



Sterling P. Newberry

1915 - 2017



Biography

Sterling Newberry was born on August 10, 1915 in Springfield, Missouri (he claimed partial Cherokee Native-American ancestry), and died in Rumford, R.I. on January 28, 2017 at the age of 101.

He went to graduate school at Washington University, St. Louis, where in 1938 and 1939 he built the first high-resolution TEM in the US.

After WWII, during which Sterling worked at Western Cartridge Company, he joined GE, where he designed a prototype electrostatic TEM. But he made his mark in 1954, when GE announced the first commercial x-ray microscope.

After a long and distinguished career at GE, Sterling struck out on his own, founding the Micro-Bit Corporation, based on his method of electron-optical data storage by means of a "fly's eye" lens.

Finally, Sterling founded CBI labs, in Schenectady, NY, collaborating with several scientists in applications of x-ray microscopy, as well as continuing his development of x-ray microscopy until he moved in Rhode Island in Spring, 2005.

He was very active in scientific research into his 80s, and was enthusiastic about microscopy outreach and teaching young people, for which he developed creative teaching aids involving simple home-made microscopes.

TEM

Sterling Newberry's involvement with electron optics began as a student at Washington University, St. Louis under Gordon H. Scott and Howard McMillen. Scott's lab (in the Anatomy Department, not the Physics department!) had constructed an emission microscope in 1935, which was used to visualize trace elements in biological samples.

The first TEM outside Europe was built in 1935 at Washington State University, Pullman, Washington, by Fitzsimmons and Anderson, but it did not exceed the resolution of the light microscope, as did the 1938 Toronto TEM of Hillier and Prebus, and Newberry's 1938 TEM at St. Louis.

After WWII, Sterling worked for many years at the General Electric Company, where he was responsible for several patents. In the 1940s and 1950s, GE had a program to develop a simple, low-resolution, low-cost TEM. The prototype was demonstrated at the first EM conference in Chicago in 1942, but early commercial versions were not successful.

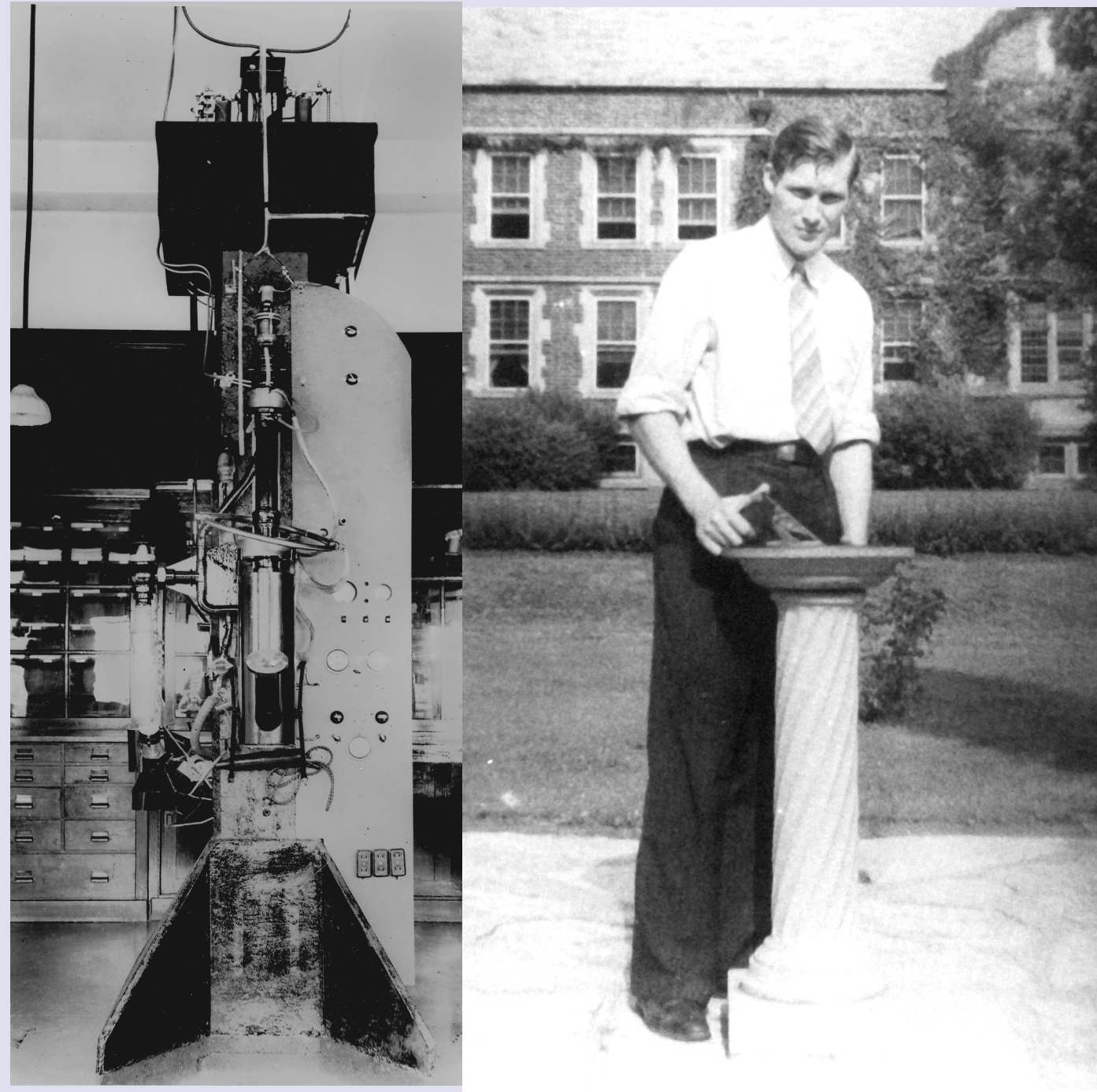


Fig. 1. Newberry's 1938 TEM (a magnetic type) at Washington University, St. Louis, the first US TEM to achieve resolution better than the light microscope; Newberry as a graduate student at WUSTL.



Fig. 2. Newberry operating his much-improved prototype GE electrostatic TEM, which was never marketed.

X-ray microscopy

Scientists had never been able to get a magnified X-ray look at internal structures through ordinary optical microscopes, since X-rays cannot be focused by optical lenses like ordinary light. The first X-ray microscopes used grazing-type lenses at a very low angle to focus X-ray images, however the images were blurry due to diffraction. Newberry recognized that by placing the specimen very close to a point source of X-rays, and placing the photographic plate much further away, a working commercial microscope could be created. The resolution of such a microscope is comparable to the light microscope.

Designed in collaboration with Selby E. Summers, the instrument was introduced at a conference of the International Council of Scientific Unions in London in 1954.

Fig. 3. The GE model, designed by Newberry, was the first commercial x-ray microscope. Six microscopes were sold by 1956 and about 100 units were produced, some of which are still operating. Some users fitted the microscope with a crystal spectrometer for recording x-ray emission lines from selected areas on the specimen. In time, kits were made available for converting an SEM into an x-ray microscope.

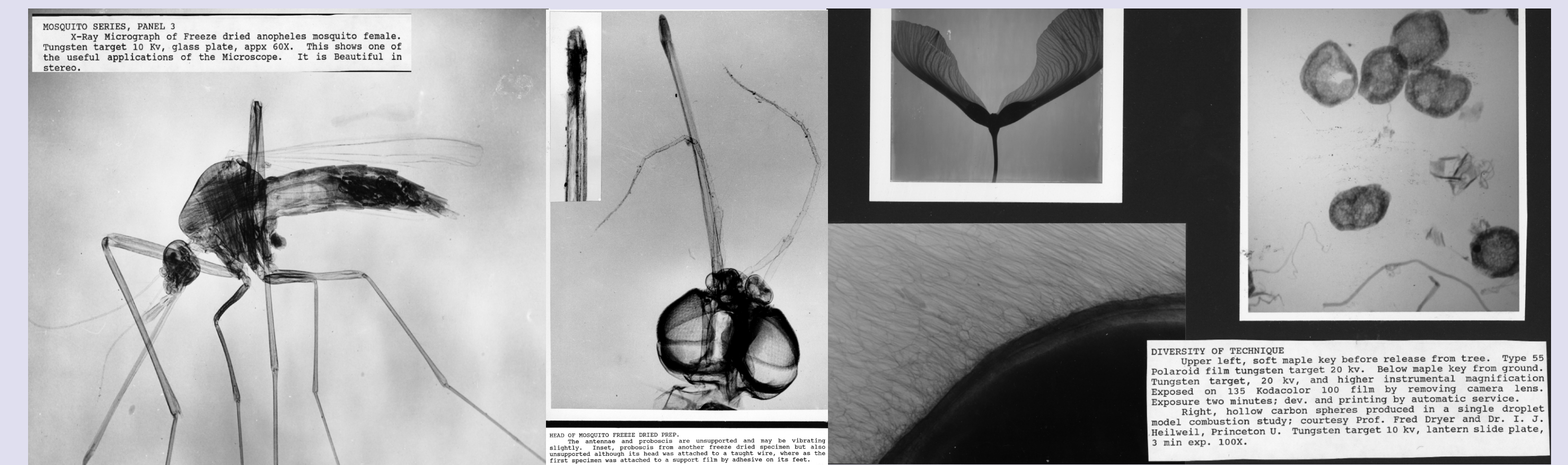
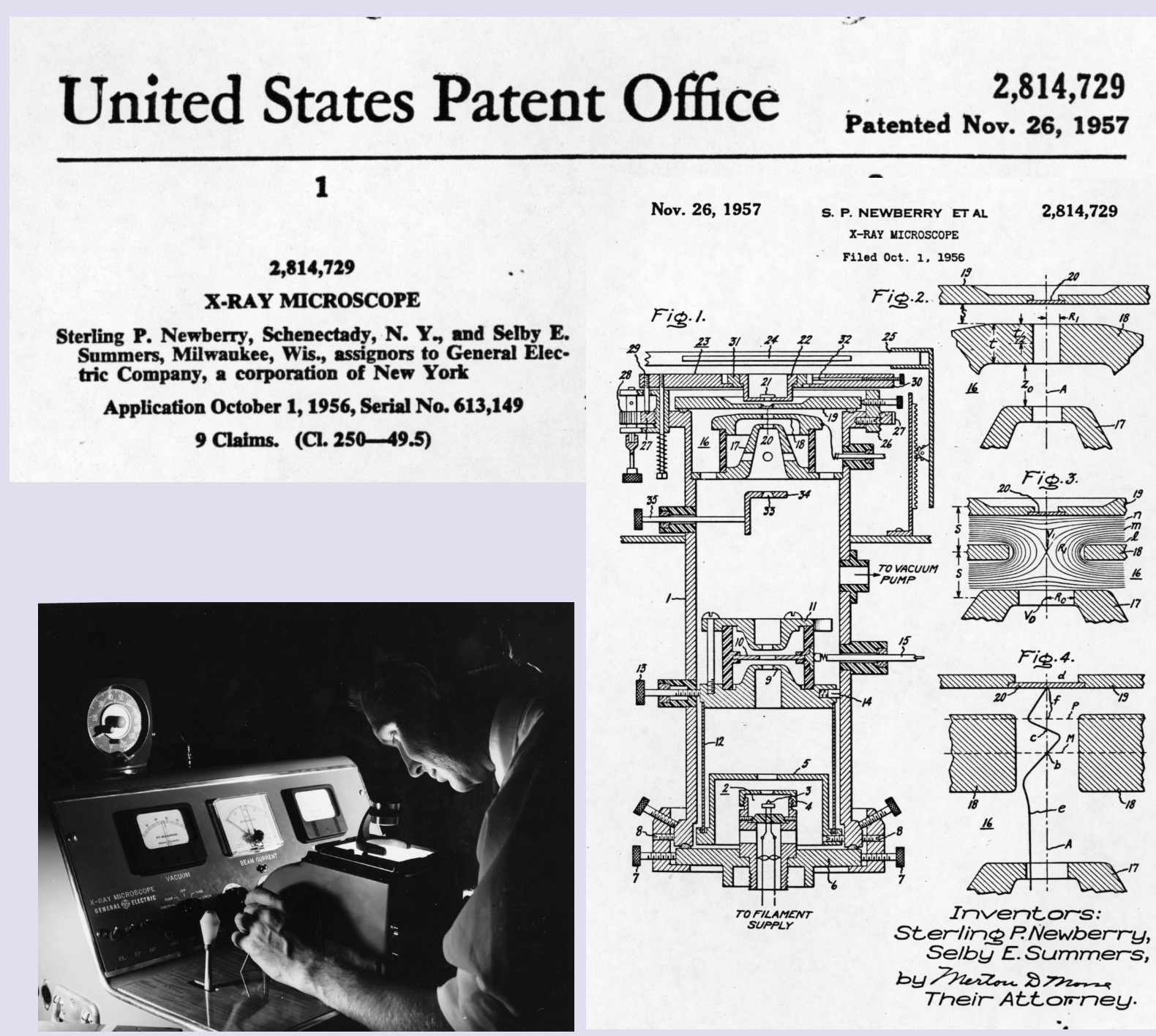


Fig. 5. Examples of Sterling's x-ray micrographs.

Fig. 4. Patent page and patent drawing of the x-ray microscope. Note that for the electron optics, electrostatic lenses were used.

Micro-Bit corporation



After GE, Sterling founded the Micro-Bit Corporation, which designed a "fly's eye" electron-optical memory device for computers. In the late 1960s, computer technology was limited because of insufficient RAM. A fast, high-density, small-size memory unit was needed. Of course, in time, silicon devices solved the problem, with less complexity and at a lower cost than electron-optical storage.

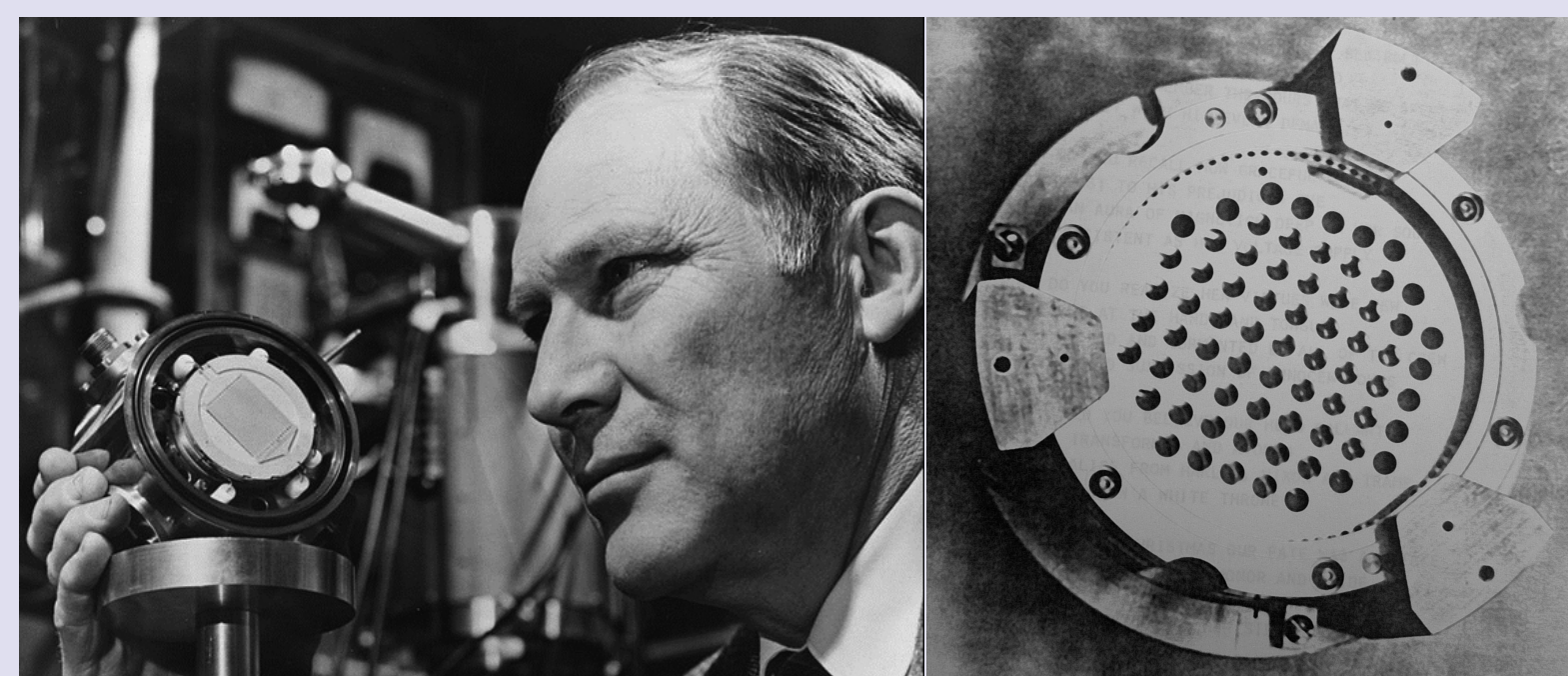


Fig. 6. Sterling holding a "fly's eye" lens at GE in 1966.

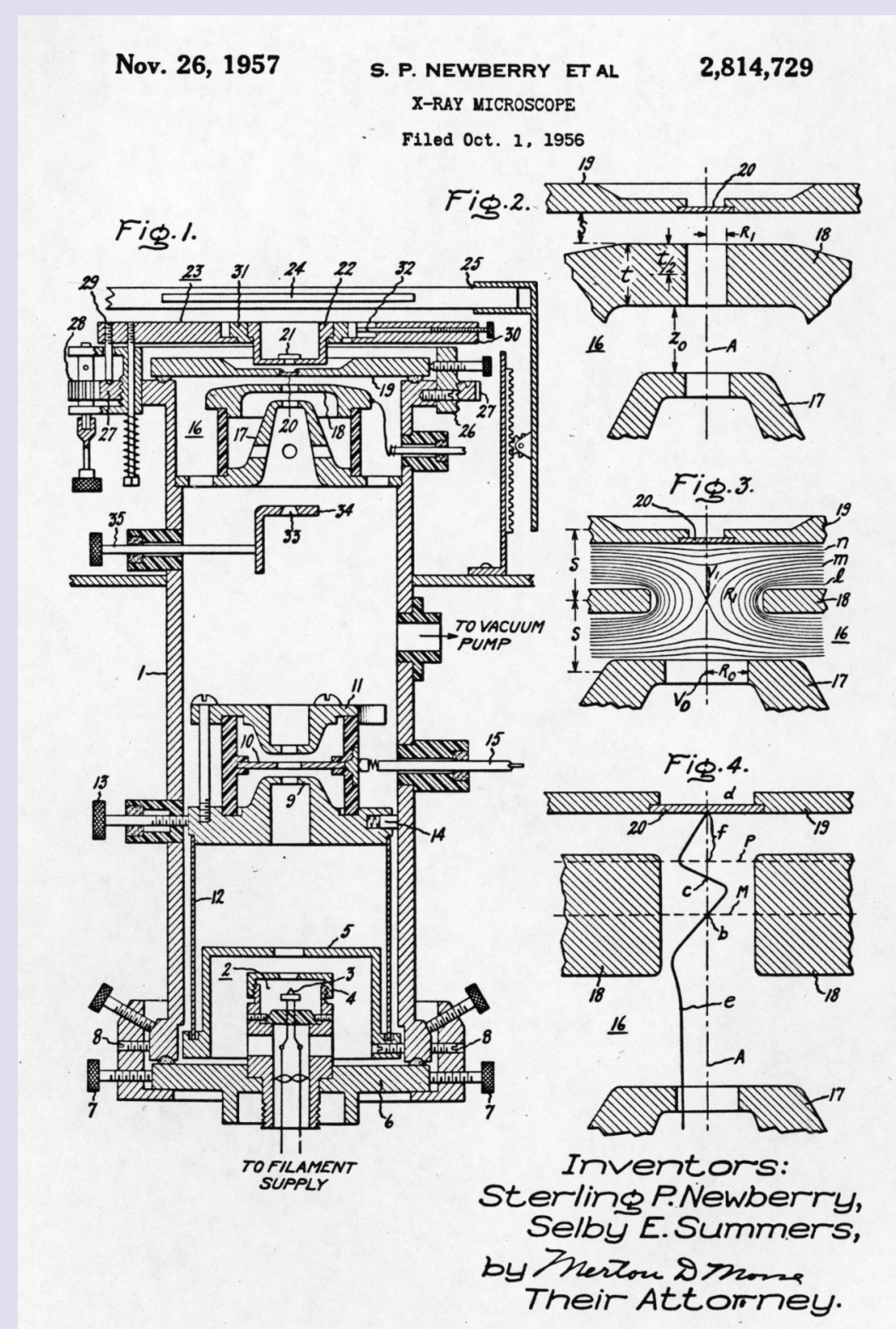


Fig. 7. Original patent drawing

The original patent was filed while Sterling was at GE, so Micro-Bit could be considered a GE "Spin-off". The concept was introduced in 1966, as recorded in the Proceedings of the AFIPS 1966 Joint Computer Conference. The Micro-Bit Corporation, which became a division of Control Data, existed for over 10 years, starting from the late 1960s.

(EMSA) involvement

At his passing, Sterling was the last remaining Charter Member from the founding of the Microscopy Society of America, in 1942. He contributed to our society throughout his career, especially for our 50th anniversary, in 1992. For this occasion, starting in 1990, he carried out video interviews of many of the pioneers in our field. This work has continued, and the list is at: <http://www.microscopy.org/about/interviews.cfm>

Our Society published Sterling's book "EMSA and its People - The First Fifty Years", which was given to each attendee of the 50th Anniversary Annual Meeting in 1992 in Boston. Sterling was given a certificate of special recognition at M&M 2006 in Chicago, the last meeting he could attend.



Charter members at 1992 50th Anniversary Meeting of EMSA in Boston:

Left to right: O. F. Schuette, G. I. Simard, E. F. Fullam, J. Hillier, J. S. Bryner, A. G. Richards, J. S. Bryner, Mary S. Jaffe, unidentified, T. Rochow, E. P. Olivieto, G. B. Levy, C. S. Barrett, E. A. Boettner, S. P. Newberry (at arrow), S. M. Zollers, A. Prebus, J. L. Watson, F. O. Schmitt



Sterling at the presentation of his Certificate of Appreciation at M&M2006 (Chicago), with former MSA presidents

Presidents left to right: Gracie Burke, Mike O'Keefe, Charlie Lyman, Barry Carter, Sara Miller, Jay Jerome (2006 President).

Sources / references

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