Smithsonian
National Museum of American History Kenneth E. Behring Center

Guide to the Greenleaf Pickard Notebooks and Nikola Tesla Patents

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Collection Overview

Repository:	Archives Center, National Museum of American History
Title:	Greenleaf Pickard Notebooks and Nikola Tesla Patents
Date:	1898-1941
Identifier:	NMAH.AC.0915
Creator:	Pickard, Greenleaf Whittier, 1877-1956 (Creator)
Source:	Cardwell Condenser Corporation (Lindenhurst, New York) (Donor)
Extent:	1 Cubic foot (5 boxes)
Language:	English .
Summary:	The collection documents Greenleaf Whittier Pickard, an engineer, and his experiments in wireless technology. Materials include Greenleaf Pickard notebooks and patents issued to Nikola Tesla.

Administrative Information

Acquisition Information

The collection was donated by the Cardwell Condenser Corporation, through Paul Meyer and David C. Kjeldsen in November 2004.

Provenance

The collection was transferred from the Museum's Division of Information, Technology and Communication (now the Division of Medicine and Science) in 2006.

Processing Information

Processed by Robert Ageton, volunteer; supervised by Alison Oswald, archivist, 2009.

Preferred Citation

Greenleaf Pickard Notebooks, Archives Center, National Museum of American History.

Restrictions

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Biographical / Historical

Dr. Greenleaf Whittier Pickard was born February 14, 1877, in Portland, Maine and died on January 8, 1956 in Newton, Massachusetts. Dr. Pickard was a grandnephew of the poet John Greenleaf Whittier, and was a graduate of Harvard University and the Massachusetts Institute of Technology. In 1899 he received a grant from the Smithsonian Institution to support his wireless research at Blue Hill Observatory in Milton, Massachusetts. He was an engineer at the American Telephone and Telegraph Company (1902-1906); and after 1945 he was head of Pickard and Burnes, an electronics engineering firm.

Pickard discovered that a number of naturally occurring crystalline minerals could detect radio signals. The contact between a fine metallic wire (cat's whisker) and the surface of certain crystalline materials rectifies and demodulates high frequency alternating currents, such as those produced in a receiving antenna by radio waves. Pickard patented a crystal detector in 1906. The point-contact rectifier was the forerunner of the transistor invented in 1948. Pickard conducted experiments to determine the effect of sun and sunspots, meteor showers, atmosphere pressure and temperature on reception. He contributed to the development of the direction finder, and noted in 1908 that errors in reading radio compasses might be caused by buildings, trees, and other objects.

Arrangement

- Series 1: Greenleaf Pickard Notebooks, 1898-1941
- Series 2: Nikola Tesla Patents, 1890, 1896 (bulk 1901-1918)

Names and Subject Terms

This collection is indexed in the online catalog of the Smithsonian Institution under the following terms:

Subjects:

Inventors
Radio
Radio -- History
Radio -- Receivers and reception

Types of Materials:

Notebooks

Names:

Cardwell Condenser Corporation (Lindenhurst, New York)
Tesla, Nikola, 1856-1943

Container Listing

Series 1: Greenleaf Pickard Notebooks, 1898-1941

Scope and Contents: This series includes notebooks that are arranged chronologically. Some of the notebooks are paginated and contain drawings, typescript and handwritten notes, and compiled data and statistics from other print sources. Brief summaries of the notebook contents is provided.

Box 1, Folder 1 — Notebook, 1902
1 Notebook
Notes: Photographic action of metals on sensitive plates; coherer experiments; spark gap; eclipse observations; discharge of atmospheric electricity on kite wire; CO2 determinations; wireless telegraphy; receiving circuits; capacity measurements; carbon steel detectors [pages 1-89]

Box 1, Folder 2 — Notebook, 1903
1 Notebook
Notes: Atmospheric potential; relays; polarizing cell; lightening arrester; wireless telephony; coils; selenium cell [pages 218-384]

Box 1, Folder 3 — Notebook, 1904
1 Notebook
Notes: Telephone receivers; cable; lightening arresters; condensers; radium; arrester; cone cell [pages 385-576]

Box 1, Folder 4 — Notebook, 1904
1 Notebook
Notes: Electrolytic detectors; barrier arrester; carbon black arrester; lightening arrester; telephone relay; resonant circuit; chemical recording [pages 577-705]

Box 1, Folder 5 — Notebook, 1905
1 Notebook
Notes: Static separation; arresters; carbon filament; resistance; insulation; electrolytic detector; thermo-electric detector; burretter; repeater coherer; carbon steel detector antennae; submarine cable; capacity [pages 706-807]

Box 2, Folder 1 — Notebook, 1906
1 Notebook
Notes: Galena & Pyrite Detectors; bridle cable; capacity conductance; impedence coils; magnetic detector; Thermo-Electric detectors; inductance; transmission losses; "Flame Transmitter"; tuning inductormeter; mineral contacts; condensors; carborundum detector; current in receiving antenna; relay; Thermo-electric and Rectification Effects In Electrically Conducting Minerals; electrostatic separation [pages 808-972]

Box 2, Folder 2 Notebook, 1903
1 Notebook
Notes: Thermo-Electric Detectors; electrostatic detector micanite condenser; loop receiving antenna; telephone transformer; T-J and Rectifier Detectors (minerals); minerals, current in receiving antenna; Marconi Station Wellfleet, Massachusetts; telephone transformers; electrostatic separation; variable air condenser; zinc sulfide flotation; TU and Rectifier Detectors (minerals); inductance measurement; Perikon Detector; Silicon Detector; Interference Preventor; telephone receivers; Electrolytic Detectors; Pupin Cell Detector [pages 973-1142]

Box 2, Folder 3 Notebook, 1910-1911
1 Notebook
Notes: Rectifier Detectors Mineral Tests; Receiving Antenna Static Shield; electrolytic detector and Pupin type; received energy carbon granules; Amplifone; carbon-metal detector (Pt and Au tests); microphones; inductance measurement (cylindrical Inductometers); Amplifones (carbon) and efficiency; static elimination; receiving circuits [pages 1143-1272]

Box 2, Folder 4 Notebook, 1912-1914
1 Notebook
Notes: Iron Wire Antenna; Selened Detector; condenser circuits; coil transformers.

Box 2, Folder 5(1) Notebook, 1915-1920
1 Notebook
Notes: Condenser Tests; Audion (Vacuum Tube) Detector Tests; two step amplifier; Cross Aerial Towers, Antenna at 131 State Street, Boston; coils; Edison Storage Battery; inductance coils; Mercury Arc Rectifier Tubes; Special Electrolytes; magnetic condenser; phase adjuster; reception curves, Directional Geophone; static neutralizer

Box 2, Folder 5(2) Notebook, 1920-1921
1 Notebook
Notes: Loop Aerial; POZ (Nauen, Germany station heard along with others); atmospheric absorption tests; "Radio Communication and the Atmosphere"; storage battery separators; sulphur experiments; signal strength tests; Paragon and Grebe Short-wave Receiver circuits and tests; Heaveside Layer; tube transmitters; antenna tests

Box 3, Folder 1 Notebook, 1934-1937
Notes: Mutual impedance of two straight vertical antenna; difference of temperature correlation; Pickard Improved 5 Meter Receiver; V.H.F. Receivers; field intensity recording equipment (FCC); Latitudes and Longitudes of Clear Channel Stations; blue print Philco Research Lab Model 18-128; graphs without data to confirm; Log of Station W1IVT Damariscotta, Maine, August 1935 tests of doublet; Losses in Concentric Cable at 42 MC

Box 3, Folder 2	Notebook, 1934-1941	
	Notes:	Graph Monthly Relative Sunspots September 1, 1937; High Frequency Impedance Meter; Roff's Earth Curvature Correction Factor; 42-50 Mc. Transmission: Theory vs. Measurement
Box 3, Folder 3	Notebook, 1923-1925	
	Notes:	Report of receptions; wave meter; Erla Duo-Reflex Circuit; The Como Duplex Transformers; direction finders; radio receiving conditions; reception from airplane, cities and Newton Centre
Box 3, Folder 4	Notebook, 1922-1923	
	Notes:	Audibility of Broadcasting Stations at Newton Centre, Massachusetts; July 1,1921 Licensed Amateur Transmitting Stations; Radiophone broadcasting today suffers from the following, January 8, 1922; constant output circuit, 1922; Fading Reduction, Superhetrodyne Receiver, 1925; test open wire antenna and loop antenna WBZ and others, 1922; map of the United States with no relationship to project; two wire V counterpoise under single wire; Dorsey's Bulletin "The Armstrong Super Circuit 1922" and others; Broadcasting Station Directory, 1922
Box 3, Folder 5	Notebook, 1925	
	Notes:	KDKA 970KC at Newton Centre, Massachusetts, May 1925 and graph of Averages of Means; Analyzer Station Seabrook Beach, New Hampshire, August and September 1925; Preliminary Calibration Frequency Meter, November 1925, and data
Box 4, Folder 1	Notebook, 1926-1928	
	Notes:	WBBM 1926 – Chart – Microvolts/meter, records, and charts of other stations; Wolfer Provisional Sunspot Numbers; Massachusetts Institute of Technology report, December 3, 1927 field-strength measurements at Wayland and Weymouth; The Relation of Natural Wavelength; Frequency and Inductance Capacity Product in Condenser Circuits; WBBM Reception; Correlation of monthly average with sunspots
Box 4, Folder 2	Notebook, 1928-1929	
	Notes:	High Power Radio Stations of the World (Long Wave), April 1928; Pasadena Temperatures; Report 1928 Radio 8AKI, Altoona, Pennsylvania; reception at 3950 KC; Distribution of Reception During Solar Rotations, November 5, 1928; Millivolts in Antenna Tests; High Power Radio Stations of the World, December 15, 1928; Decibel Recorder, 1920; Faraday Effect Oscillograph, 1930; Turbulence, sunspots, pressure, and records; SM-712 Recorder Circuit, 1930; WBBM Reception and Graphs
Box 4, Folder 3	Notebook, 1929-1930	

Notes: Calibration and circuit SM-712; Meteor Showers and Nauen Day at Washington; WBBM Reception; Meteor Showers; Adcock Direction Finder, 1930; Field Strength Values, WEEI, November 1929; Reception Data and Graphs

Box 4, Folder 4 Notebook, 1930-1932

Notes: Blue Print Map of location of Seized Station F.W., North Bergin, New Jersey, 1931; WBBM graphs of reception and data by months; cathode tube graphs; scanning device for television, (Pickard & Dolbear) 1931; fruit and vegetable preserver, 1931; band conditions reported by observers

Box 4, Folder 5 Notebook, 1932-1933

Notes: WBBM reception noting moon, sunspots, and meteor hour rates; harmonic analysis, Pasadena, California; note on Gas-Filled Amplifier-Oscillator Tubes; developed by Raytheon; receptions at various locations with data and graphs; Field Strength Calculation Curves, 1932; Chart for Converting Power & Voltage into d.b.s.; VE9GW at Tufts College; antenna design ½ wave doublet; miscellaneous reception data and graphs.

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Series 2: Nikola Tesla Patents, 1890, 1896, 1901-1918 (bulk 1901-1918)

Box 5, Folder 1	US 424,036, Electric Magnetic Motor, 1890 March 25
Box 5, Folder 1	US 433,700, Alternating Current Electric Magnetic Motor, 1890 August 5
Box 5, Folder 1	US 433,701, Alternating Current Motor, 1890 August 5
Box 5, Folder 1	US 433,702, Electrical Transformer or Induction Device, 1890 August 5
Box 5, Folder 1	US 433,703, Electro Magnetic Motor, 1890 August 5
Box 5, Folder 1	US 445,207, Electro-Magnetic Motor, 1891 January 27
Box 5, Folder 1	US 447,920, Method of Operating ARC Lamps, 1891 March 10
Box 5, Folder 1	US 447,921, Alternating Electric Current Generator, 1891 March 10
Box 5, Folder 1	US 454,522, System of Electric Lighting, 1891 June 23
Box 5, Folder 1	US 455,067, Electro-Magnetic Motor, 1891 June 30
Box 5, Folder 1	US 455,068, Electrical Meter, 1891 June 30
Box 5, Folder 1	US 459,772, Electro Magnetic Motor, 1891 September 22
Box 5, Folder 1	US 462,418, Method of and Apparatus for Electrical Conversion and Distribution, 1891 November 8
Box 5, Folder 1	US 464,666, Electro-Magnetic Motor, 1891 December 8
Box 5, Folder 1	US 464,667, Electrical Condenser, 1891 December 8
Box 5, Folder 1	US 487,796, System of Electrical Transmission of Power, 1892 December 13
Box 5, Folder 1	US 511,559, Electrical Transmission of Power, 1893 December 26
Box 5, Folder 1	US 511,560, System of Electrical Power Transmission, 1893 December 26
Box 5, Folder 1	US 511,915, Electrical Transmission of Power, 1894 January 2
Box 5, Folder 1	US 511,916, Electric Generator, 1894 January 2
Box 5, Folder 1	US 512,340, Coil For Electro-Magnets, 1894 January 9
Box 5, Folder 1	US 514,169, Reciprocating Engine, 1894 February 6

Box 5, Folder 1	US 514,167, Electrical Conductor, 1894 February 6
Box 5, Folder 1	US 514,168, Means For Generating Electric Currents, 1894 February 6
Box 5, Folder 1	US 514,170, Incandescent Electric Light, 1894 February 6
Box 5, Folder 1	US 514,972, Electric Railway System, 1894 February 20
Box 5, Folder 1	US 514,973, Electrical Meter, 1894 February 20
Box 5, Folder 1	US 517,900, Steam Engine, 1894 April 10
Box 5, Folder 1	US 524,426, Electromagnetic Motor, 1894 August 14
Box 5, Folder 1	US 555,190, Alternating Motor, 1896 February 25
Box 5, Folder 1	US 567,818, Electrical Condenser, 1896 September 9
Box 5, Folder 1	US 568,176, Apparatus For Producing Electric Currents Of High Frequency and Potential, 1896 September 22
Box 5, Folder 1	US 568,177, Apparatus For Producing Ozone, 1896 September 22
Box 5, Folder 1	US 568,178, Method Of Regulating Apparatus For Producing Currents of High Frequency, 1896 September 22
Box 5, Folder 1	US 568,179, Method of and Apparatus For Producing Currents Of High Frequency, 1896 September 22
Box 5, Folder 1	US 568,180, Apparatus For Producing Electrical Currents Of High Frequency, 1896 September 22
Box 5, Folder 1	US 577,670, Apparatus For Producing Currents of High Frequency, 1897 February 23
Box 5, Folder 1	US 577,671, Manufacture of Electrical Condenser Coils, 1897 February 23
Box 5, Folder 1	US 583,953, Apparatus For Producing Currents Of High Frequency, 1897 June 8
Box 5, Folder 1	US 593,138, Electrical Transformer, 1897 November 2
Box 5, Folder 1	US 609,245, Electrical Circuit Controller, 1898 August 16
Box 5, Folder 1	US 609,246, Electric Circuit Controller, 1898 August 16
Box 5, Folder 1	US 609,247, Electric Circuit Controller, 1898 August 16
Box 5, Folder 1	US 609,248, Electric Circuit Controller, 1898 August 16

Box 5, Folder 1	US 609,249, Electric Circuit Controller, 1898 August 16
Box 5, Folder 1	US 609,250, Electrical Igniter For Gas Engines, 1898 August 16
Box 5, Folder 1	US 609,251, Electric Circuit Controller, 1898 August 16
Box 5, Folder 1	US 611,719, Electrical Circuit Controller, 1898 October 4
Box 5, Folder 1	US 613,735, Electric Circuit Controller, 1898 November 8
Box 5, Folder 1	US 613,809, Method of and Apparatus For Controlling Mechanism Of Moving Vessels Or Vehicles, 1898 November 8
Box 5, Folder 1	US 645,576, System Of Transmission Of Electrical Energy, 1900 March 20
Box 5, Folder 1	US 649,621, Apparatus For Transmission Of Electrical Energy, 1900 May 15
Box 5, Folder 1	Reissued US 11,865, Method Of Insulating Electric Conductors, 1900 October 23
Box 5, Folder 1	US 685,012, Means For Increasing The Intensity Of Electrical Oscillations, 1901 October 22
Box 5, Folder 1	US 685,953, Method Of Intensifying And Utilizing Effects Transmitted Through Natural Media, 1901 November 5
Box 5, Folder 1	US 685,954, Method Of Utilizing Effects Transmitted Through Natural Media, 1901 November 5
Box 5, Folder 1	US 685,955, Apparatus For Utilizing Effects Transmitted From A Distance To A Receiving Device Through Natural Media, 1901 November 5
Box 5, Folder 1	US 685,956, Apparatus For Utilizing Effects Transmitted Through Natural Media, 1901 November 5
Box 5, Folder 2	US 685,957, Apparatus For The Utilization Of Radiant Energy, 1901 November 5
Box 5, Folder 2	US 685,958, Method Of Utilizing Radiant Energy, 1901 November 5
Box 5, Folder 2	US 723,188, Method Of Signaling, 1903 March 17
Box 5, Folder 2	US 725,605, System Of Signaling, 1903 April 14
Box 5, Folder 2	US 787,412, Art of Transmitting Electrical Energy Through The Natural Mediums, 1905 April 18
Box 5, Folder 2	US 1,061,142, Fluid Propulsion, 1913 May 6

Box 5, Folder 2	US 1,061,206, Turbine, 1913 May 6
Box 5, Folder 2	US 1,113,716, Fountain, 1914 October 13
Box 5, Folder 2	US 1,119,732, Apparatus For Transmitting Electrical Energy, 1914 December 1
Box 5, Folder 2	US 1,209,359, Speed Indicator, 1916 December 19
Box 5, Folder 2	US 1,266,175, Lightening Protector, 1918 May 14
Box 5, Folder 2	US 1,274,816, Speed Indicator, 1918 August 6
Box 5, Folder 2	British Letters Patent No. 20,981, 1896 Notes: Improvements relating to the Production, Regulation, and Utilization of Electric Currents of High Frequency, and to Apparatus therefore

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Series 3: Miscellaneous, 1930s

Box 5, Folder 3 Summary, 1930s

Notes: Data and graphs related to receiving stations in the 1930's including reports for June, July, August, September, October, November, and December 1933 written by Howell C. Brown entitled "KPO 680 kc, San Francisco, Obs., at Pasadena, 549 kms." Several stations had Amateur Radio Call Signs beginning with the letter W, but calls signs with the suffix "X" were reserved by the FCC for experimental stations. 1BCG (Amateur Station built by members of the Radio Club of America) sent the first message to span the Atlantic to Ardrossan, Scotland.

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