Bernard Finn addendum

PROJECTS, PAST (collections):

Most curatorial activities related to collecting, preserving, and documenting the broad range of objects related to electrical history can be considered as routine responsibilities. Those that are easily identified as "projects" are exhibitions and publications. But occasionally a special organized collecting or documenting effort is required which justifies this term.

Those acquisitions projects that come to mind are the Western Union objects and archives (which involved developing long-term relationships with the WU curator), early communications satellites (negotiating with corporate and government agencies), lasers (identifying and contacting scientists and laboratories), electrical appliances (an ad campaign), submarine telegraph apparatus (negotiating with local and Newfoundland government interests), transistors and integrated circuits (collections at corporations), 19th-century laboratory apparatus (a multi-year campaign to obtain items from colleges and universities).

Documentation strategies changed as we became more interested in the social uses of technical devices. And the computer (with digital cameras) revolutionized how information about objects was stored. In both instances obtaining and organizing necessary information can take on the aspects of a project. For the Electricity unit this has been accomplished by years of effective collaboration between professional staff members and dedicated volunteers.

PROJECTS, PAST (scholarly):

* Symposium on historical importance of underseas communications cables (with Daqing Yang). In 2002 a group of historians came together for two days at the Dibner Institute in Cambridge, Mass., to explore the social impacts of submarine cable in a symposium organized by Finn and Yang, who were afterwards editors of these presentations in *Communications under the Seas: The Evolving Cable Network and its Implications* (MIT Press, 2009.

* Artefacts: an international organization promoting the use of objects in historical studies. (1995-). Co-founder (with Robert Bud, Helmuth Trischler). A joint project of the Smithsonian Institution, Science Museum (London) and Deutsches Museum (Munich) with annual meetings and a book series (now published by the SI Scholarly Press). Special responsibility for the website www.artefactsconsortium.org.

* Edison and the Electric Light (with Robert Friedel, Paul Israel). In 1978 Finn and Friedel became principal investigators of a project funded by the NSF to develop a book-length manuscript describing Edison's invention; Israel was soon added to do detailed research.

The book, *Edison's Electric Light: Biography of an Invention*, appeared in 1985 with narrative text by Friedel, research essay by Israel, and short "sidebar" essays by Finn (see under Publications below).

* Retrospective Technology Assessment (with Vary Coates). In 1975-6 the NSF funded four projects to "test the proposition that studies of the past can guide and improve studies of the future." Finn and Coates were Principal Investigators of one of these, which analyzed what contemporary people anticipated would be the impact of the 1866 Atlantic cable and compared it with what actually happened. The results were published in a report to the NSF and in a book: *A Retrospective Technology Assessment: Submarine Telegraphy, The Transatlantic Cable of 1866* (San Francisco Press, 1979).

Documentation of changes in the power industry (notably the separation of generation from distribution) as they happened, paying special attention attitudes of key people in the industry, with David Allison; also Hal Wallace who managed all the basic operations. Funded with help of participating companies (1996-) http://americanhistory.si.edu/powering/.

Using the internet to collect information about the technical development and social impact of electric lighting and fuel cells (one of several similar projects funded at the same time by the Sloan Foundation), with Hal Wallace (1998-) http://americanhistory.si.edu/lightproject/introduction/intro.htm; and http://americanhistory.si.edu/fuelcells/index.htm.

The Thomas A. Edison Papers. With Brooke Hindle, served as representatives of Smithsonian as co-sponsor (with National Park Service and New Jersey Historical Commission) to establish a project to publish the papers of Thomas A. Edison, and to find a host institution and an editor. Served on oversight committee, 1978-2004.

"Manuscripts in U. S. depositories relating to the history of electrical science and technology" (1973), booklet with information assembled by David Hounshell, summer project funded by IEEE.

"Relics of the Electrical Age: A directory of public and private repositories in the U. S. and Canada containing artifacts associated with the history of electric technology and science" (1977), booklet compiled by Robert B. Belfield, summer project funded by IEEE.

PROJECTS PAST (administrative):

Members of staff are occasionally asked to help develop programs for the museum and/or institution. For example:

Helped establish procedures for peer evaluation of curators (Professional Accomplishments Evaluation Committee) which was new to the Smithsonian (it had just been adopted at

NMNH) and reportedly was being used in only two other federal agencies, with Silvio Bedini (1965).

Organized volunteers from the staff to make a detailed year-long survey of visitors to the museum, for Smithsonian's Office of Policy and Analysis, with Marion Gill. (1994-5).

Curatorial member of committee testing the value of "re-engineering" process to examine museum's outgoing loan practices and make recommendations for improvements (1997-9).

PROJECTS PAST (non-administrative):

Activities within the institution/museum initiated by staff and although sanctioned by the administration not subject to its direction. For example:

Active in founding of Association of Curators (1963) and chair on several occasions; also in founding of Smithsonian Congress of Scholars (1994-6) and chair (2003).

NMAH representative with Smithsonian scholars organizing two Institution-wide conferences (held at the zoo) under the general title of *Dialogue*: "What about Research" (1994) and "What about Diffusion" (1996) which examined issues of mutual interest to the professional staff and offered suggestions to the administration (including, for instance, establishment of the annual secretary's award for outstanding scholarly work).

PROJECTS, PAST (exhibitions):

All exhibits were in MHT/NMAH except as noted.

* "Cyrus Field & the 1866 Atlantic Cable," 2016-17, in association with the NMAH Archives Center.
  Based on the Isabella Field Judson Collection of letters and other documents. Of special interest is a letter from Samuel Morse (Oct. 3, 1856) erroneously concluding that successful tests (made with W. Whitehouse) on 2000 miles of land line showed that the cable also would be successful. See blog posting
  http://americanhistory.si.edu/blog/trans-atlantic-telegraph-cable

* "Museums at the Smithsonian: 150 Years of Collecting," 2002-2006, with Margaret Grandine. In Arts & Industries Building. Objects remaining from "1876" exhibit were assembled in the east and west halls and the central rotunda to describe how most SI museums began life in the A&I building.

* "The Underwater Web," 2001-02, in association with the Smithsonian's Dibner Library.
  150 years of submarine cables arranged in terms of ironies. For instance: cables were promoted as instruments of peace, yet became critical elements for war; relay stations

in remote locations were in immediate contact with stations around the world; earlier optical (semaphore) systems, replaced by electrical cables, would return as fiber optic cables. See web version http://www.sil.si.edu/exhibitions/Underwater-Web/.

* “Lighting a Revolution II,” 2000-present, with Hal Wallace.
Revision and extension of 1979 exhibit included new labels in the form of brief dialogues: historical quotes from Edison and contemporaries with curatorial responses. The extension applied the five-stage structure of the main exhibit to inventors working 100 years later on new lighting devices.

* "Information Age," 1990-2005, with David Allison, Jon Eklund, and Steve Lubar.
Overall organization: separate communications and processing technologies came together post-WWII with the advent of the computer. Communications highlights included 1858 Atlantic cable (excitement of the new technology even as this first cable failed); operational 1877 Bell telephone (good fidelity, weak signal); Edison stock ticker (importance to finance); radio station mock-up (showing importance of advertising, commentators); Kennedy-Nixon debate with original camera (importance to politics); Syncom satellite (greatly expanded world reach, including television).

* "Edison after the Electric Light: The Challenge of Success," 1986, with Joyce Bedi.
Association of Science-Technology Centers Traveling Exhibition Service.
Informally called “Edison after 40.” Based on a collection of photographs taken during the period when Edison had a new laboratory, a new wife, and new expectations. Approximately 100 photos on 15 panels. In 1993 the photos were reconfigured, the panels displayed in the museum’s cafeteria lobby, and then presented to the science museum in Chiba, Japan. In 1996 (150th anniversary of Edison’s birth) four copies of the exhibition were produced. Three were given to museums in China, India, and Yugoslavia; the fourth was made available on occasional loan. See web version: http://americanhistory.si.edu/edison/.

* "The Laser at Twenty-Five," 1985, with Robert Friedel, Alan Morton, and Elliot Sivowitch.
Smithsonian Institution Traveling Exhibition Service.
Included unique collection of early experimental lasers, interactive demonstration of laser action, miniature light show. Emphasis on wide range of practical uses, most anticipated from the beginning in 1960.

* “History as Seen from the National Museum of American History,” 1983, with James Wallace.
Some 50 photographs taken by Smithsonian photographers on and around the Mall over the museum’s first two decades, as if the building had been watching history unfold. For each of the next five years new sets of photographs taken during that particular year were chosen by panel of curators and photographers and displayed in the museum’s cafeteria lobby.

* “Edison: Lighting a Revolution,” 1979-present, with Robert Friedel.

Produced for the centennial of Edison’s incandescent lamp. Conceived as a case study in the process of invention, the exhibit looks at five stages: science and technology available to the inventor, activities undertaken to produce invention, promotion, competition, and consequences. Highlights: early Voltaic pile (battery), Wheatstone self-excited dynamo, experimental material from Edison lab, sequence of his early lamps, converted gas light fixtures, original model of turbine designed for Niagara Falls station, Tesla AC motor. Exhibition revised in 2000: http://americanhistory.si.edu/lighting/.

* “Person to Person,” 1976-1990.

Marking the centennial of Bell’s patent but including telegraphy. Central theme was that first the telegraph but then especially the telephone connected individual people to each other over long distances and across physical barriers. Highlights included Bell experimental apparatus, original Morse 1837 telegraph, Valentine telegrams, early telephone booth, first-generation panel-frame automatic telephone switchboard, and a telephone where visitors could talk to the curator (if the curator was at his desk).

“The Transistor: Fifty Years Old” (with Hal Wallace), 1998.

"Historians and Museums" (with Robert Friedel), 1992. Prepared for the SHOT meeting in

Society for the History of Technology meeting in Uppsala, Sweden. A panel show with graphics and publications of interest to historians of technology.

"The Historian and the Museum" (with Steve Lubar), 1985.

A panel show for International Congress of the History of Science, Berkeley; subsequently given to University of West Virginia.

"Edison Papers Project,” 1984.

Marking initiation of a project co-sponsored with Rutgers University and the IEEE to annotate and publish letters and other material in archives and elsewhere.

"Microelectronics," 1984.

Update at end of Person to Person to include transistors, integrated circuits, and fiber optics.

“Edison and the Electrical Age: 100 Years,” 1978, with Robert Friedel

Smithsonian Institution Traveling Exhibition Service; two kiosks and two panel versions. Included graphics and (for kiosks) some objects. Marking the centennial of Edison’s incandescent lamp in 1979, with a focus on the importance of the light bulb bringing electric power into home and factory, stimulating the creation of stations and power line networks. The kiosk versions (without objects) were later given to Edison museums in New Jersey and Florida.

* "Communication" section of "A Nation of Nations" 1976-, with Elliot Sivowitch
    This was the final section, with title “A Nation Among Nations.” It included an operating ham radio station, underseas telegraph cables, early short wave radio transmitters, emphasizing the importance of interaction with other nations.

* "Western Union," "Wallace-Farmer" "Elisha Gray," "Submarine Telegraphy" sections of "1876: A Centennial Exhibition" 1976-2001. In A&I Building.

“Western Union office” 19**, in Pioneer Square, Seattle

"Discovery Corner" for Electricity Hall, 1975.
    A walk-in area of the hall where docents made presentations for visitors.

* "Leave It to the Mermaids," 1973-74. At the Science Museum, London.
    For the first half century submarine telegraphy was largely a British enterprise. This exhibit drew upon the rich collections of the Science Museum and surviving items in private hands. Basic theme was the importance of this technology to the British Empire. Included a machine for winding iron cladding wires on cables as part of a continuous manufacturing process and a near-full-scale mock-up of loading cable onto a ship.

"Electrical Appliances" (with Ron Kopicki), 1972-.
    Recent efforts had dramatically increased the number of home appliances in the collections—from toasters and cigar lighters to refrigerators and washing machines.

"Electricity in Second Half of the 19th Century" 1971-.
    Focus on discoveries indicating that electricity was the same no matter how it was produced.

"Submarine Telegraphy," 1971-.
    A display of apparatus recently collected from Heart’s Content, the eastern terminus of the first successful Atlantic cable in 1866.

* "Early Electricity," 1970-2000.
    Friction machines and Leyden jars from late 18th and early 19th century, including a machine designed by Franklin. At entrance to hall was a large plate machine seemingly causing a spark to leap between the lips of two mannequins every few seconds—which could be seen and heard some 50 feet away at the center of the building.

* "Energy Conversion," 1970-72, with Warren Danzenbaker.
    Various ways of producing electricity on a commercial scale, including batteries, fuel cells, and a thermoelectric generator powered by radioactivity.

"Lasers" (with Elliot Sivowitch), 1970. Basement level of museum.
    Historical section of an exhibit marking the tenth anniversary of the laser.

"Alexander Graham Bell, the Critical Year," 1967.

Drawing on the museum's important collection of Bell experimental apparatus to trace his work from mid-1875 to mid-1876.

"Acoustics" and "Optics" in new section of physics hall, 1966.

Koenig tuning forks, Michaelson rotating mirror (for measurement of speed of light)etc. A few cases summarizing developments up to the early 20th century.

* "Telegraph and Telephone," "Electrical Power," "Electrical Measurement" (with Robert Chipman, Elliot Sivowitch), 1965.

The first long-term exhibits for the new Hall of Electricity, occupying about one third of the total space. Based on concepts of previous curator W. James King.

* "Communications in Space," 1964.

Full-scale back-up units representing all of the first generation communications satellites: Courier, Echo, Oscar, Relay, Syncom, Telstar, West Ford.

"Transformer at 180 years" 1964.

Small exhibit based on two transformers on loan from Ganz company in Hungary, marking critical invention for commercial alternating current systems.

"Telstar" (in Arts & Industries Building), 1963.

First commercial communications satellite, a fully-operational back-up. Capitalizing on a recent (July 1962) scientific/technical achievement Shown as an example of things to come in the new museum.

"35 Years of Electrons as Waves" in Arts & Industries Building, 1962.

Marking 35th anniversary of discovery of diffraction of beams of electrons in crystals, for which Clinton Davisson and G. P. Thomson received a Nobel prize in physics. Included specially-designed vacuum tube that Davisson and Lester Germer had used in their critical experiment in 1927 at Bell Labs.

PROJECTS, PAST (publications):

Arranged by topics.

Submarine telegraphy

* "Underwater Cables," Proceedings of the IEEE 101 (2013), 1253-9. Also published on-line in Engineering and Technology History Wiki, http://ethw.org/Underwater_Cables. An overview up to the era of fiber-optics cables.

* "Submarine Telegraphy: A Study in Technical Stagnation," in Bernard Finn and Daqing Yang (eds.), *Communications Under the Seas: The Evolving Cable Network and its Implications* (MIT Press, 2009), 9-24.

Underwater telegraphy involved a number of innovative techniques, but after success was achieved the companies (especially Western Union) showed little interest in further improvements.

"Submarine Telegraphy: Impacts Related to Technology," ICHS Meeting (Edinburgh, Scotland), 1977.

* "Growing Pains at the Crossroads of the World: A Submarine Cable Station in the 1870s," *IEEE Proceedings* 64 (1976), 1287-1292.
New instruments were introduced in the 1870s, which were implemented by the operators at Heart's Content. How they did this is examined in records and correspondence.

History of science & technology

"Electricity," in Mark G. Spencer (ed.), *The Bloomsbury Encyclopedia of the American Enlightenment* (Bloomsbury Academic, 2015).
Franklin's contributions and how they were publicized.

* "Bell and Gray: just a coincidence?" *Technology and Culture* 50 (2009), 193-201.
An essay review of recent books, agreeing that when Bell achieved successful transmission with a variable-resistance liquid transmitter he probably knew of Gray's work, but from a practical point of view this was irrelevant since that claim in Bell's patent was not granted and his commercial telephone used an induction transmitter.

"Electricity, History of," in John Zumerchik (ed.), *Macmillan Encyclopedia of Energy* (Macmillan Reference USA, 2001), 394-9.

"Introduction," in Bernard Finn (ed.), *Exposing Electronics* (Harwood Academic Publishers, 2000), 1-5.

"Collectors and Museums," in Bernard Finn (ed.), *Exposing Electronics* (Harwood Academic Publishers, 2000), 175-191.
How private collectors of electrical objects made significant contributions to museums.

"Samuel F. B. Morse," "Nikola Tesla," "Moses Farmer," in *American National Biography*, (Oxford University Press, 1999), also available on line.

Backgrounds of those working with Edison on the lightbulb.

"How the US Acquired and Developed Technology that Originated in Europe," *Technology Transfer and Technology Diffusion, Proc. of The Third International Symposium, Engineering Academy of Japan* (1994), 37-44.
From textiles to trains, examples of technology transfer.

"Telegraph," in *Encyclopedia of the Confederacy* (1992).

"Edison and the Style of Invention." *Rassagna: Problemi di architettura dell'ambiente.* 13, 46/2 (1991), 44-53.

* "Working at Menlo Park." In William S. Pretzer (ed.), *Working at Inventing: Thomas A. Edison and the Menlo Park Experience.* Dearborn, MI: Henry Ford Museum & Greenfield Village, 1989 (reprint 2002). Pp. 32-47.

* T*he History of Electrical Technology: An Annotated Bibliography* (Garland Press, 1991).
Over1500 entries with a cut-off date of 1986. As a graph shows, a dramatic increase in publications took place in the 1980s, which was accompanied by a much better system of citations.

* "The Search for a Vacuum," "Carbon and the Incandescent Lamp, "Who Invented the Incandescent Lamp?," "The Menlo Park Mystique," "Menlo Park Journal," in Robert Friedel and Paul Israel with Bernard Finn, *Edison's Electric Light: Biography of an Invention* (Rutgers University Press, 1985).

* "History of Thermoelectricity," in *Advances in Electronics and Electronic Physics*, 50 (1980), 175-240.
Condensed from PhD dissertation. Thermoelectricity was an early (and surprising) indication of a relationship between heat and electricity and was the subject of scrutiny by major physicists for a century.

* "Franklin as Electrician," *IEEE Proceedings* 64 (1976), 1270-1273.
Franklin was fortunate in starting his work when new instruments—the Leyden jar and improved friction machines—were available.

"The Influence of Experimental Apparatus on Eighteenth-Century Electrical Theory," *Actes du XIIe Congrés International d'Histoire des Sciences* (1971).
[Isis CB has "Survival of early techniques in the telegraph industry" vol 11. Pp 258-263]

* "Output of Eighteenth-Century Electrostatic Machines," *British Journal for the History of Science* 5 (1971), 289-291.
Current experiments in the museum and early 20th-century experiments at GE provided means to calculate the voltage of sparks reported by those working with early electrostatic machines.

Biographical entries for A. G. Bell, J. L. Clark, J. Cummings, T. A. Edison, R. T. Glazebrook, E. H. Hall, H. E. Ives, M. H. von Jacobi, H. Moritz, J. G. Kerr, J. C. A. Peltier, H. Ruhmkorff, W. Sturgeon in Charles C. Gillispie (ed.), *Dictionary of Scientific Biography* (Scribners, 1970-76).

* "An Appraisal of the Origins of Franklin's Electrical Theory," *Isis*, 60 (1969), 362-369.
Analysis of Franklin's writings confirms reliance on British contacts, especially Watson, which spared him from (French) concerns over the mechanism of attraction. He also

didn’t get involved in pursuing his signature explanation of the Leyden jar (his one-fluid theory implied a barrier down the middle of the glass, which his own experiments proved didn’t exist).

* "Thomson's Dilemma," *Physics Today* 20 (Sept. 1967), 54-59.
The dilemma was how to treat the differential heating (Thomson effect) along a wire between two junctions by the second law of the thermodynamics, which wasn’t done successfully until Onsager in 1930. Thomson is seen at his experimental best.

"History of Electrical Technology: The State of the Art," *Isis* 67 (1967), 32-35.

"Electronic Communications." Chapter 19 in M. Kranzberg and C. Pursell, Technology in Western Civilization (1967).

"Controversy and the Growth of the Electrical Art," *IEEE Spectrum* 3 (Jan. 1966), 55-56.
Controversies tended to be highly personal, aggravated by a patent system that didn’t allow for shared credit. Consequences were often bitter feelings, but also included incentives to inventors to find alternative solutions.

* "Alexander Graham Bell's Experiments with the Variable-Resistance Transmitter," *Smithsonian Journal of History* 1, No. 4 (1966), 1-16.
Experiments showed that his transmitter was marginally successful. Increases in voltage produced static due to decomposition of the water, which no doubt confused Bell and caused him to abandon the device.

* “Laplace and the Speed of Sound” *Isis* 55, No. 1 (Mar., 1964), 7-19.
Calculating the speed from knowledge of effects of compression of air by sound waves.

"Electron Theories of Conduction in the 19th Century," *Actes du XIe Congrés International d'Histoire des Sciences* (1968). [Warsaw meeting 1965]
Progress was slow in large part because of lack of evidence of electrical particles until the end of the century. Various attempts were made to explain relationship between electrical current and heat.

"Keeping in Touch," Smithsonian Book of Invention, Smithsonian Exposition Books (1978), 174-181.

"Telegraph Practice in the Nineteenth Century," ICHS Meeting (Moscow, U.S.S.R.), 1971 (publ. 1974).

Museums

* “The International Influence of the Deutsches Museum on Museums of Science and Technology,” in Ulf Hashagen, Oskar Blumtritt, Helmuth Trischler (eds) *Artefakte in der Gründungszeit des Deutschen Museums* (München: Deutsches Museum, 2003).
The museum had a critical impact on the development of national historical museums of

science and technology, including the Smithsonian's Museum of History and Technology (now National Museum of American History).

* "Context and Controversy," in Svante Lindqvist (ed.), *Museums of Modern Science; Nobel Symposium 112* (Canton, MA: Science History Publications, 2000), pp. 151-158.
The science and technology collections of the Smithsonian were at first an addendum to natural history and later, with the construction of the Museum of History and Technology, a partner with social and cultural history. Furthermore, many of the new curators came from recently formed academic programs. The result was an emphasis on story-telling (good) and a de-emphasis on the value of objects as evidence (not so good). One would like to find a compromise.

* "Exhibit Reviews--Twenty Years After." *Technology and Culture* 30 (1989), 993-1003.
Suggestions for how reviewers should pay special attention to the way objects are used, and to be aware of the restrictions that control exhibits.

* "The Museum of Science and Technology." In Michael S. Shapiro (ed.), *The Museum: A Reference Guide*. Westport, CT: Greenwood Press, 1989. Pp. 59-83.
Commentary and bibliography on the development of these museums.

"Collectors and Museums," in Bernard Finn (ed.), *Exposing Electronics* (Harwood Academic Publishers, 2000), 175-191.
How private collectors of electrical objects made significant contributions to museums.

"Exhibition Critique: Background for the Information Age," with Jon Eklund in Bernard Finn (ed.), *Exposing Electronics* (Harwood Academic Publishers, 2000), 135-141.
Description of objects were given special interpretation in this exhibit.

"Museums of Science and Technology," in Maria Alzira Almostere and José Rodrigues (Fundacao Oriente, 1998), 73-81.

"The role of museums in the history of science and technology: Historical roots of the power industry as a case study." *Kagakugijutsushi* (The Japanese Journal for the History of Science and Technology) 2 (1998).

"Technology and Society: Implications for Museums." *Proceedings of ICOM\CIMUSET Conference, September 1991.* (Rome: 1992), pp. 84-91.

"History of Electricity at the Smithsonian," with Arthur P. Molella. *IEEE Transactions on Education*, E-27, No. 4 (November 1984), 218-225.
A century of collecting and exhibitions. The early curators depended heavily on industrial contacts for their collecting efforts. More recently they have used historical judgements to lead them. Throughout, however, chance donations have been very important.

"Electricity," in Robert C. Post (ed), 1876: A Centennial Exhibition (1976), 62-65.

"The Science Museum Today," *Technology and Culture*, Vol. 6, No. 1, Museums of Technology (Winter, 1965), 74-82.
A new Smithsonian curator from a new museum reacts to predecessors in Europe, noting differences among them. Includes a tabulation of some basic characteristics.

"The New Technical Museums," *Museum News* 43 (Nov. 1964), 22-26.

Science/technology and culture

* "Thomas Wilfred's 'Study in Depth,' Opus 152: An Artist's Experiment with Lighting Viewed by a Historian of Technology," in Mary Jo Arnoldi (ed.), *Engaging Objects* (Smithsonian Institution Scholarly Press, 2016).
Wilfred developed his projection technique (c1919) just as bright incandescent lamps became available and it remained essentially unchanged throughout his career. He promoted it as a new art form with little success in his lifetime; a comparison is made with photography.

* "Atomic Art: A curator's view," in Victor Faccinto (ed.), *Alyce Simon: Artist of the Atomic Age* (Pfafftown, NC: Rolling Press Inc., for Tree of Life, Inc., 2013), 11-20.
Simon seized the opportunity, in the 1960s, to use a particle accelerator to make patterns in translucent plastic sheets, which she incorporated in her sculptures.

* "The Incandescent Electric Light." In *Bridge to the Future*, edited by Margaret Latimer and Brooke Hindle, *Annals of the New York Academy of Sciences*, Vol. 424 (1984), 247-263."The Incandescent Electric Light." In *Bridge to the Future*, edited by Margaret Latimer and Brooke Hindle, *Annals of the New York Academy of Sciences*, Vol. 424 (1984), 247-263.
Symbolisms attached to light and the light bulb: associations with deities, symbol of the home (in cartoons), symbol of an observing but insensitive "civilized" world (Picasso's Guernica).

AWARDS

* Grant of $1000 from American Philosophical Society (1972) to support travel in Europe during sabbatical year. Of particular value because of contacts made with science/technology museums.

* Naming of the Bernard S. Finn annual award for best article on electrical history, given by Society for History of Technology and funded by the Institute of Electrical and Electronic Engineers. Of special meaning as a recognition of the implied importance of history to professional engineers.

PROFESSIONAL AFFILIATIONS:

* History of Science Society (1960-)
    Managing editor of *Isis* (1963-78)

* Society for the History of Technology (1960-)

* Institute of Electrical and Electronics Engineers
    Member of History Committee (1964-2004)
    Editorial Board of *Spectrum* (1975-80)

* University of Maryland, Certificate Program in Museum Scholarship (1995-)
    Co-founder, member Advisory Board
    Adjunct professor (1996-2002)
    Established as a joint SI-UM program with an emphasis on showing how museums can be valuable to scholars.

* National Council of Science Museums (India) (1977-)
    A long-term relationship that included Smithsonian personnel participating in a training program for NCSM (and other) curators (2005-).

University of Oklahoma (1961-62). Instructor.

Catholic University (1964-66). Lecturer.

University of Pennsylvania (1967). Visiting professor.