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A Short History of the Photographic Lens

The earliest experiments on what would become the modern-day photographic lens are attributed to Arab scientist Abu Ali Hasan Ibn-al-Haitham (Alhazen) (965-1040), who detailed looking through portions of a glass sphere in *Thesaurus Optica*, first published in Latin in 1572. More than two centuries later, in 1803, William Hyde Wollaston (1766-1828) described the effects of light on paper treated with guaiacum resin, which reportedly inspired Nicephore Niepce to experiment with early photographic processes. After Louis Jacques Mande Daguerre (1789-1851) officially invented photography in 1839, the first camera lens was developed by his colleague Charles L. Chevalier (1804-1859). This achromatic landscape lens paid homage to Mr. Wollaston by utilizing the meniscus form he perfected. However, with an aperture of $f/14$ or $f/15$, there was considerable astigmatism associated with the lens, requiring an extremely long exposure time. The variable focus portrait lens Mr. Chevalier developed in 1840, with an aperture of $f/6$, was essentially free of spherical distortion.

When German physicist Andreas von Ettingshausen (1796-1878) was introduced to the daguerreotype process and Mr. Chevalier's portrait lens, he shared the information with his friend Joseph (Josef) Max Petzval (1807-1891), who developed a far superior portrait lens that was manufactured by Friedrich Voigtlander (1812-1878) in 1840.



JOSEPH MAX PETZVAL.
1807-1891.



ANDREW ROSS.
1798-1859.



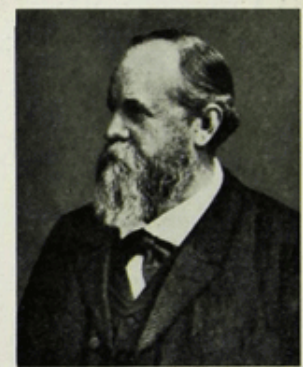
THOMAS ROSS.
1818-1870.



JOHN H. DALLMEYER.
1830-1883.



THOMAS DALLMEYER.
1859-1906.



HUGO A. STEINHEIL.
1832-1893.

Subsequent attempts to produce symmetrical lenses that eliminated the common problem of distortion appeared in the forms of the panoramic lens of Thomas Sutton (1819-1875), the Periskop lens of Carl August von Steinheil (1801-1870), and the Globe lens of Charles "C.C." Harrison (?-1864) and his young protege Joseph Schnitzer (? - ?). Mr. Petzval's Orthoskop lens boldly promised to be "the solution for all the photographer's problems," but when it was revealed that it did not remove distortion completely, the Orthoskop quickly faded into obscurity. By the late 1850s, John Henry Dallmeyer (1830-1883) had established a reputation as an innovative rapid lens pioneer, having produced a Pistolgrafe lens for an early instant camera, and a Petzval type rapid lens that had three focus sizes (3-inch, 6-inch, and 8-inch). Because it was used primarily for photographing children, it was referred to by industry professionals as "the baby lens." In 1866, the Dallmeyer Rapid Rectilinear and the similarly constructed Aplanat lens by Hugo Adolph Steinheil (1832-1893) were produced. However, they significantly overcorrected astigmatism, which adversely affected high aperture lenses. Barium crown glasses developed by Ernst Abbe (1840-1905) and Otto Schott (1851-1935) finally eliminated astigmatism from lenses permanently.

The next great phase of photographic lens development occurred around 1930, when reversed telephoto lenses were being produced for close-ups and for Technicolor three-strip cameras. Zoom lenses were developed for 35 mm movie cameras, and Dr. Henri Chretien suggested applying anamorphic progression to motion pictures. For the amateur photographer, new lenses for 8 mm and 16 mm movie cameras were produced, and large lenses were designed for aerial cameras. In March 1934, Arthur Kingston and Peter Maurice Koch de Gooreynd formed a business partnership, KGK Syndicate Ltd., and by September of that year, Mr. Kingston was credited with

developing the Perspex plastic lens, the first of its kind. Two years' later, Rohm and Haas produced an acrylic lens known as Plexiglas. At the same time, DuPont began manufacturing Lucite acrylic lenses. Mr. Kingston continued to promote plastic optics development using precision molding by opening an optical products manufacturing company, Combined Optical Industries Limited (COIL). In 1937, Dow Chemical released STYRON, its brand name for polystyrene, and that same year, the Purma Special camera, which featured an integrated plastic lens view finder, was introduced. A TIME magazine article that same year described the growing competition between manufacturers in the United States, Great Britain, and Germany to replace glass lenses with their plastic counterparts in cameras, binoculars, and eyeglasses. The following year, a contentious dispute between Arthur Kingston and Peter Maurice Koch de Gooreynd about the the true inventor of the plastic lens resulted in the dissolution of their partnership. But COIL remains a leading low vision product manufacturer in the twenty-first century under the ownership of Carclo Technical Plastics.

World War II increased the demand for acrylic, and plastic optics were needed for experimental aerial cameras. At war's end, there was another resurgence in new lens design, primarily for motion pictures (CinemaScope) and for television. After its economic restructuring, Japan began manufacturing affordable quality cameras and lenses for amateur photographers, which culminated in a market domination that continues today. Nikon presently manufactures more than 50 lenses for 35 mm single-lens reflex cameras. In the U.S., Kodak took the lead in the production of objective lenses and acrylic viewfinders, and in 1959, produced the the Brownie 44A, the first plastic lens camera. During the next decade, Kodak manufactured more than 50 million Instamatic cameras with plastic lenses. In the 1970s, zoom lenses became the rage,

leading to various types of autofocus lenses with Japan once again leading the way. Like everything else in the twenty-first century, photographic lenses have gone digital. Digital lenses have telephoto capabilities at lightning fast speeds, often with hefty price tags attached to them. As times change, the photographic lens has demonstrated an amazing resiliency to adapt to and evolve with them.

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J. Jex Bardwell

John Jex Bardwell was born in Cheapside, London on October 24, 1824. As he would later recall in an autobiographical profile, "I celebrated with much howling and kicking, and from all accounts have kept it up more or less ever since." Finding himself increasingly at odds with the prevailing politics of the period, the senior Bardwell decided to move his family to the United States, which he felt more closely represented his views on democracy. Settling in Ann Arbor, Michigan in 1834, the father became successful in the brewing/distilling industry while his son sold newspapers and later worked in a physician's office. He was sent to Suffolk, England to complete his studies, and upon his return to Michigan, he joined his father as a brewer and distiller.



C. M. Hayes & Co.

JEX BARDWELL.

Detroit.

However, an introduction to the relatively new daguerreotype process changed the young man's life forever. In 1845, Mr. Bardwell returned to London to settle his recently deceased father's estate when he noticed a daguerreotype hanging in a doctor's window. He wasted no time in taking instruction from local daguerreotypist John Wharry Egerton. He returned to the United States the following year and married Emma Brown. Mr. Bardwell received his first daguerreian camera as repayment for a debt. Shortly thereafter, he opened the Jones & Bardwell gallery in Marshall, Michigan, of which by 1851 he was the sole owner. At around this time, he began experimenting with stereoscopes and optical lanterns, and hosted what is believed to be one of the first lantern demonstrations at Detroit City Hall. When Mr. Bardwell became manager of Joel E. Whitney's studio in St. Paul, Minnesota, he became an accomplished photographer of Native Americans, who were each paid the English equivalent of 10 cents to pose for portraits

that were later sold for \$2 each. He also experimented with Frederick Scott Archer's wet plate process while manufacturing his own soluble gun-cotton and adding gutta percha to his baths.



By 1854, Mr. Bardwell was back in Marshall, where he opened and operated a gallery for the next six years before setting in Detroit, focusing on photography full time. He became an eloquent spokesman for photography as art and science, and wrote several articles for the leading photography journals of the period. He also became involved in industry politics, most notably the Cutting bromide-collodion process patent issue, which remained under the strict licensing control of inventor James Cutting, much to the financial detriment of many struggling photographers. In protest, Mr. Bardwell closed his gallery, and at an 1867 convention, he produced documents from his own extensive archive that proved bromide had been used since the advent of the daguerreotype, thereby nullifying the patent and its oppressive licensing fees. His efforts were successful, and Mr. Cutting's patent was not renewed.

In his later years, Mr. Bardwell worked as a photographer for the Michigan Central Railroad, launched the Bardwell Photo Engraving Company, and taught a photography course at the Detroit Museum of Art, none of which were lucrative ventures. In appreciation for leading the defeat of the Cutting patent, members of the Photographers' Association of America

organized a Jex Bardwell Fund to aid the impoverished family. Contributions fell short of purchasing a new house, but were used to pay for a few months' rent and later to purchase a cemetery plot for Mrs. Bardwell, who died in 1899. Her 78-year-old husband joined her three years' later, on December 14, 1902.

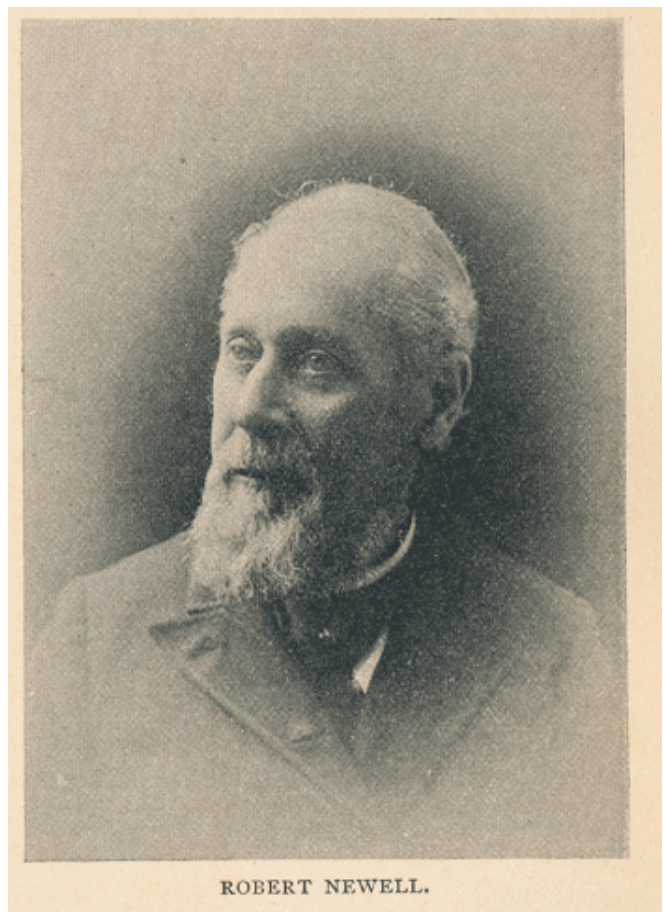
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Robert & Henry Newell



Robert Newell was born in 1822 in Burlington, New Jersey. He married Elizabeth Wormwood circa 1845, and their first child

Henry (known as 'Harry' to family and friends) was born three years' later. Four sons and two daughters would follow. Settling in Philadelphia, Mr. Newell entered the photography profession in 1855 and quickly established himself as one of the city's preeminent portraitists. For the next decade, his studio was located at 724 Arch Street. Although he initially specialized in portraiture, his true passion became outdoor and landscape photography. Mr. Newell closed his portrait studio in 1865 and opened a larger gallery at 626 Arch Street to satisfy the increasing and more lucrative demand for landscape and commercial photography. The grounds included a lush garden where families and military personnel could be photographed in a pastoral setting. The three-story structure featured the studio and an ornate parlor on the first floor, the printing room and office on the second, and the silver processes were housed on the third floor.

Ever the innovator, Mr. Newell designed a specially equipped van that could be transported easily and efficiently. It was virtually a studio on wheels, consisting of a darkroom, water tanks, and processing chemicals. His van enjoyed immense popularity among other photographers of the era. Mr. Newell's prowess as a landscape photographer attracted the attention of Clarence Howard Clark, a Philadelphia philanthropist who was then president of E. W. Clark and Company, a prominent banking and insurance corporation. He commissioned Mr. Newell to create an expansive portfolio of his family's estate. 'Views of Chestnutworld' are now part of the Smithsonian American Art Museum collection, but are not presently on display. 1872 was a banner year for Robert Newell. His son Henry entered the family business, which was promptly renamed R. Newell & Son. The successful duo collaborated on photographing building construction for the upcoming Centennial Exhibition being held in Philadelphia as well as photographing the interiors of the Eastern State Penitentiary that were featured in their

1872 annual report. Father-and-son also published a photographic series entitled Old Landmarks & Relics of Philadelphia and produced several stunning stereographs of commercial Philadelphia. Robert Newell continued experimenting with new processes, and developed an acid resistant composition that was used in wooden photographic coating baths, pans, and trays.

Henry Newell, who had established himself as a gifted photographer in his own right, married Clara McCormick on December 30, 1875. They had one son, Henry K. Newell, who died in infancy. The senior Newell died on February 2, 1897 at his Philadelphia home following a brief illness. Sadly, his son died less than a year later, on December 28, 1897. It is believed the firm of R. Newell & Son ceased operations shortly thereafter.



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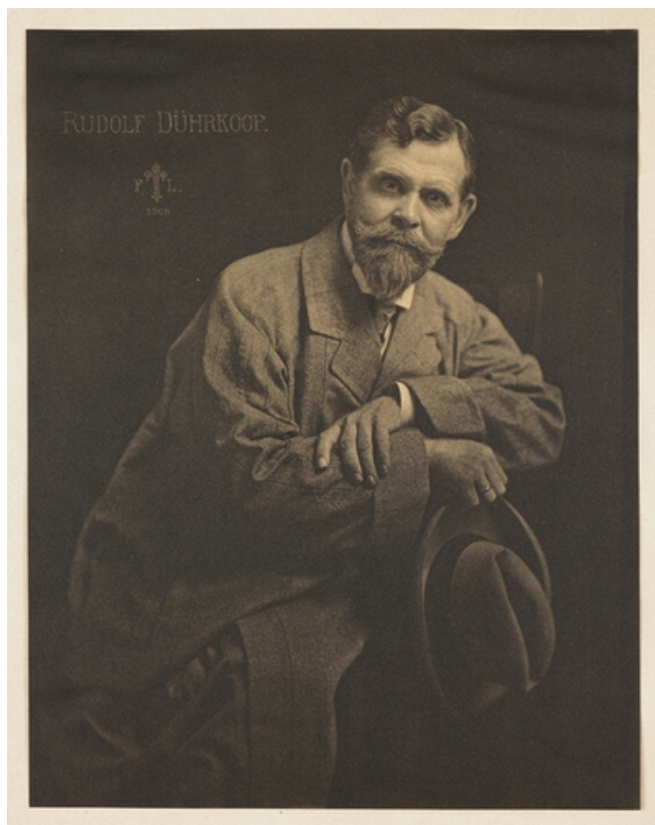
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Rudolf Durkoop



Rudolf Johannes Durkoop was born in Hamburg, Germany on August 1, 1848. The only child of working class parents Christian Friedrich and Johanna Frederica Emile Durkoop, he received only a rudimentary public school education before entering military service during the Franco-Prussian War. Afterwards, Mr. Durkoop returned home and married Maria Louise Caroline Matzen in 1872, with whom he would have two daughters, Hanna Maria Theresia and Julie Wilhelmine (known as Minya). To

support his growing family, he found a job with the local railroad and later became a mildly successful merchant. Unlike his contemporaries, Mr. Durkoop was introduced to photography rather late in life. At age 35, he attended a series of lectures by art historian Alfred Lichtwark, founder and director of the Hamburg Kunsthalle. Deeply inspired by the Pictorialist movement, Mr. Durkoop began conducting experiments with the wet collodion process in his spare time. He received his commercial photographer's license in 1882 and published his first article entitled, "On the Use of Yellow Light in Developing Bromide Gelatin Plates."

In 1883, he opened his first portrait studio at 26 Grosse Backerstrasse and enjoyed immediate success. Within six years, he would relocate his studio twice to accommodate the need for more space and also opened two additional galleries in the Hamburg enclaves of Altona and St. Pauli. His daughter Minya joined her father in the family business at age 14. For the first few years, Mr. Durkoop focused solely on commercial photography. However, the growing popularity of the German Modernist movement shifted his focus to artistic portraiture. His works were first exhibited in 1899 at the 6th Salon of the Hamburg Society for the Encouragement . Of Mr. Durkoop, poet and art critic Sadakichi Hartmann wrote, "To him a portrait is not merely a record, not merely actuality, but the means by which he can give utterance to poetic sentiments and aspirations. He revels in the mysteries of light and shade." For example, in Mr. Durkoop's portrait "The Lovers," the interplay between light and shadows on the faces of the subjects powerfully emphasizes the emotional intensity of their feelings.

By the twentieth century, Mr. Durkoop's professional sphere extended far beyond Hamburg. He was elected to England's prestigious Linked Ring and Royal Photographic Society and received an honorary membership into the elite London Salon of Photography. On his first visit to the United States in 1904, he held court with famed American photographer Gertrude Kasebier. The following year, he published a compilation of his photographs, Hamburg Men and Women at the Beginning of the 20th Century. In celebration of his 60th birthday and the 25th anniversary of his first studio, Mr. Durkoop received several honors, most notably the "Medal of Progress" by the Suddeutschen Photographie-Verein. Relocating his Hamburg studio for a final time, he also opened a lavish studio in Berlin. In 1907, Mr. Durkoop was named Photographic Advisor to the German government, with whom it would consult on various copyright issues. During his later years, he became a strong advocate of photography as a means of German cultural development. After a brief illness, 70-

year-old Rudolf Duhrkoop died on April 3, 1918. His daughter Minya (who used the professional name of Minya Diez-Duhrkoop following her brief marriage to photographer Luis Diez) became a famous photographer in her own right. She continued to operate the studios in Hamburg and Berlin until her death in 1929.

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