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The Kinamo movie camera, Emanuel Goldberg and Joris Ivens

Michael K. Buckland

Abstract

The design and characteristics of the compact spring-driven Kinamo movie camera (1921) are explained. The career and achievements of its designer, Emanuel Goldberg (1881-1970), are summarised, including his efforts to promote and popularise film making. The avant-garde filmmaker Joris Ivens was significantly influenced by his experiments with the Kinamo camera and also by Goldberg personally. Ivens used the Kinamo camera to film *De Brug*, *Regen*, *Borinage*, *Indonesia Calling*, and other films. Other uses and users of the Kinamo are noted.

Films are made with movie cameras and the technical characteristics of the camera determines the kind of filming that can be done. Innovation in camera technology can have two kinds of impact: a technical change can allow a different filming technique; but, as important, exploring the changed affordances of a new technology allows the cinematographer to discover new possibilities in film craft. Technique includes both technology and know-how. An example of an innovative camera having a strong influence occurred in the early work of Joris Ivens when he experimented with the Kinamo, a compact, spring-driven 35mm camera designed by Emanuel Goldberg expressly to permit hand-held filming. The role of the Kinamo and the influence of Goldberg were both acknowledged by Ivens in his memoirs and are routinely mentioned in biographical accounts of Ivens' early years, but with little or no explanation. Preparation for a biography of Goldberg provides the basis for a fuller explanation.¹

Emanuel Goldberg before the Kinamo

Emanuel Goldberg was Russian. Born in Moscow in 1881, he grew up in a cultured, cosmopolitan environment, a son of a distinguished medical officer in the Tsar's army. He graduated in Chemistry at Moscow University, but left Russia to avoid antisemitism and settled in Germany. He studied physical chemistry at the University of Leipzig and received his PhD in 1906 with a dissertation on the kinetics of photochemical reactions. After a year as an assistant to Adolf Miethe in the Photochemistry Laboratory at the Technical University in Berlin-Charlottenburg, he returned to Leipzig to be head of the department of photography at the Königliche Akademie für graphische Künste und Buchgewerbe (Royal Academy of Graphic Arts and Bookcraft) in 1907. He taught classes in photography, photoengraving and reprographics, and published numerous papers on photochemistry, sensitometry, photoengraving, moiré, halation, image resolution and other topics. Inventions included a practical method for making optically neutral gelatin wedges (the 'Goldberg Wedge') and the Densograph, an inexpensive device for measuring the characteristic curves of photographic emulsions.

During the First World War Goldberg caught the attention of the Carl Zeiss company in Jena because he had invented an ingenious device for testing all the important characteristics of a lens (aberrations, distortions, resolution, etc.) in a single exposure and because of his suggestions for aerial photography of enemy trenches from tethered balloons. In 1917 he was hired by Zeiss, initially as a consultant, then as a director of Ica, the Internationale Camera Aktiengesellschaft, in Dresden, then the centre of the German photographic products industry. Ica was a subsidiary into which in 1909 the Carl Zeiss Stiftung had consolidated its camera manufacturing operations making it the largest camera company in Germany. Goldberg's assignment was two-fold: to help modernize the firm, and to develop

new military products. Modernization was achieved through updated manufacturing procedures, new products and some sixty new patents. Military products, however, were soon outlawed by the Treaty of Versailles. Ica was then reorganised into two divisions: one for still cameras and related equipment, and the other, under Goldberg, for movie equipment.

The Kinamo camera

Ica was already making movie equipment, notably its Monopol projector, which sold well for use in schools. Goldberg believed that there could be a large market among amateurs making home movies and he saw the immobility imposed by the tripod as a major constraint. The tripod was necessary to keep the camera stable while turning the crank, so cranking had to be eliminated. Electric motors had been tried, but supplying electric power was also constraining, especially when filming outdoors. Goldberg opted for a wind-up, spring-driven motor as used in clocks. It was an engineering challenge. The gradually diminishing tension in a wound-up spring as it unwinds has to be converted into a very evenly regulated movement, and the spring has to drive not only the shutter and the movie gate, but also the take-up spool and its slipping clutch.²

As a student Goldberg was influenced by Wilhelm Wundt, who researched the physiology of perception, and as a designer he paid a lot of attention to ease of use. A good example is the Contax II 35mm camera, which was not only the first camera to have a range-finder incorporated into the viewfinder eyepiece, but the rangefinder was coupled to the lens and the focus could be adjusted by the second finger without moving the hand during picture-taking.

Goldberg's approach was heuristic. He would develop a concept for a new device, then make (or have someone else make) an initial prototype. He would then develop and improve the design repeatedly. This approach was more feasible for him than for others because, unlike most scientists and industrialists, Goldberg was also a versatile craftsman, highly skilled in woodwork, metalwork, lens-grinding, photoengraving, diamond-cutting and other precision engineering techniques. He liked to say that he was 'a chemist by learning, a physicist by calling, and a mechanic by birth'.

Ernst Wandersleb, of Carl Zeiss, Jena, who had helped recruit Goldberg to work for Zeiss, remembered taking a four-day skiing vacation with Goldberg and others, and relaxing after a day on the slopes:

While we other comrades enjoyed the evening in the cozy hut on the Schwarzwasser Alp, having fun, eating, drinking, smoking, and singing, happy to be far from our jobs, Goldberg unpacked from a backpack an entire arsenal of small tools and worked for hours on the first Kinamo model, which he had brought, a new movie camera that he was developing then in Dresden.³

Goldberg, who liked skiing and mountains, took care to ensure that the spring motor would function at very low temperatures. Initially it did not, so he would leave his Kinamo out overnight in freezing temperatures then dismantle the spring motor section each morning trying to find the source of the problem.

The Kinamo was the smallest of competing, compact 35mm movie cameras brought to the market in the early 1920s.⁴ The Debie Sept, a spring-driven 35mm camera marketed in 1921, held five metres of film, enough to film for only 17 seconds. The hand-cranked Kinamo N25 appeared in 1921 and an attachable spring-driven motor was in experimental use in 1923 and marketed in 1924. The Bell & Howell Eyemo appeared in 1923. Meanwhile studio cameras acquired electric motors and within five years hand-cranked cine cameras were obsolete.

The name Kinamo, derived from Goldberg's early studies of Greek (kine) and Latin (amo), meant 'I love movies'. The initial model was the basic hand-cranked Kinamo N25, for cassettes of 25 metres of 35mm film. (A variant model, coded 5402, took 15 metre cassettes.) The optional spring motor attachment was in experimental use in 1923 and marketed in 1924 (Fig. 2). Around 1925 the N25 was

modified and renamed Universal Kinamo. The high cost and flammability of 35mm film stock were encouraging interest in smaller formats, so Ica introduced the Kinamo S10 for 10 metre cassettes of 'Schmalfilm' (16mm film, sold only as safety film), followed by an improved model, the KS10. Starting in 1934 the Movikon 16mm and 8mm cameras was introduced and the Kinamo production was eventually phased out.

The Kinamo was remarkably compact and portable. The N25 model, even though it could be loaded with twenty-five metres of 35mm film, was only six inches high, five and a half inches deep and four inches wide (15×14×10 cms). The KS 10 model, which held 10 metres of 16mm film, measured less than 4½ by 3½ by 2½ inches (11.5×9×6.5 cms) and weighed under three pounds. It was said to be the smallest 16mm movie camera sold.

Designed for ease of use, the Kinamo had several attractive features. The film came in cassettes that were easily changed even in sunlight. A button could be pressed to mark the film at the end of a scene. A second gear reduced the filming speed to one eighth for trick photography and filming slow moving actions such as dramatic cloud movements. (The Universal Kinamo had four film speeds and a simple attachment that enabled it to copy films.) Particularly useful for the home movie maker was the delayed action release mechanism, which enabled the camera operator to be included among those being filmed. One inserted a leaf or a scrap of paper in a small clamp on the front, and, in the words of an evaluation in the *British Journal of Photography*: 'When the camera is released and the photographer is in the view of the lens he will see the piece of paper flutter to the ground just before the camera mechanism starts up. The mechanism is very quiet in operation and the photographer using the delayed action thus avoids the terrible uncertainty as to when to begin the action for the film.'⁵

Joris Ivens works on the Kinamo

In his memoirs Ivens describes how he went to Germany to acquire technical knowledge of photography, initially in Adolf Miethe's Laboratory in Berlin, where Goldberg had been some sixteen years earlier. Ivens then went to Dresden, where he worked briefly in the works of the competing Ernemann and Ica companies. Ernemann made a range of still and movie cameras, and was the leading supplier of movie theatre projectors in markets outside the USA. At Ica, Ivens worked on the assembly line for the Kinamo and later wrote:

In the mechanical workshop, one man made a great impression on me: Professor Goldberg. He was an inventor who had just perfected a marvellous little camera, the famous Kinamo, a professional 35mm spring-driven camera of a robustness and precision that was astonishing for its time. From this man I learned the basic principles of this kind of machine and I meddled with the secrets of manufacture.⁶

Goldberg was always referred to as 'Professor Goldberg'. He had been promoted to the rank of full professor at the Academy in Leipzig in 1912 to counter C.E.K. Mees' invitation to join him in establishing the new Kodak Research Laboratory in Rochester, N.Y. In Dresden, Goldberg was an adjunct professor (*Honorarprofessor*) at the Institute for Scientific Photography at the Technical University. His inaugural lecture on 19 May 1921 was on 'Cinematography as a Technical Problem' and he regularly taught a course on cinematography and also one on sound movies.

Goldberg's Kinamo movies

Around the time that Goldberg was advising Ivens, he had himself been learning the characteristics of the Kinamo by producing short dramas using himself, his wife (Sophie), his son (Herbert) and daughter (Renate), and friends as actors. Three complete shorts and a fragment have survived in a single 16mm copy made some forty years later from deteriorated 35mm originals which no longer exist.

Im Sonneck: Bilder aus dem Kinderleben (In the Sunny Corner: Scenes from the Children's Life,

4 mins.) is a series of episodes, from waking up to going to sleep, in the day of his daughter, Renate, then about two years old, looked after by her older brother, Herbert, then aged about nine or ten. Some of the scenes were shot inside the Goldberg home at Wallotsstrasse 35.

In *Zeltleben in den Dolomiten* (Camping in the Dolomites, 9 mins.) Goldberg stars in his own film. He would wind up the spring motor, set the camera on a tripod, compose the scene, then use the Kinamo's delayed release mechanism so that he could take up his position in the scene being filmed. He, Herbert, and a young man set up a tent in a lush alpine valley next to a stream, cook breakfast, then climb up higher to camp on rocky ground above the tree line, among fine views of rugged mountain peaks and dramatic cloud effects. A rock-climbing scene seems to have been enhanced by trick photography.

The most ambitious and dramatic Goldberg short is *Die verzauberten Schuhe: Eine heitere Kinamo-Tragödie* (The Magic Shoes: An Amusing Kinamo Tragedy, 13 mins.), a humorous melodrama about a family on vacation in the Alps. The exasperated father, played by Goldberg, loses his temper at meal-time. He denounces family life, knocks plates on to the floor and storms off to hike in the mountains, leaving his wife and daughter in tears. Two boys, played by Herbert and a friend, set off after him, track his footprints in the snow, and find him sleeping in a tent. Seeing that the father had removed his shoes, they teach him a lesson. They tie a long cord to the shoes, hide, and wait. When the father wakes and reaches for his shoes, they pull the cord and the shoes magically move out of his reach. Repeatedly, the boys pull on the string. The father is obliged to chase after the shoes and is eventually brought home repentant and apologetic. The mood in the story is exactly paralleled by the weather, with shots of a gathering storm, dramatic, billowing storm clouds among spectacular mountain peaks, then calm, and, after the reconciliation, lovely sunshine as the three children play happily in a meadow. The film was shot in the Dolomites, where the family spent four weeks after Renate had had pneumonia.

In a fourth, incomplete, and untitled film of eight minutes, father and son (Goldberg and Herbert) travel by train to a little town in the mountains. They set off cross-country skiing, but, caught by bad weather, they shelter in an old farm hut. Returning to the town, they find a letter from Mother at the post office and also a parcel of candies. They set off skiing again, then stop to open the parcel and, in a good-natured way, each tries to seize the tastiest items.

These short films are charming, humorous, and good-natured. Goldberg, formally dressed with a collar, tie, and hat, tends to play a comic role, dropping things, stumbling and, for example, trying to rescue the cooked breakfast that he has spilled on the ground. In 1927 Goldberg went skiing in Vikartal in the Austrian alps with a group of university students and they made a movie *Ein Sprung . . . ein Traum*.

Marketing the Kinamo

Ica's publicity stressed the Kinamo's small size and ease of operation: 'The Kinamo is a practical camera. ... Its very compact size will make a strong appeal to those who have always wanted to make movies. The great bulk, excessive weight and complicated mechanism of the average movie camera, not to mention its expense, has heretofore confined motion picture photography to the professional producer.'⁷ Goldberg's personal interests were reflected in Ica's advertising of the hand-held spring-driven Kinamo as the camera to use when mountain climbing, skiing, or taking candid photos of children. An undated, unsigned cartoon with a rhyming caption showed Goldberg making a skiing film (Fig. 4):

Herr Professor Goldberg froh
Schafft den Schlager Kinamo
Fährt auf Skiern gern spazieren
Liebt das Kinomagraphieren.

This can be rendered as:

The Professor is cheerful;

His Kinamo successful.
He likes to ski
And loves Kinamography.

The Kinamo was advertised for family use: 'In the home, movies of the family, the children and friends will be priceless in years to come. What would be more interesting after the children have grown up or the old folks have passed away, than to spend an evening showing a few thousand feet of Kinamo film. ... [T]he results will in every way equal most of the best professional motion pictures.'⁸

Neue Universum, an annual for boys, reported with enthusiasm that the introduction of the Kinamo removed all reservations about making amateur movies. Since it is no larger than the usual still camera, 'one can easily take it along on outings, walks and journeys. ... Operation is extremely simple; one does not need to be an experienced amateur to take good pictures because any good photoshop can process the film. What inviting prospects using a Kinamo offers for the family chronicles!'⁹

Because Goldberg saw amateur movies as an important potential market, he gave talks and wrote articles on the topic, including an article on how to film clouds for a magazine called *Bezee-Photo-Mitteilungen*. Unfortunately, this article seems lost. In the only set of this magazine found, in the Leipzig University Library, the pages containing Goldberg's article were destroyed by bombing in the Second World War.¹⁰

In 1926 four leading German photographic firms Ica, Ernemann, Contessa and Goerz merged to form Zeiss Ikon under Goldberg's leadership and headquartered at the Ica works. It was called, diplomatically, a 'Fusion', but, at the time, only Ica was profitable. The three other companies were failing. Zeiss Ikon was legally an independent company, but the Carl Zeiss Stiftung owned the great majority of the shares and exercised close control.

In an effort to increase Kinamo sales, Goldberg's short movies were packaged as promotional shorts with intertitles bearing the Zeiss Ikon logo and frequent mention of the Kinamo in prominent lettering in slogans such as: 'Handheld filming with the Zeiss Ikon Kinamo' (*Aufgenommen aus freier Hand mit Zeiss Ikon-Kinamo*). The Zeiss Ikon logo on the intertitles means a date in or after 1926, but the ages of the children show that the action sequences must have been filmed around 1923 or 1924 and frame enlargements were published in the Ica magazine, *Photo-Technik*, in 1925.

The implication that anybody could make movies like these if they only bought a Kinamo camera was quite misleading. Goldberg's shorts were far from amateurish. They reveal very skillful composition, crisp editing, and sophisticated use of backlighting, shadows and entrances. Nevertheless, the Kinamo has been credited with making home movies popular among the wealthy, at least in Germany.¹¹

For more than home movies

Although intended for the home movie market, the Kinamo was more than a cine version of a Kodak box camera. During the 1920s cinematography progressively differentiated into three markets: professional studio work; semi-professional which included technical, scientific, business, sport and experimental applications; and home movies. Ica was careful to define amateur photography and to position the Kinamo as covering everything other than studio production of feature films for movie theatres.¹² In the USA the Kinamo was advertised as a 'semi-professional' camera.

One scientific application was Ica's 'Goldberg Mikrophot Microscope Attachment' for taking photographs through a microscope. It was an attachment that could be clamped to the top of any microscope, with a partially silvered mirror set at a 45° angle, reflecting 99 per cent of the light from the microscope's specimen at right angles into a Kinamo camera attached at the side. If the specimen was brightly lit there would be enough light to film and, in addition, the subject still be seen through an eyepiece at the top of the microscope in the usual way, providing a view-finder and enabling the photographer to ensure that the microscope was properly focused during filming. The photographer could take a still photo, film at the usual speed or at reduced speed for slow motion.¹³

The 1920s saw a rapid increase in the use of microfilm in scholarship, libraries, record keeping, and the mechanization of office procedures. The Kinamo was used in a data processing system sold to reduce labour costs and clerical errors in preparing telephone subscribers' monthly bills. Some telephone exchanges had large arrays of sets of dials resembling automobile odometers, one set for each subscriber, counting the number of calls made. Billing was cumbersome and unreliable. Once a month, a clerk would call out each subscriber's number to a second clerk, who wrote down the number, deducted the previous month's number, and used the difference to calculate that subscriber's telephone bill. There were many errors in the recording and in the arithmetic. The Zeiss Ikon solution was to mechanize the process. A Kinamo camera, with two lamps, moved mechanically and, operating as a still camera, systematically photographed the dials. Each frame copied the dials of about a hundred subscribers. A carefully-designed workstation displayed two microfilms, the current and the previous months' filming, so that a clerk could easily read and transcribe the subscriber's number, enter the current month's count, then the prior month's count, into an adding machine. A single motion, pulling a lever, then performed the arithmetic, generated the bill, and advanced both films to the next subscriber. Labour was reduced by more than 80 per cent and errors by over 98 per cent.¹⁴

Filming compared with still photography

The Kinamo was no larger and no more expensive than many good still cameras in the widely-used 9 × 12cm format, and because it could take a single frame it could also serve as a still camera. Goldberg, however, went further, drawing on his studies of visual perception.¹⁵ He argued that the important role movement played in human vision made filming both easier and also more effective than still photography. The eye follows movement and weaknesses in composition and picture quality that would be distracting in a still image would not be noticed when watching a film. In consequence, lower standards of photography were acceptable with film than with stills.¹⁶ Given the advantages of moving images, the Kinamo, which could also take stills, could be seen as an all-purpose camera and this idea might have been behind the new name *Universal Kinamo*. This reasoning implied that cameras only capable of taking still images would become obsolescent for ordinary everyday purposes. It seems likely that Goldberg was the source of a report in the 1926 *British Journal Photographic Almanach*: 'The head of one of the largest camera-making facilities on the continent is credited with having stated that he would be surprised if in 1930 his workpeople were employed in making any amateur cameras but those taking motion pictures.'¹⁷ With the emerging technology of digital cameras this prediction may eventually prove true, but, back then, the trends diverged. Amateur movie-makers adopted the smaller, less-expensive 9.5 and 16mm safety film and, with the unexpected success of the Leica, still cameras moved towards the larger, double-frame 35mm film format. In 1930 Goldberg and his staff at Zeiss Ikon were struggling to develop and market the Contax to compete with the Leica.

Joris Ivens uses the Kinamo

Back in the Netherlands in 1927, Ivens experimented with free-form, hand-held filming inside a Zeedijk bar using the Kinamo and was pleased with the tonal quality of the resulting film:

But, even better, with my camera held in my hand, the marvellous Kinamo of Professor Goldberg, I was, naturally, freed from the rigidity of a tripod, and I had given movement to what, normally, would have had to be a succession of fixed shots. Without knowing it, filming flexibly and without stopping, I had achieved a continuity. That day I realised that the camera was an eye and I said to myself, 'If it is a gaze, it ought to be a living one'.¹⁸

Ivens went on to use the Kinamo for *De Brug* (The Bridge, 1928):

For me the bridge was a laboratory of movements, tones, shapes, contrasts, rhythms and the

relations between all of these. ... What I wanted was to find some general rules, laws of continuity and movement. ... I used a borrowed camera from my father's store, a Kinamo with three lenses. ... The Kinamo is a small spring driven automatic handcamera. It holds a magazine of seventy-five feet of 35mm film. I had worked on this very model in the construction department in the Ica factory. I had learned all its advantages and also its weaknesses from Professor Goldberg, the inventor of this practical little instrument, so that when I took the Kinamo onto the bridge it was already an old friend.¹⁹

De Brug is just twelve minutes long, a fast-paced, rhythmic series of patterns and movements in and around the bridge: shadows, girders, wheels, steam, seagulls and boats. It is both a study of movement and also a portrait of the bridge, the steam trains that cross it, the boats that pass under it, and life around it. Ivens had consciously explored what this camera could do and, at the start of the film, the screen is dominated not by the bridge but by close-ups of the Kinamo itself.

Borinage (1933) was filmed mainly with Kinamo cameras by Joris Ivens and by Henri Storck, who had been trained in Kinamo use by Boris Kaufman. *Borinage* was filmed surreptitiously. Being so small, the Kinamo was easily concealed from the police, which, on at least one occasion, prevented Ivens from being arrested and deported.²⁰

Goldberg and Ivens in Dresden in 1931

Ivens returned to Dresden in August 1931 to attend the VIII International Congress of Photography, organised by Goldberg; John Eggert, head of research at the Agfa plant in Wolfen, near Leipzig; and Robert Luther, the founding Director of the Institute for Scientific Photography at the Technical University in Dresden and Goldberg's dissertation advisor. The proceedings were heavily technical and dominated by discussion of the measurement of film speeds. The Congress was noteworthy because a film speed standard proposed by Goldberg and Luther was approved and, in Germany, became DIN 4512, and also because Goldberg demonstrated his 'Statistical machine', a desktop search-engine for finding microfilmed documents on rolls of 35mm film, probably the first use of electronics for information retrieval.

A special session of a more popular nature was scheduled for the general public in the evening of 5 August with talks by Goldberg, Eggert and Ivens. 'Dr E. Goldberg ... gave an extremely well illustrated popular lecture on "Fundamentals of Talking Films"' reported the *Journal of the Society of Motion Picture Engineers*.²¹ In his lecture he demonstrated how the vibrations from a needle playing a phonograph recording of the Egmont Overture, one of his personal favorites, could be converted into an electric current which produced patterns on an oscillograph, and also fluctuations in a rotating glow-lamp which were then converted, by means of a photoelectric cell, from light back to electric current and fed into a loudspeaker to reproduce the music recorded on the phonograph record. Eggert described the development of colour movies.

Ivens spoke on 'The documentary film in the avant-garde'. He said that commercial considerations led to 'art inflation' in the film industry and that avant-garde filmmakers sought to achieve purer artistic expression. Cinematography is the art of moving images and an aesthetic sense of rhythm was fundamental. The principles of rhythm, important in music, painting, literature and dance were also decisive for cinematographic movement, and film needs its own rhythmic principles involving both spatial and temporal relationships. Documentary films can evoke patterns of time and space from the objects filmed instead of using externally-imposed sequences of ideas. In this way documentary films can inspire more authentic feature films. Ivens then screened excerpts from six films: *Zuiderzee* (Ivens, 1930), *Turksib* (Victor Turin, 1929), *Sturm über Asien* (Vseolod Pudovkin, 1928), *Philips Radio* (Ivens, 1931), *Studie Nr 9* (Oscar Fischinger, 1931), and unidentified animated films made at Fleischer Studios. Ivens' 1931 Congress paper was published in the proceedings. An almost identical version was published in 1963 and an English translation in 1999.²²

Cameraman Erwin Anders, who, against Goldberg's advice, had given up secure employment at Zeiss Ikon to become a filmmaker, may well have been referring to Ivens' screening at the 1931 Congress in his 1963 tribute to Ivens:

At the end of the 1920s I worked as an assistant to the world-famous scientist Professor Dr. Emanuel Goldberg in Dresden. He had prepared the way for participation in the film medium by a wider circle with his 35mm Kinamo movie camera, which, for its time, was unusually compact and affordable. Many of those who bought it were simply amateurs who wanted only to enrich their family records, but there were also scientists, especially doctors, and also some young artists who wanted to express their concerns to the public through the film. And it happened that one day I was able to see a documentary film by a young Dutchman about the draining of the Zuiderzee that had been filmed with this spring-driven camera. The creator of this film was Joris Ivens. Together with our Prof. Goldberg we were deeply impressed with what a work of art had been achieved by Ivens with a camera thought to be more for amateurs.²³

The strong construction, tolerance of cold, and compact camcorder-like size of the Kinamo proved ideal for spectacular shots taken from the skiers' perspective in alpine skiing action sequences in the mid-1920s mountain films of Arnold Fanck. Impressed, cameraman Robert Baberske used a Kinamo to film *Berlin – Die Sinfonie der Grossstadt* (Berlin – Symphony of a Great City, 1927) and again, many years later, when required to film from the crow's-nest of a ship's mast at sea in raging storm for *Leuchtfeuer* (1954).²⁴

Filmmaker Martin Rikli, when young, worked for Goldberg at Ica and 'contributed largely to the development of camera equipment, most notably in the construction of the lightweight Kinamo, which revolutionized documentary filmmaking.'²⁵ Others who worked with Kinamos included Erwin Anders, who had also worked for Goldberg when young, and Ella Bergmann-Michel, who bought a Kinamo on Ivens' advice and used it in *Fliegende Händler* (Travelling Hawkers, 1932).²⁶ Bengt Berg, the Swedish nature photographer, filmmaker and author of best-selling travelogues visited Goldberg and presented him with copies of some of his books as a gesture of appreciation for the Kinamo. Werner Sell, a Junkers aircraft engineer with a taste for travel to exotic places, financed his trips through commercial use of movies and frame enlargements taken with his Kinamo.²⁷ Other filmmakers reported to have used Kinamos early in their careers include Jacques Cousteau, Boris Kaufman and Henri Storck.

Goldberg after the Kinamo

Goldberg had become an important and respected figure in photography and cinematography. His more than one hundred publications across a wide range of topics included papers on amateur cinematography, filming cloud movements, the illusion of movement, movie sound technology and measuring movie gate temperatures. In German texts the Gamma Rule was commonly called the Goldberg Condition (*Goldberg Bedingung*), but he was best known for his work on sensitometry and a book, *Der Aufbau des photographischen Bildes* (The Construction of the Photographic Image).²⁸ One of the founders of the German Movie Technology Society (*Deutsche Kinotechnische Gesellschaft*), he received that society's Messter Medal for services to cinematography and he was the first person outside of France to receive the prestigious Peligot Medal of the French Society for Photography and Cinematography.

Everything changed on 3 April 1933, when Goldberg was kidnapped from his Zeiss Ikon office by Nazi thugs. Released a few days later after pressure from the governor of Saxony, he moved to France, then, in 1937, to Palestine, where he lived on until 1970, a founder of the high-tech industry in Israel. But he was largely forgotten in Europe and North America. The Nazis would not give credit to a Russian Jew; his publications receded from view as time and scholarship advanced; and ambitious others, Heinz Küppenbender, Vannevar Bush and J. Edgar Hoover, took or concealed credit for his major achievements: the design of the Contax 35mm camera, his search engine and microdot technology,

respectively - but not for the Kinamo. Even his several years as the founding chief executive of Zeiss Ikon remains unmentioned in successive Zeiss corporate histories in 1937, in 1951, and even in 2000. He can serve as a case study in how thoroughly the memory of a well-known figure can be erased.²⁹

Conclusion

Leading writers on film have commonly theorized film history in terms of the increasing mobility or liberation of the camera. The development in the early 1920s of cameras capable of hand-held filming was only one of several methods of increasing, or simulating, camera mobility, but it was a very important one. So long as even detailed filmographies continue to fail to note the technical aspects of the films they describe it will remain hard to know who used what technology to what effect in which film. It has been possible in the case of Goldberg, the Kinamo, and Joris Ivens to document something of what happened, but, in general, comparable examinations of other technological innovations are not easily found and offer a large challenge to film historians.

Acknowledgement: I am very grateful for the assistance of Goldberg's son, Herbert Goldberg, daughter, Chava (Renate) Gichon, and son-in-law, Prof. Mordechai Gichon.

Notes

¹ Michael K. Buckland, *Emanuel Goldberg and his Knowledge Machine* (Westport, CT: Libraries Unlimited, 2006). For consideration of the Kinamo, see Chapter 8: Ica and the Kinamo, 88-98.

² A.S. Newman, 'A spring-driven cinematograph camera', *Transactions of the Society of Motion Picture Engineers*, 12, 34 (April 1928): 397-402.

³ Ernst Wandersleb, Einige persönliche Erinnerungen an Prof. Emmanuel (*sic*) Goldberg (unpublished typescript, 1957), [2]. Translations from German and French by the author.

⁴ Gerhard Kemner, 'Amateurfilm – Eine Zeitreise durchs Familienkino', in Gerhard Kemner and Gelia Eisert, *Lebende Bilder: Eine technikgeschichte des Films* (Berlin: Nicolai, 2000), 136-156.

⁵ *British Journal of Photography* 79 (23 Sept 1932): 582-583, 583.

⁶ Joris Ivens and Robert Destanque, *Joris Ivens, ou la mémoire d'un regard* ([Paris]: Editions BFB, 1982), 43.

⁷ *Ica Kinamo*, undated sales flyer issued by Ica's U.S. agent, Harold M. Bennett of New York.

⁸ *Ica Kinamo*, undated sales flyer issued by Harold M. Bennett, New York.

⁹ 'Liebhabekinetographie', *Neue Universum* 44 (1923): 433-436.

¹⁰ Emanuel Goldberg, 'Kinematographische Wolkenaufnahmen', *Beezee-Photo-Mitteilungen* (Leipzig) 2 (1926): 145-148.

¹¹ Michael Kuball, *Familienkino: Geschichte des Amateurfilms in Deutschland* (Hamburg: Rowohlt, 1980), 62.

¹² See Martin Rikli, 'Kinematographische Aufnahmen ohne Stativ', *Phototechnik* 10 (1925): 175-176, 175.

¹³ Martin Rikli, 'Mikromomentphotographie und Mikrokinematographie', *Photographische Korrespondenz*, 62, 3 (1926): 139-143.

¹⁴ C.E.A. Maitland, 'Die photographische Gesprächszählerablesung und die optisch-mechanische Auswertung der Zählerstände', *Zeitschrift für Fernmeldetechnik, Werk- und Gerätebau*, 12, 2. Heft (28 February 1931): 17-20.

¹⁵ See Emanuel Goldberg, 'Bewegungssynthese in der Kinematographie', *Die Kinotechnik* 8, Heft 13 (10 July 1926): 333-336.

¹⁶ Kurt Dienstbach, 'Ist die Filmaufnahme leichter als die photographische Aufnahme?', *Phototechnik* 19 (December 1925): 354-356.

¹⁷ [George E. Brown], 'Amateur cinematography', *British Journal Photographic Almanac* (1926): 179-200, 182.

¹⁸ Ivens and Destanque, *Joris Ivens*, 70-71.

¹⁹ Joris Ivens, *The Camera and I* (New York: International Publishers, Seven Seas Books, 1969), 26-27.

²⁰ Ivens and Destanque, *Joris Ivens*, 115-116.

²¹ S.E. Sheppard, 'Resumé of the proceedings of the Dresden International Photographic Congress', *Journal of the Society of Motion Picture Engineers* 18 (1932): 232-241, 239.

²² Joris Ivens, 'Der dokumentarische Film in der Avantgard', in VIII International Congress of Photography, Dresden, 1931, J[ohn] Eggert and A[rpad] von Biehler (eds.), *Bericht über den VIII. internationalen Kongress für wissenschaftliche und angewandte Photographie, Dresden, 1931* (Leipzig: J.A. Barth, 1932), 221-224; Joris Ivens, 'Vortrag auf dem Internationalen Kongress für Photographie, Leipzig, 1932', in Wolfgang Klaue, Manfred Lichtenstein, Hans Wegner (eds.), *Joris Ivens* (Berlin: Staatliches Archiv, 1963), 263-265; Joris Ivens, 'The artistic power of the documentary film (1932)', in Kaes Bakker (ed.), *Joris Ivens and the Documentary Context* (Amsterdam: Amsterdam University Press, 1999), 227-229. The last two give the date as 1932 and the location as Leipzig and neither mentions the original publication in the Congress proceedings.

²³ Erwin Anders, [Tribute to Joris Ivens], in Klaue, Lichtenstein, Wegner (eds.), *Joris Ivens*, 28-29, 28.

²⁴ Jochen Hergersberg and Martin Koerber, 'Alte Kameras: Eine Blick in die Sammlung der Stiftung Deutsche Kinemathek', in Von Cinema Quadrat (eds.), *Gleissende Schatten: Kamera Pioniere de Zwangiger Jahre* (Berlin: Henschel Verlag, 1994), 103-104; IMAGO, *Making Pictures: A Century of European Cinematography* (New York: Abrams, 2003), 182.

²⁵ Jan Aitken (ed.), *Encyclopedia of Documentary Film* (New York: Routledge, 2006), 1127; also, Rikli, 'Mikromomentphotographie und Mikrokinematographie'.

²⁶ Bernt Karger-Decker, 'Kameramann Erwin Anders', *Fotographie*, 13, 12 (December 1959): 466-469. Hergersberg and Koerber, 'Alte Kameras', 104; Hans-Michael Bock (ed.), *CineGraph* (Edition Text+Kritik) s.v. Ella Bergmann-Michel.

²⁷ Kubell, *Familienkino*, 74-76.

²⁸ Emanuel Goldberg, *Der Aufbau des photographischen Bildes. Teil I: Helligkeitsdetails*. (Halle: Knapp, 1922).

²⁹ Buckland, *Emanuel Goldberg and his Knowledge Machine*, 242-246, 254-256; Michael K. Buckland, 'Histories, heritages, and the past: The case of Emanuel Goldberg', in W.B. Rayward and M.E. Bowden (eds.), *The History and Heritage of Scientific and Technical Information Systems. Proceedings of the 2002 Conference* (Medford, NJ: Information Today, 2004), 39-45. Also at <http://www.chemheritage.org/events/asist2002/03-buckland.pdf>.

Figure captions:

Fig. 1 Emanuel Goldberg, 1881-1970, undated photograph.

Fig. 2 Kinamo N25 movie camera with spring motor attachment.

Fig. 3 Emanuel and Herbert Goldberg in a tent. Frame enlargement, *Zeltleben in den Dolomiten*.

Fig. 4 Cartoon of Goldberg using a Kinamo for a skiing film.

Fig. 5 'Handheld filming with the Zeiss Ikon Kinamo.' Promotional intertitle in *Im Sonneck: Bilder aus dem Kinderleben*.