, *Images and Enterprise: Technology and the American Photographic Industry, 1839-1925*, 130-131.

¹¹⁰ The Eastman Company to John R. Connon, 17 February 1890, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

¹¹¹ Carl P. Stirn to John R. Connon, 20 May 1893, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

In October of 1895, John received a similar letter from Gennert, again inquiring about the stock of Wonder panoramic cameras that had been left unusable, stating “Mr. Stirn is, we believe, selling out his stock of Panoramic Cameras. Do you think that any of the parts of these cameras would be of any use to us? We have just received a notice and we believe the entire outfit will be sold at auction.”¹¹² Around this time, “the firm of Stirn & Lyon became involved financially, and, sometime later, made an assignment. The camera business had nothing to do with this, so it was only a comparatively small side issued controlled by Mr. Stirn, but, owing to the failure of the toy business which they were engaged in, the camera business came to an end.”¹¹³ However, there is no indication within the textual records at either Archives of Ontario or the Wellington County Archives as to what became of Stirn’s stock, or as to Connon’s reply to either Stirn or Gennert.

A final opportunity for John to contribute with his patent arose in 1895 when Gennert again contacted him regarding a request for a large-scale panoramic camera:

“Mr. Geo. E. Curtis of Niagara Falls, New York wants a Panoramic Camera to use 10-inch film and 12 or 14-inch lens. He really wants two lenses with it but we have explained to him that he must have a camera for each focal length. Could you give me an idea of what it is worth to make such a camera? If Mr. Curtis wishes it will you kindly make the drawings for it? He really wants you to make it but of course, you have not the facilities. We can do it much better. We would want to have you make the drawings so as to avoid any errors.”¹¹⁴

An interesting request Connon made drawings for the camera which Gennert proceeded to construct. However, Mr. Curtis was in contact with Connon multiple times throughout 1896 regarding issues with

¹¹² G. Gennert to John R. Connon, 15 October 1895, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

¹¹³ John R. Connon, “History of the Panoramic Camera,” April 1913, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

¹¹⁴ G. Gennert to John R. Connon, 6 August 1895, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

the camera, primarily streaky image results.¹¹⁵ Any further indication of what became of this camera is again absent from Connon family archival records.

¹¹⁵ G. E. Curtis to John R. Connon, 25 November 1896, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

5. THE QUEST FOR RECOGNITION

The Kamaret, Cycloramic, Cirkut and Others

In 1891 Connon started to notice cameras using a technology similar to his own appearing on the market. He came across an advertisement for the Kamaret while working for Gennert (see figure 42), and recognized that the position of the roll-holders was a potential infringement of his own patent. John mailed it to his father with a letter stating "I notice that the party who stole this from my panoramic camera patent knows so little about the practical part of photography that this roller would be placed emulsion side out so that it could not be handled without marking."¹¹⁶ Despite this accusation, and suggestions from his father to go to Ottawa to begin an infringement case, Connon never took any action to defend his patent.

Figure 42. [Kamaret advertisement], ca. 1890. Drawings and descriptions file, textual records series, Connon family fonds, C 286-6-0-23, Archives of Ontario.

Connon continued to find published articles and advertisements for panoramic cameras that he felt were encroachments on his design. He found himself in a dispute with another panoramic camera inventor, Marcellus, whose invention he read about in an issue of

Left: Figure 43. P. S. Marcellus, Panoramic Roll Holder Camera. American Patent no. 512512, filed July 27, 1893 and issued Jan. 9, 1894.

¹¹⁶ Thomas Connon to John Connon 5 April 1891, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

October 1894 to January 1895 of the Photo Beacon. The Chicago publication refused to take sides and eventually notified Connon that they would no longer be pursuing the issue in their publication.¹¹⁸ Later in the year of 1895, Connon came across another article titled “New Invention

Another camera that John found with similarities to his own included an invention that would become the Kodak Cirkut camera, patented by

119 G. G. Rockwood and H. B. Shallenberger, Panoramic Camera. American Patent no. 441704, filed Feb. 28, 1890 and issued Dec. 2, 1890.

William J. Johnston (1856-1941), the Canadian founder of the Panoramic Camera Company of Canada in 1904 (see figure 45).¹²⁰ Johnston had also been a founder of the Rochester Panoramic Company, along with David A. Reavill and Frederick W. Brehm. In 1905, Reavill left the company and it was sold for \$5000 to the Century Camera Company, then owned by Eastman Kodak Company, which continued the manufacture of the Cirkut into the 1940s¹²¹. When the company was sold, Johnston, originally from a suburb near Kingston, Ontario, returned to Canada where he began the Canadian version of his company in Toronto, Ontario.¹²² Connon, who read an article about Johnston's camera in the Toronto Daily Star from February 29, 1905, wrote to the editor for a correction, which was printed on March 8th of the same year, a small success story for John.¹²³

Last Attempts to Sell the Patent

During the years John was involved with Stirn he received updates about camera sales and requests for additional prints. He also corresponded with Maurice Gennert, who asked him to return to New York City to work for him. Connon agreed, and spent the spring of 1891 keeping track of stock in Gennert's shop as well as assisting amateur customers. Unhappy with this position and concerned for his parents' declining health, Connon returned to Elora (in 1892?) and hired broker E.J. Johnson to try and sell his patent during his travels through the states. He paid Johnson \$15.00¹²⁴ to find a buyer for his invention but in 1893 Johnson gave up his broker's position and passed Connon's patent onto Mr. Williams who finally found a potential buyer in 1899. Mr. Clougher, from the Canadian Camera and Optical Company, showed serious interest in purchasing John's patent for \$500 along with \$100 for two shares in the company. Originally, John was insulted by this offer, as he had hoped to make at least

¹²⁰ William J. Johnston, Panoramic Camera. American Patent no. 776,403, filed Jan. 7, 1904 and issued Nov. 29, 1904.

¹²¹ Rudolf Kingslake, *The Photographic Manufacturing Companies of Rochester, New York* (Rochester: George Eastman House, 1997) 41.

¹²² Robert Lansdale, "The Inventor of the Cirkut Camera and its Parts," *Photographic Canadiana* 36, no. 1 (May-June, 2010): 17.

¹²³ John R. Connon to Editor of the Daily Star, 4 March 1905, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

¹²⁴ E. J. Johnson to John R. Connon, 2 June 1893, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

\$1000. But, after a decade of trying to make use of his camera, John was willing to take what he could get. Unfortunately, negotiations went sour and after an unfavourable investigation Clougher changed his company's offer to only \$200 in shares.¹²⁵ Although his broker Mr. Williams discouraged Connon from accepting this low offer, John was tired of chasing what now appeared to be an impossible dream. On April 12, 1900, just over a year after his father's death, he wrote: "I do not feel like doing any more with it."

Seeking Acknowledgement

After failed attempts to manufacture his camera and sell his patent, Connon began to spend a great deal of time scanning newspapers and science and photography journals for cases of infringement. Although never having the means to get into a serious legal battle, Connon wrote with dogged determination to editors demanding they correct articles stating that inventions similar to his own were described as "new" and/or "original". Connon often claimed many later camera models stole the position of the roll holders from his patent, placing them in front of the focal plane, allowing for smaller sized cameras.¹²⁶ He felt that Eastman's small-sized Kodaks did this, but was never able to make a case for it.¹²⁷ In a 1921 letter to George Eastman, John mentions this observation, to which Eastman replied that the idea had been purchased from another inventor, David H. Houston.¹²⁸ Connon was one of many patent-holders making accusations against Eastman during the time that the Eastman Kodak Company was growing exponentially. However, like the other inventors, Connon had neither the business savvy nor the financial and legal resources of the Eastman Kodak Company. As photography became accessible to the masses, everyone was searching for a faster, easier and less expensive way to make photographs, and

¹²⁵ Mr. Clougher to John R. Connon, 10 April 1900, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

¹²⁶ John R. Connon, *The Early History of Elora, Ontario, and Vicinity*, (Elora ON: Elora Express and Fergus News Record, 1906) 189.

¹²⁷ John R. Connon, "History of the Kodak," April 1913, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

¹²⁸ George Eastman to John R. Connon, 16 August 1921, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

many inventors contributed pieces to this complex puzzle. Some were successful selling their patents while others secured positions in the growing research and development divisions of companies like Eastman Kodak Company. However, there were many inventors, like Connon, who poured their lives into their inventions and never received recognition or financial reward and these individuals inevitably developed a bitter attitude towards entrepreneurs like Eastman, a man who is often described as a modern day Steve Jobs, American entrepreneur and co-founder of Apple Inc. Like Jobs, Eastman was able to create products that were irresistible to consumers because he was successful in transforming a complex and expensive process practiced only by professionals and into a cheap, easy to use system that was available to all.

The Story of Hannibal B. Goodwin and Eastman Flexible Films

John continued to try and make something of his invention well into the twentieth century, and carefully followed the case of Rev. Hannibal B. Goodwin for inspiration. Goodwin, an Episcopal minister from New Jersey, filed a patent application for a method of making transparent, flexible roll film out of a nitrocellulose film base in May of 1887. However, his patent was not granted until September of 1898. At the time there was a huge demand to find a transparent film base for holding a photographic emulsion, as, such as seen in Connon's early negatives, because this new flexible support eliminated many of photography's technological limitations. During the eleven years Goodwin was waiting for his patent, Eastman had begun production of roll film using his own process. Like Connon, Goodwin was from a small town, made a small salary, and had an amateur interest in chemistry. Once the patent was obtained it was eventually sold to the photographic company Ansco for a reasonable amount at the time. Ansco, realizing this patent was the key to the enormous success of the Kodak camera system, proceeded to sue the Eastman Kodak Company for infringement. In 1914, the courts ruled in favour of Ansco and awarded the company a settlement of five million dollars – an enormous sum of money at that time. Unfortunately, in the year 1900, Goodwin had been involved in a street accident and died from his injuries.

In relation to these events, Connon wrote: “When I remember that in 1890 the man who invented the process of making the transparent celluloid film which I was using so successfully was struggling to secure a patent for his invention and died a poor man while the United States Patent Office allowed Eastman Co. with their stolen millions to hold up his claims for eleven years, I feel that my father and I were not the only sufferers.”¹²⁹ This passage suggests that Connon saw his own life in the tragic story of Goodwin and perhaps this made it easier for him to accept his own fate. Regardless it was around this time that Connon abandoned his goal to secure recognition for his invention and decided to move on with his life and pursue other activities unrelated to his panorama camera.

Life for Connon after the Panoramic Camera

The last thirty years of his life Connon continued photography as a hobby and became a historian (see figure 46). He published a book titled *The Early History of Elora, Ontario, and Vicinity*, which is still today one of the most significant early histories of the area. He never could completely turn off his innovative mind and would correspond with friends about ideas he had for new inventions in the photographic field. In some letters from 1903 he mentioned an idea for a motion picture camera, but decided not to follow through with it. By this time, George Eastman and his Eastman Kodak Company were selling their Brownie cameras for \$1 each to a global population, now making their own photographs. Perhaps Connon felt that opportunities for individual inventors like him were even scarcer than before, when he had struggled to gain recognition for his panoramic camera. Today historians continue to revisit the medium’s history and revise our understanding of the photography’s early decades. While John R. Connon and his father Thomas Connon were never able to secure widespread recognition for their contributions to the history of photographic technology, my hope is that this paper will provide an opening for future researchers and further investigations into a fascinating time of photographic innovation and the story of the Connon family and their contributions to the field of photography in

¹²⁹ John R. Connon, “History of the Panoramic Camera,” April 1913, series 286-6, Connon family fonds, textual records, Archives of Ontario, Toronto, Ontario.

Canada. John Connon's panoramic camera represents the beginning of 360-degree panoramic photography captured in a single exposure on flexible film and its design inspired a succession of cameras that made the dream of capturing a full circle view in a photograph a reality.

Figure 46. [Outdoors portrait of John Connon, seated on a tree stump], ca. 1920. Photographic print. Connon portraits, University of Guelph Library.

APPENDIX: EVOLUTION OF MATERIALS USED BY JOHN AND THOMAS CONNON

Timeline of Photographic Materials used by John & Thomas Connon

1840-1852	Painting & Drawing Thomas Connon was described to have thoroughly enjoyed drawing as a child; the best gift you could give him was a pencil and some drawing paper. That passion later expanded to oil painting. Prior to his engagement with photography, Thomas had often considered the career of an artist. Some of his paintings of the Ontario landscape are currently held at archives in Toronto and Elora.
1853- approx. 1860	Daguerreotype Shortly after settling in Elora, Thomas Connon began his first experiments with the photographic medium, using the daguerreotype process. A hand-made daguerreotype camera built by Thomas is part of a private collection located in Ontario.
1860-1880	Collodion Wet Plate Demonstrated by the many cabinet cards made at the Connon studio, it is likely Thomas Connon began working with the wet plate collodion process relatively early, before building his second studio. If you look closely at figure 47, you will see sample cartes de visite on display at the location where Thomas later operated his own general store.
1865-1875	Tintype Found in collections at Library & Archives Canada, Archives of Ontario, and Wellington County Museum & Archives are a few tintypes attributed to the Connons, demonstrating their use of the collodion on iron process.
1875-1900	Collodion Dry Plate There are a number of examples from the Connon collections that demonstrate their use of the dry plate process, including various sizes of glass plate negatives.
1880-1887	Sensitized Bromide Paper Mentioned in letters from John Connon is the use of sensitized bromide paper to make negatives. He may have been making this himself, or purchasing it from George Eastman, who had sold sheets of the material while his company's primary focus was still producing dry plates.
1886-1890	Paper Negatives In figure 48 is an example of one of John Connon's early panoramic negatives, with its corresponding print, for which he used paper negative roll film, manufactured by George Eastman.
1889-1936	Transparent Film John Connon began using Eastman transparent roll film as soon as it was released and noted the trouble he had attaining it early on. Figures 49 and 50 show two different sized panoramic negatives he made using the medium and two different cameras.

Figure 47. [Cartes de visite in store window], ca. 1865. A1989.144, ph9293, Wellington County Museum and Archives.

Observations of Panoramic

Prints & Negatives

John Connon used three different sizes of paper negatives and two different sizes of nitrocellulose negatives to make his panoramic photographs.

Examples of these can be found in the collections of the Archives of Ontario, Wellington County

Archives and Library & Archives Canada. The Wellington County Archives feature a number of large paper prints and negatives that are 3 inches, 4 ¼ inches and 4 and ¾ inches in size. In the textual records, John noted that he had been using Eastman film thus allowing his camera's development to closely mirror that of the Eastman flexible films, from paper to cellulose nitrate film bases. Although Connon did not date his photographs, the 3-inch paper negative (see figure 29, page 33) from the Archives of Ontario matches his description of his first panoramic photograph. As it does not reach more than 150-degrees, and shows a vacant lot in the centre of Elora, it is indicated that this specific negative was therefore made using his first panoramic camera that was described as having a motion similar to a swinging hollow door (see Chapter 3). The larger paper negatives were likely made with the camera model which incorporated brass rollers shown in the earlier photographs, prior to the release of transparent roll film (see figure 48).

The cellulose nitrate negatives examined measured 4 ¾ inches and 2 ¾ inches. The larger (see figure 49) were again likely used with John's completed camera model with the brass rollers (the rollers

on the model were not flanged), or could have been made at a later date using a panoramic camera such as the Kodak Cirkut purchased after the death of his father. The smaller negatives, featuring a view of New York City (see figure 50), have been described by John Connon as being trimmed prior to exposure with the Wonder panoramic camera. Although the Wonder is also described for use with American Stripping Film, no preserved panoramic negatives matching this description have been found thus far.

Figure 48. John R. Connon. [Panoramic paper negative and print], ca. 1885. A1977.67.203 and A1977.67.210, ph2760 and 2753, Wellington County Museum and Archives.

Figure 49. John R. Connon. [Panoramic transparent negative], ca. 1890. A1977.67.201, ph2751, Wellington County Museum and Archives.

Figure 50. John R. Connon, [New York City], 1890. New York City file, Panoramic prints and negatives series, Connon family fonds, C 286-4-0-1-1, Archives of Ontario.

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