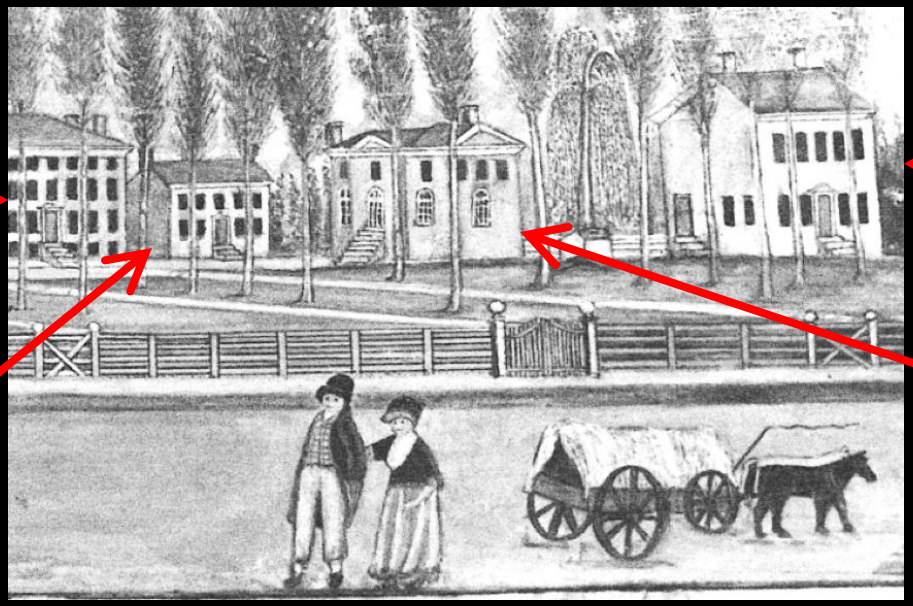
Joseph Henry: A Campus Plan, a House, and a Few Fun Experiments that Changed the World



Michael G. Littman
Mechanical and Aerospace Engineering
Princeton University

Purpose – we all live in Princeton – this is about Princeton – local history that spills over to the national and international scenes – much of Henry's work was done in Princeton.

Who is Joseph Henry ? Why should we care ?

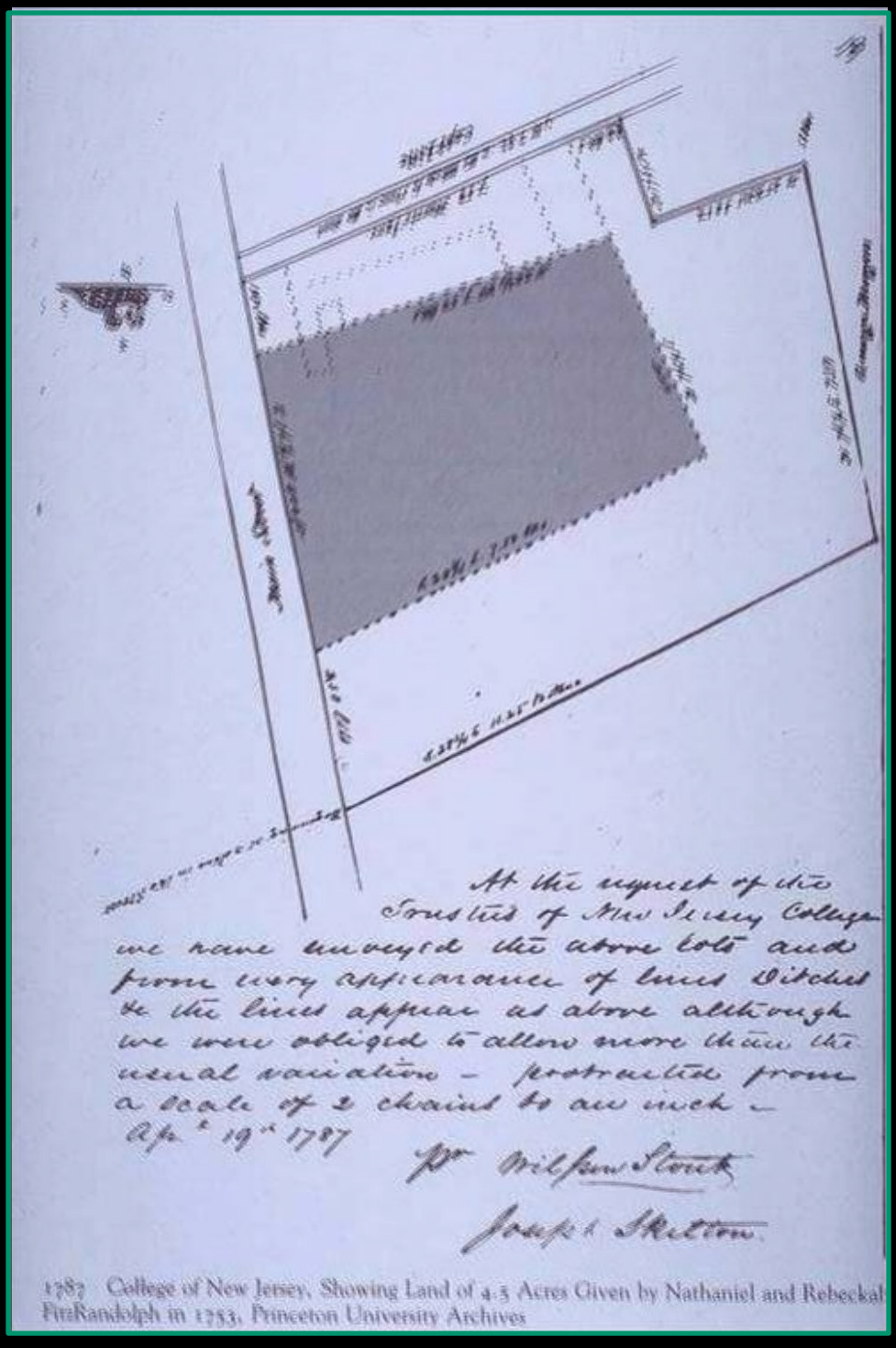
The Joseph Henry House (his second house – constructed in 1838) National Landmark – who designed it ? – Not Joseph Henry as the myth – likely Charles Steadman. Greek Revival and Federal. House now located to the northeast of Nassau Hall – moved three times – close to the original location of the VP House. **JH House looks like many of the houses in Princeton –** many of the houses in Princeton look alike.

Henry's Campus Plan – a big deal – an orderly plan for the placement of buildings in the central campus during a period of campus expansion – Building Committee – Rev. Eli Cooley, James Green, Pres. James Carnahan.

Telegraph – another big deal – and it is connected to Princeton – telegraph line between Henry's lab and his 1st house – first to use the earth as a pathway. Also Henry's electric motor – another big deal – work started in Albany and continued in Princeton. Also Henry magnetized steel sewing needles as detectors. He also made the strongest magnets.

Henry's experiment to detect radio using sewing needles – this is interesting but obscure – done in his 2nd house.

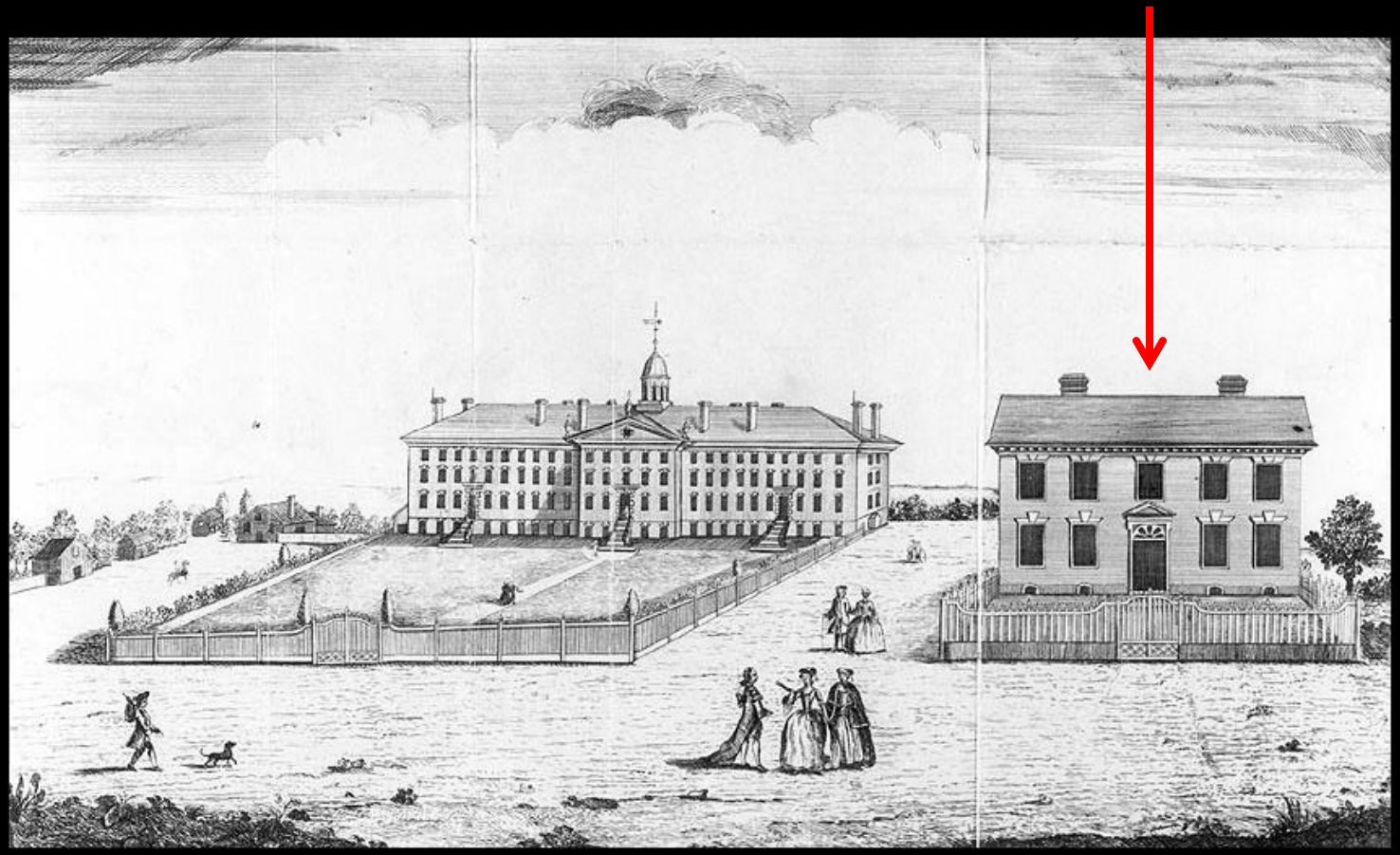
Henry and Bell – Henry inspired Bell – led to the Telephone



1787 College of New Jersey, Showing Land of 4.5 Acres Given by Nathaniel and Rebeckal FitzRandolph in 1753, Princeton University Archives

Princeton in 1764

President Samuel Finley Residence

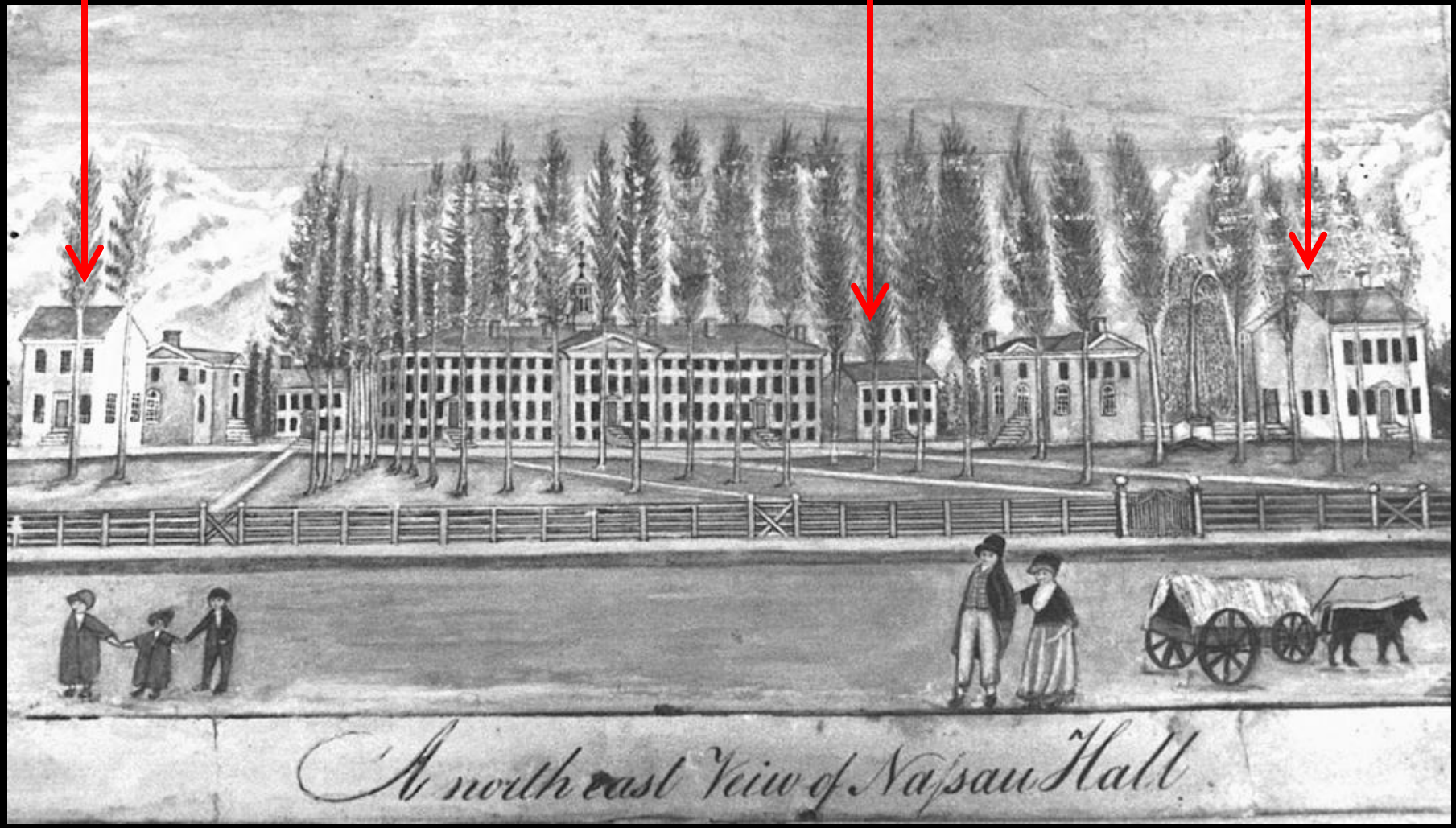


On **October 22, 1746**, a Royal Charter was granted to create the **College of New Jersey** (now Princeton University). Organized by Presbyterian ministers, the College (*shown in a 1764 drawing*) opened in 1747 in Elizabethtown, NJ, before moving to Newark and then finally to Princeton.

Vice President John Maclean's House

Prof. Henry Vethake's House

President James Carnahan's House



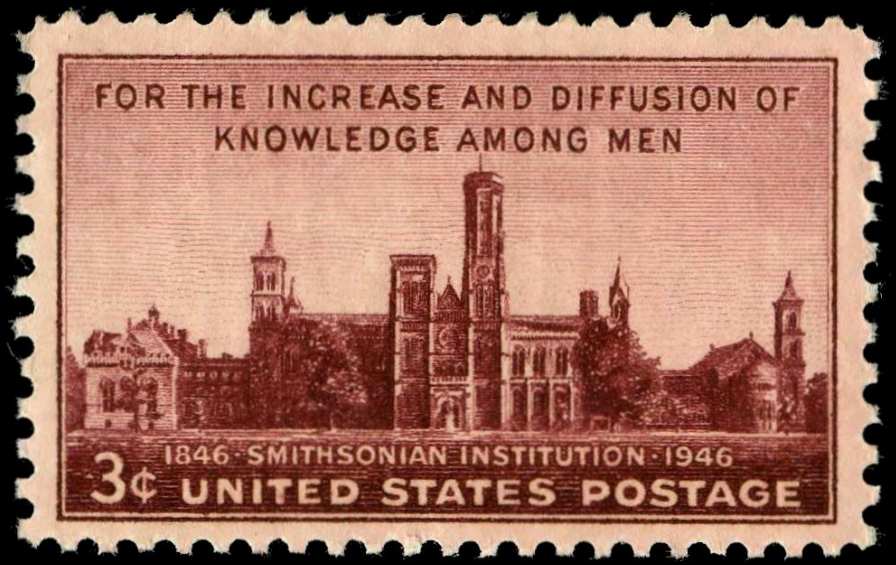
1825 Sketch

Albany, NY
TELEGRAPH

Princeton, NJ
ELECTROMAGNET

Washington DC
SMITHSONIAN

Who Joseph Henry
What Telegraph, Motor, Transformer, encourages A. G. Bell
When 1828 – 1846 Electromagnetism
1846 – 1878 Smithsonian
Where Albany, Princeton, Washington
How builds strong electromagnets
Why - Science (Unit of Induction)
- Information (Telegraph)
- Power (Motor -Transformer)



Creation of New Knowledge
Education for Leadership

"In the Nation's Service and
in the Service of all Nations"

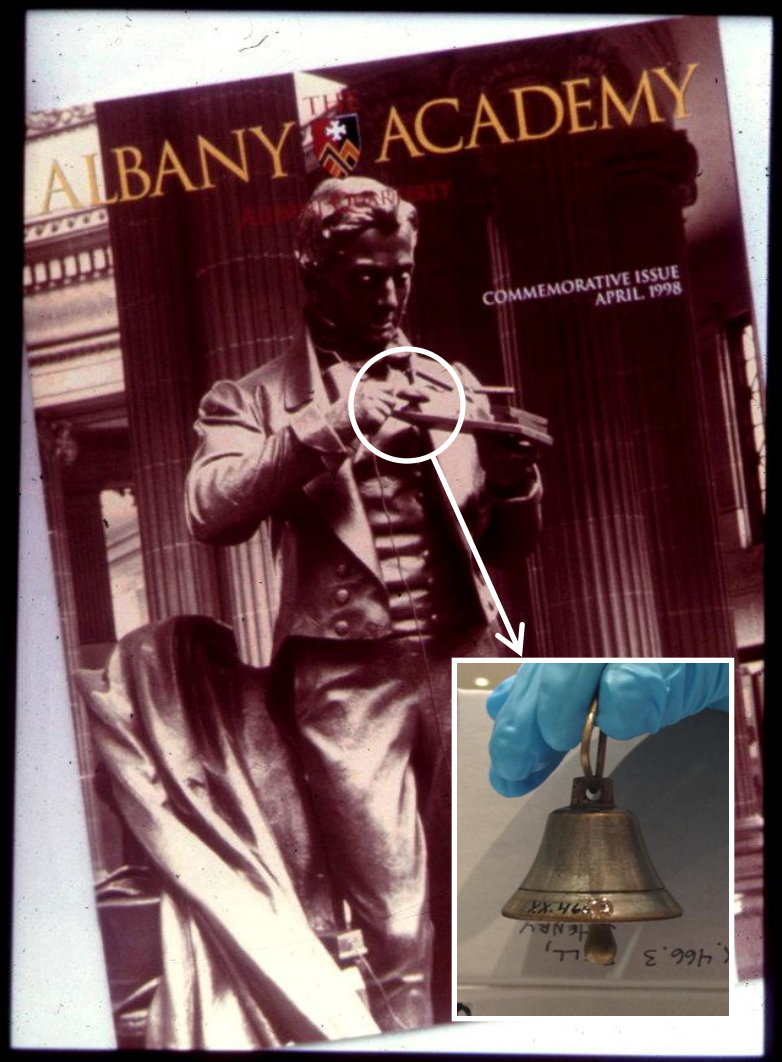
Joseph Henry

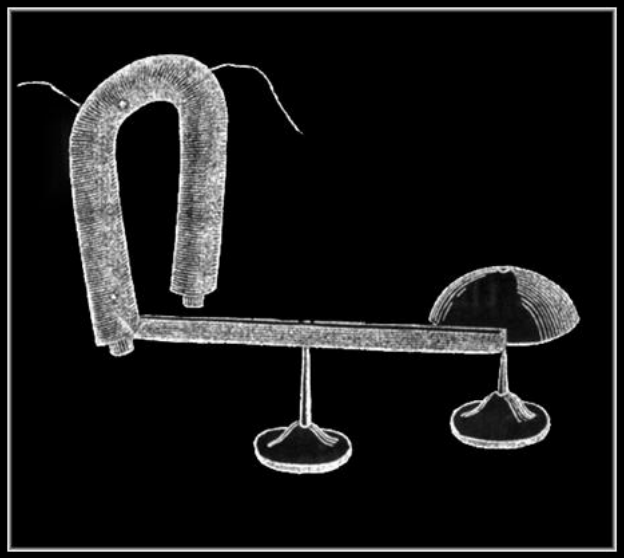
Telegraph Register

Samuel F.B. Morse

Christian Schussele – “Men of Progress”

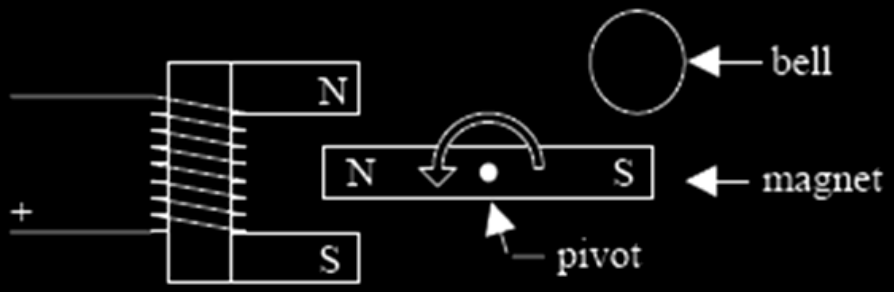
(left to right): William Thomas Green Morton, James Bogardus, Samuel Colt, Cyrus Hall McCormick, Joseph Saxton, Charles Goodyear, Peter Cooper, Jordan Lawrence Mott, Joseph Henry, Eliphalet Nott, John Ericsson, Frederick Sickels, Samuel Finley Breese Morse, Henry Burden, Richard March Hoe, Erastus Bigelow, Isaiah Jennings, Thomas Blanchard, and Elias Howe.

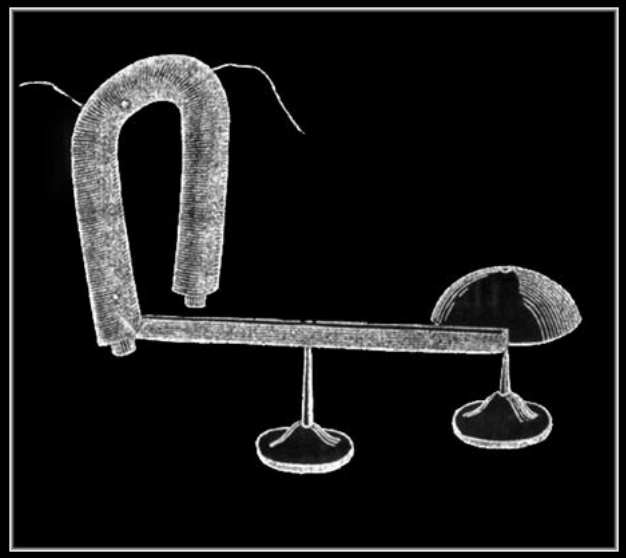




Henry's graphic of his telegraph

Henry's pole reverser at Princeton





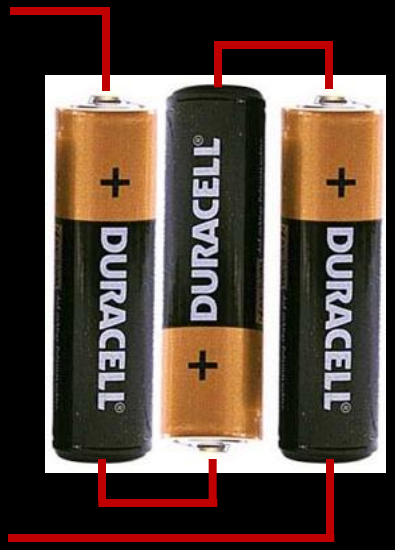
Henry's graphic of his telegraph

- Demo of telegraph
- Before Ohm's Law
- Weakening effect of a long line
- Boosts voltage to compensate

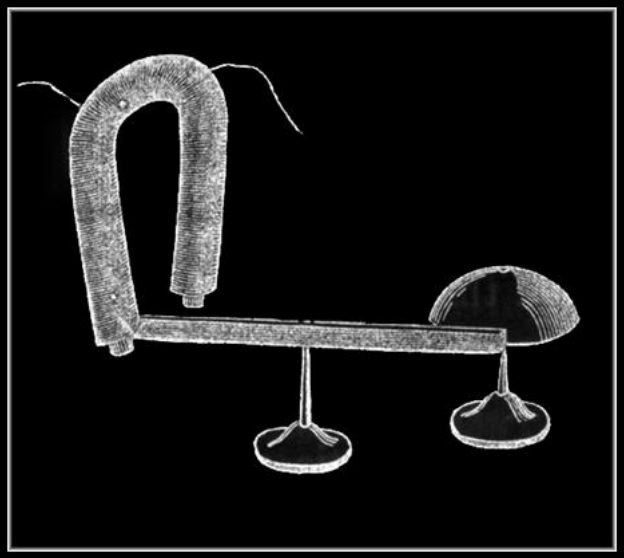
Henry's pole reverser at Princeton

1 volt and
<u>up to</u> 1 amp

Parallel – greater current



Series – greater voltage

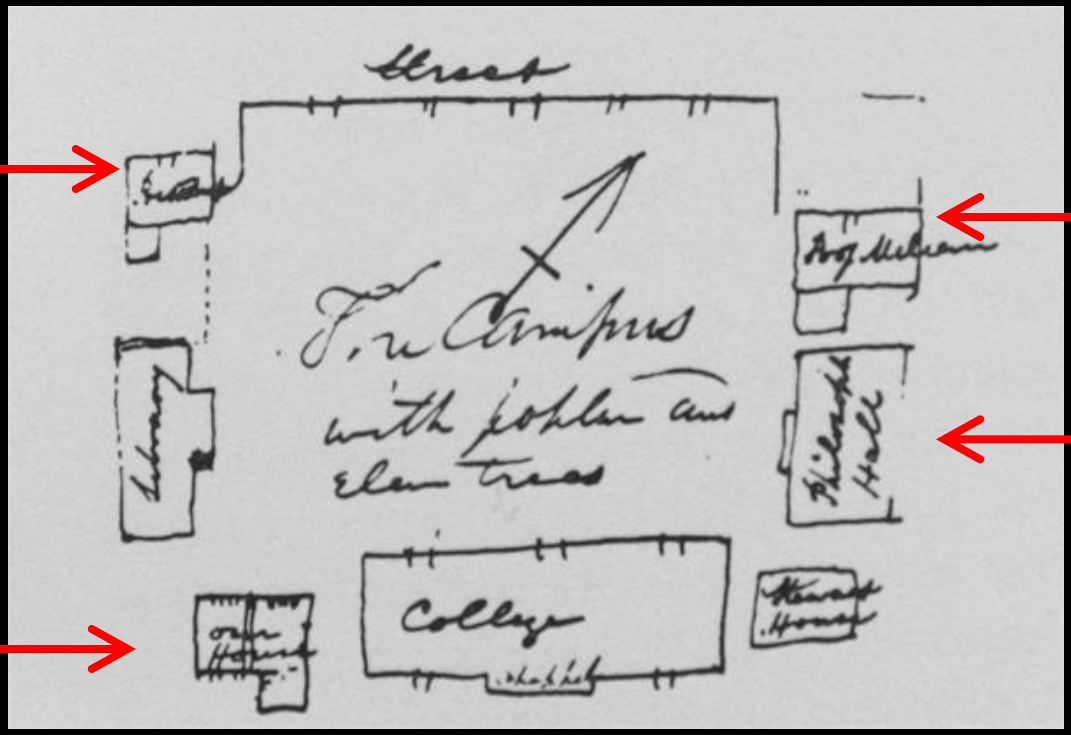


Henry's graphic of his telegraph

Henry's pole reverser at Princeton

President Carnahan's House

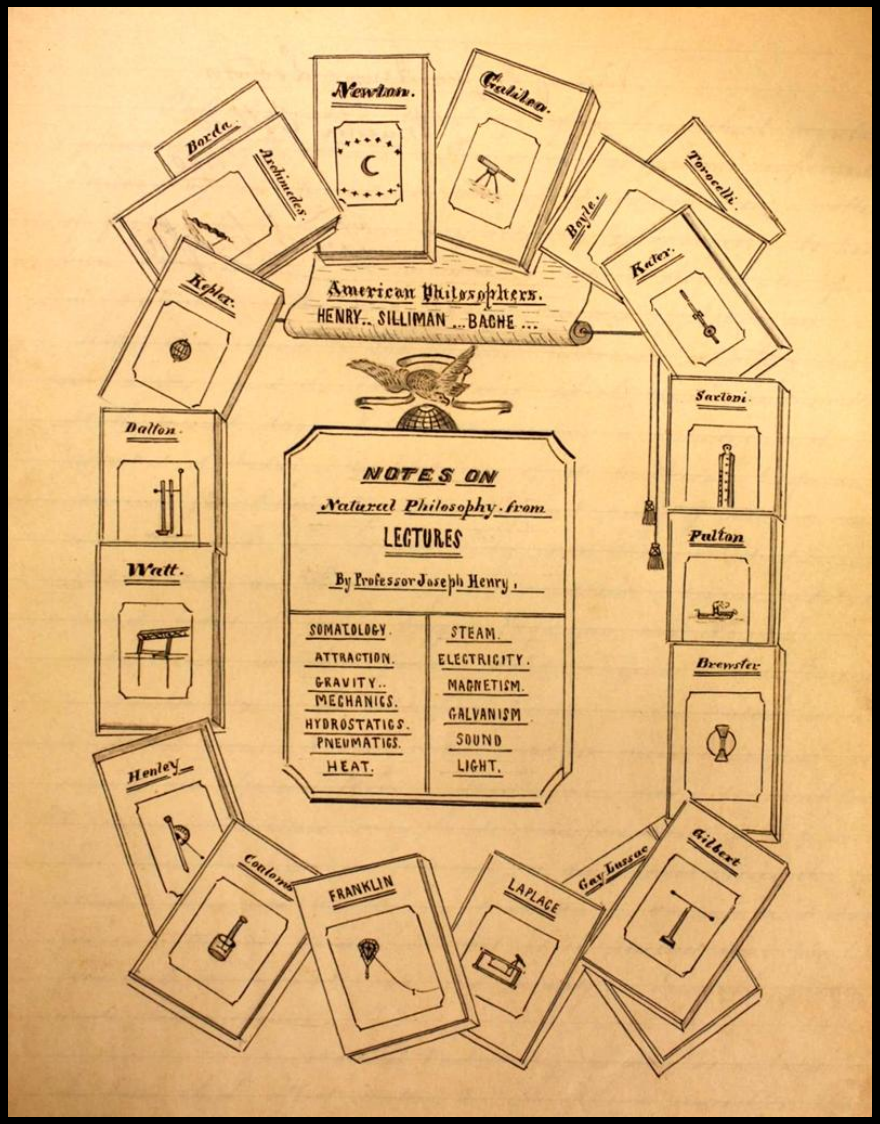
Vice President Maclean's House



Henry's Lab and College Kitchen

Our House

Henry's Hand Drawn Map (1833)
Front Campus – with poplar and elm trees



" The electro-magnetic telegraph was invented by me in Albany in 1830."

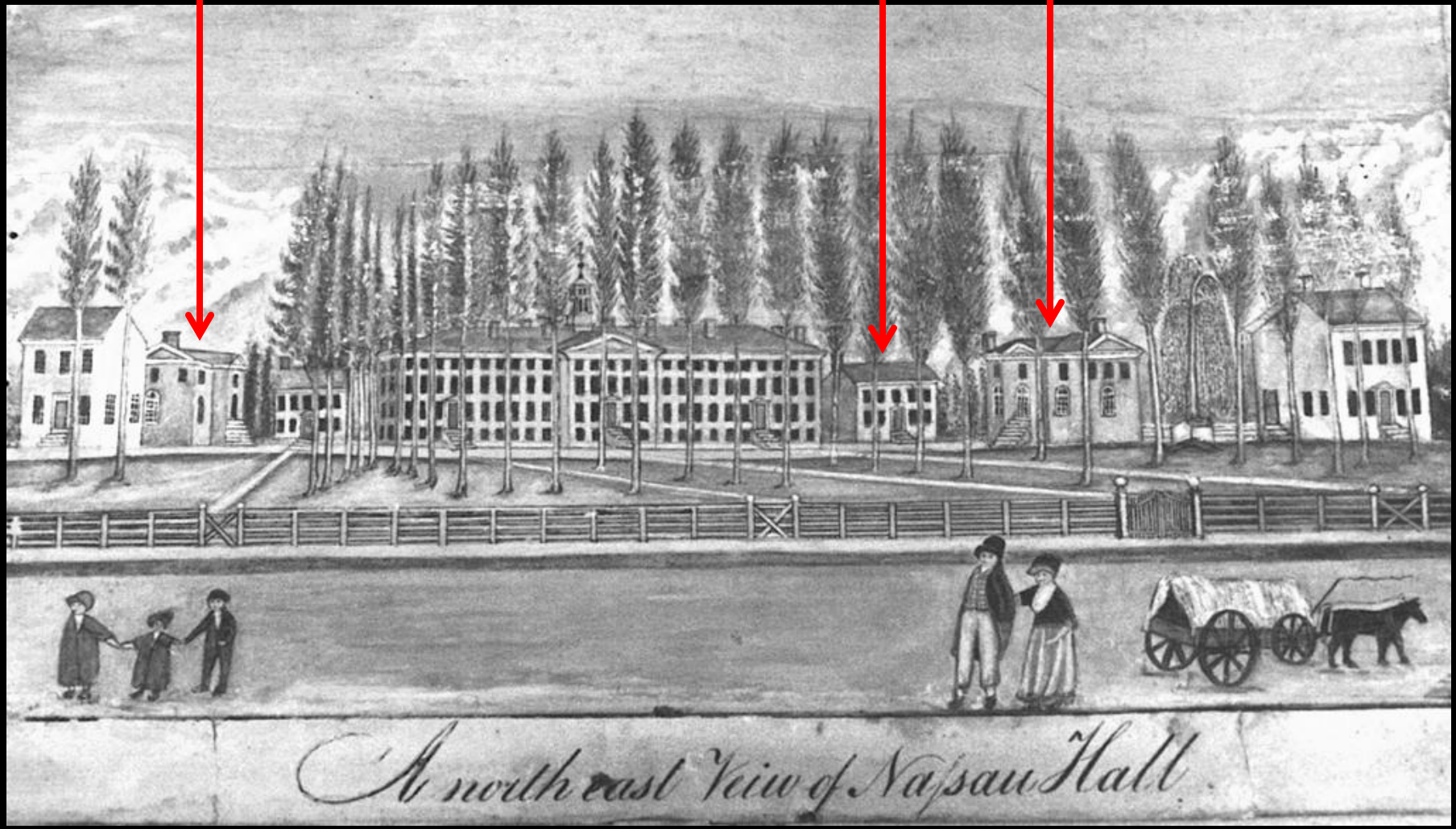
"I think that the first actual line of telegraph using the earth as a conductor was made in the beginning of 1836. A wire was extended across the front campus of the College grounds from the upper story of the Library building to the Philosophical Hall on the opposite side, the ends terminating in two wells. Through this wire signals were sent from time to time from my house to my laboratory."

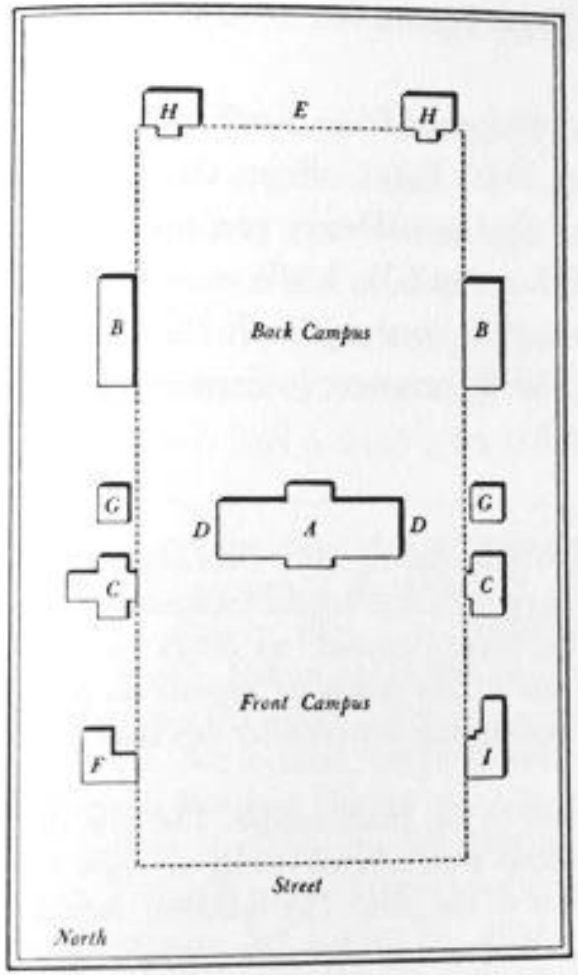
- Joseph Henry

Henry's Lab and College Kitchen

Henry's House

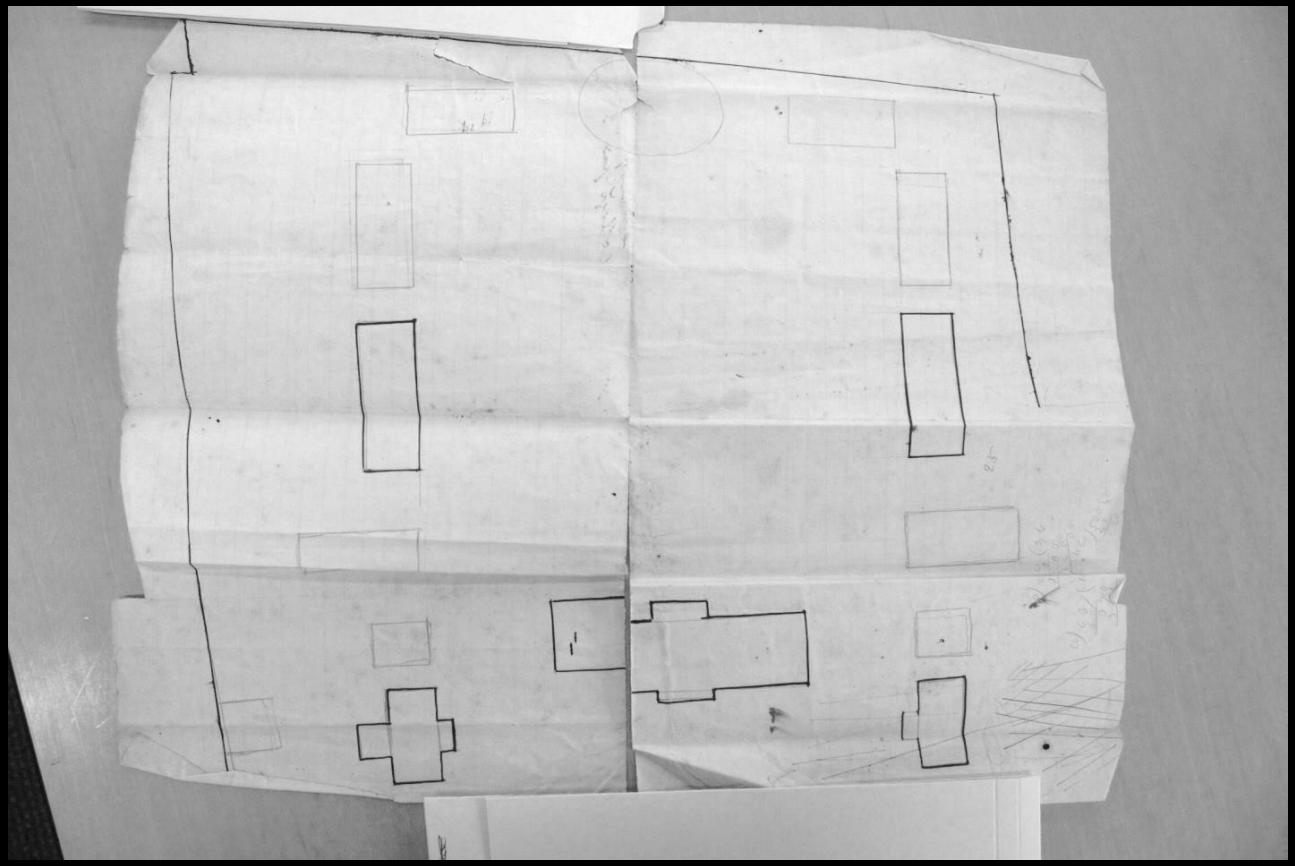
Library

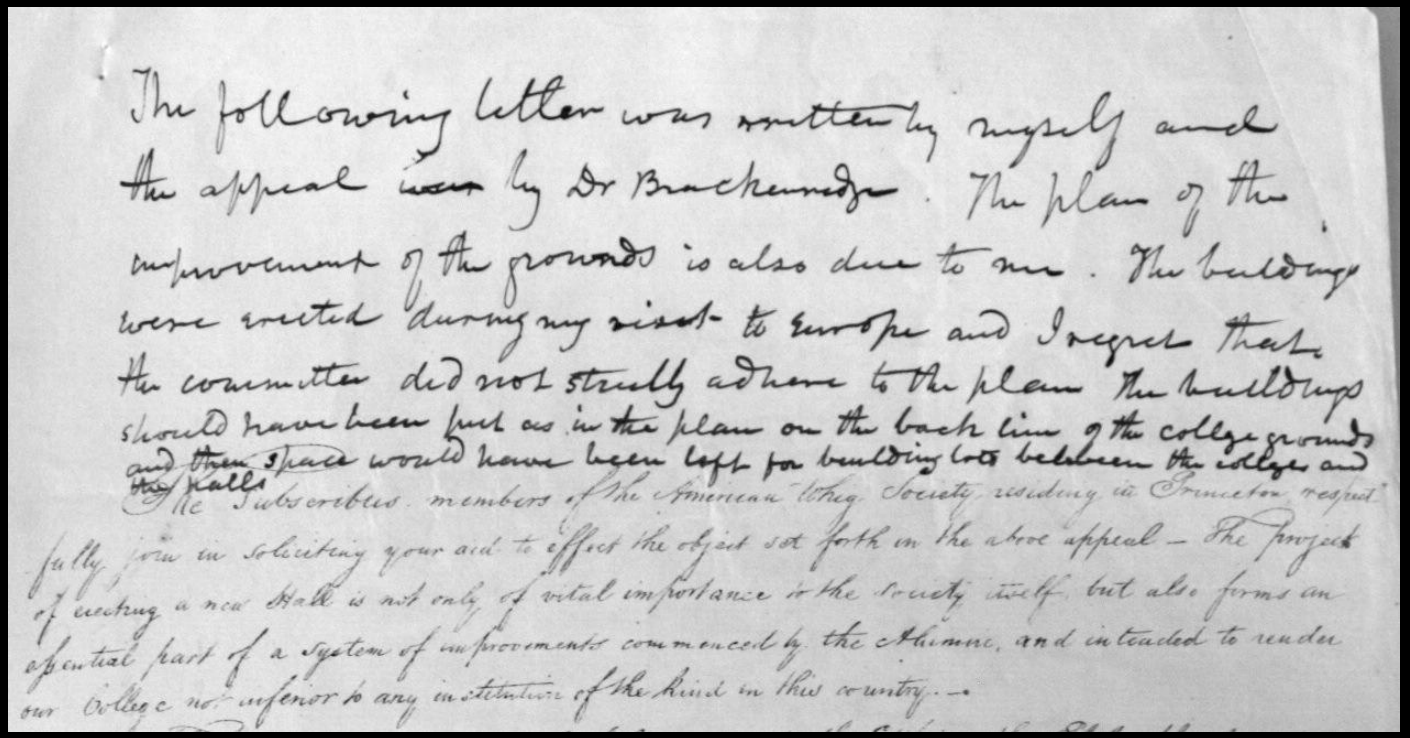




1836 Joseph Henry's Plan of the Campus, 1836, Princeton University Archives

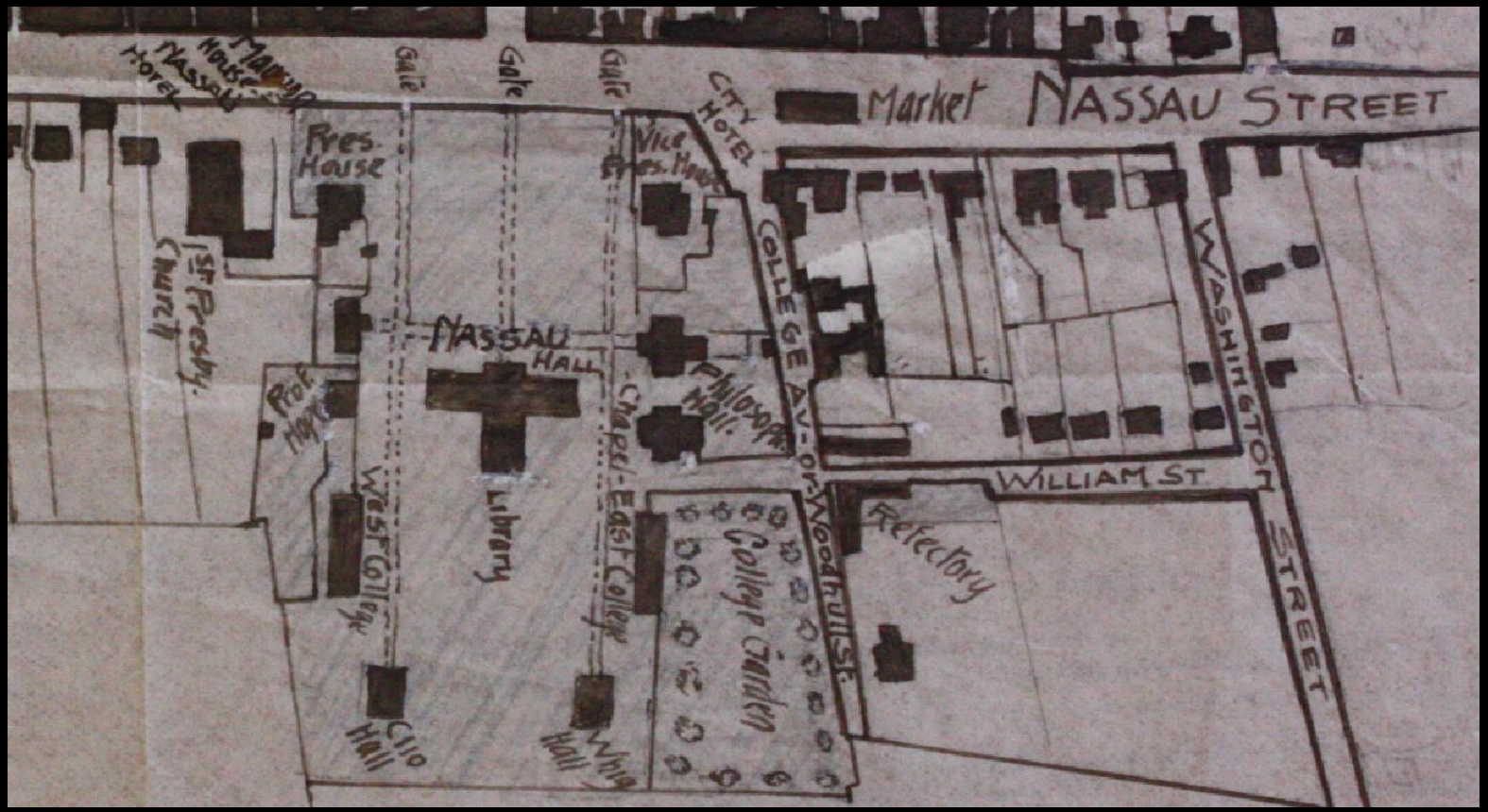
A	Old Nassau
B.B.	New Colleges
C.C.	Library. Philosophical Hall
D.D.	Present sites of Professor's & Steward's Houses. These to be removed to G & G
E	Site reserved for Chapel
G.G.	Intended sites for Professor's & Steward's Houses
I	President's House
F	Vice President's House
H.H.	Sites of new Society Halls



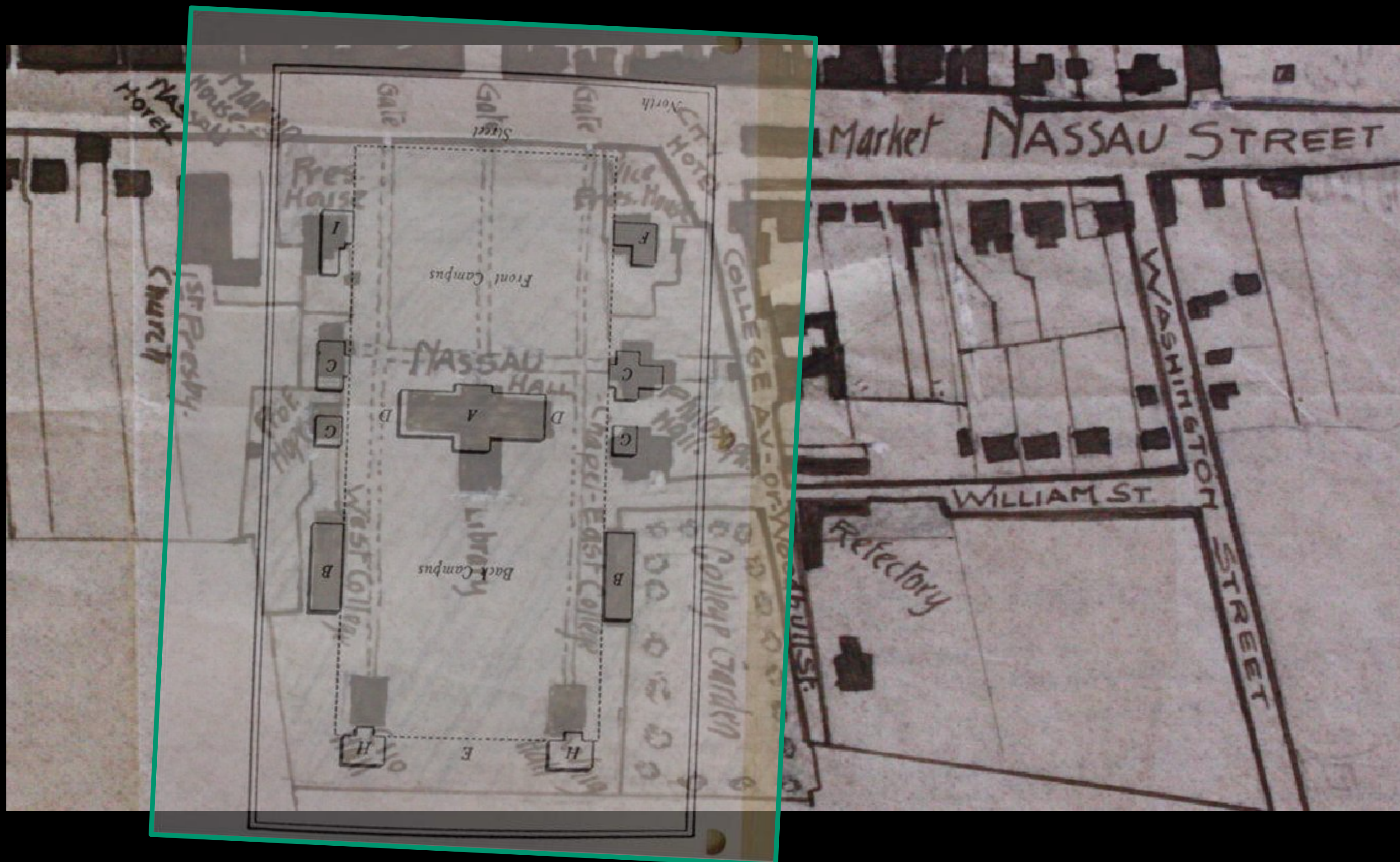

The following letter was written by myself and the appeal [was] by Dr Brackenridge. The plan of the improvement of the grounds is also due to me. The buildings were erected during my visit to Europe and I regret that the committee did not strictly adhere to the plan. The buildings should have been put as in the plan on the back line of the college grounds and then space would have been left for building lots between the colleges and the halls

The Subscribers members of the American Whig Society residing in Princeton respectfully join in soliciting your aid to effect the object set forth in the above appeal – The project of erecting a new Hall is not only of vital importance to the society itself but also forms an essential part of a system of improvements commenced by the Alumni, and intended to render our College not inferior to any institution of the kind in this country. –

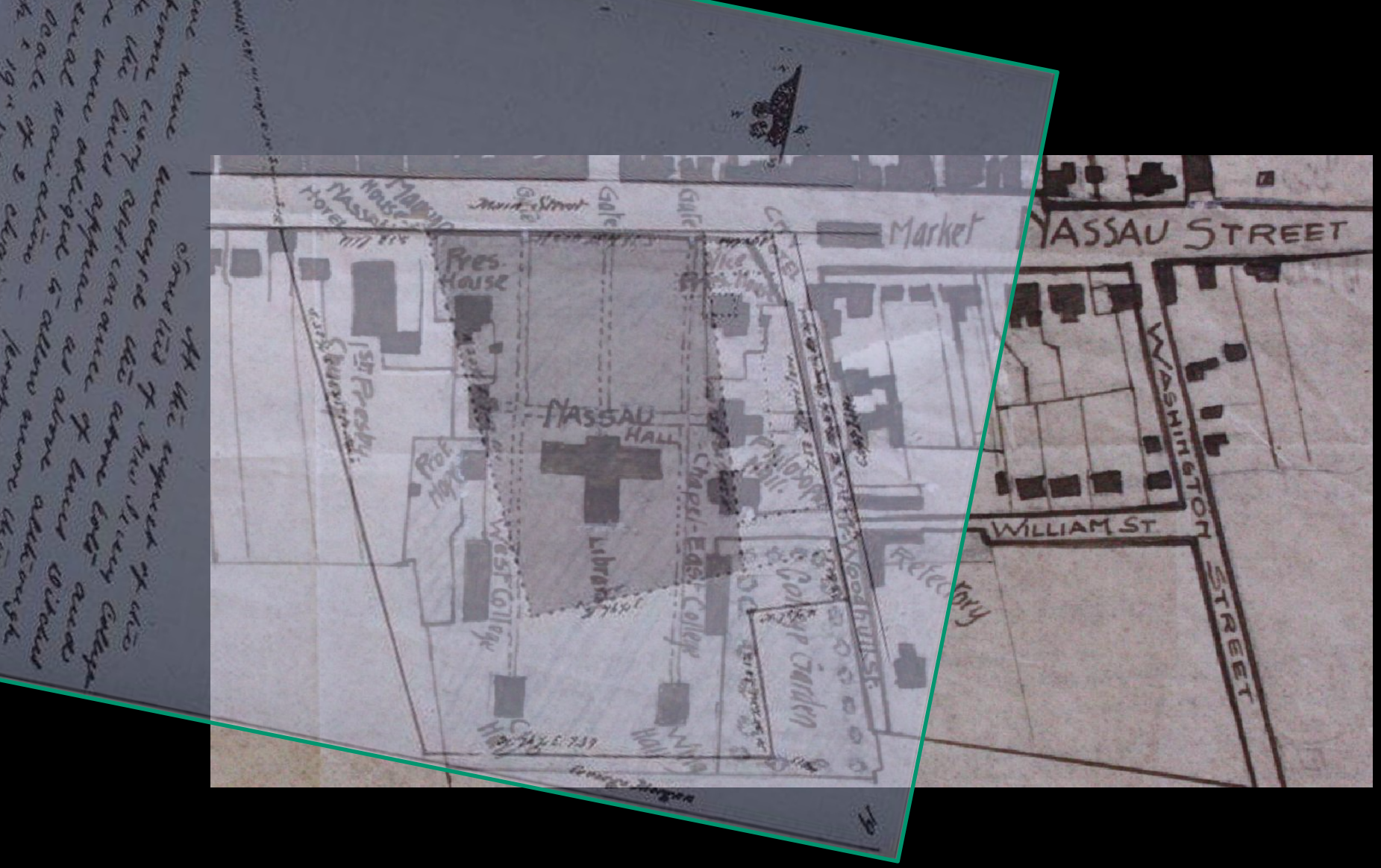
"The following letter [that is, the text in the lithographed circular] was written by myself and the appeal [was] by Dr Brackenridge. The plan of the improvement of the grounds is also due to me. The buildings were erected during my visit to Europe and I regret that the committee did not strictly adhere to the plan. The buildings should have been put as in the plan on the back line of the college grounds and then space would have been left for building lots between the colleges and the halls".



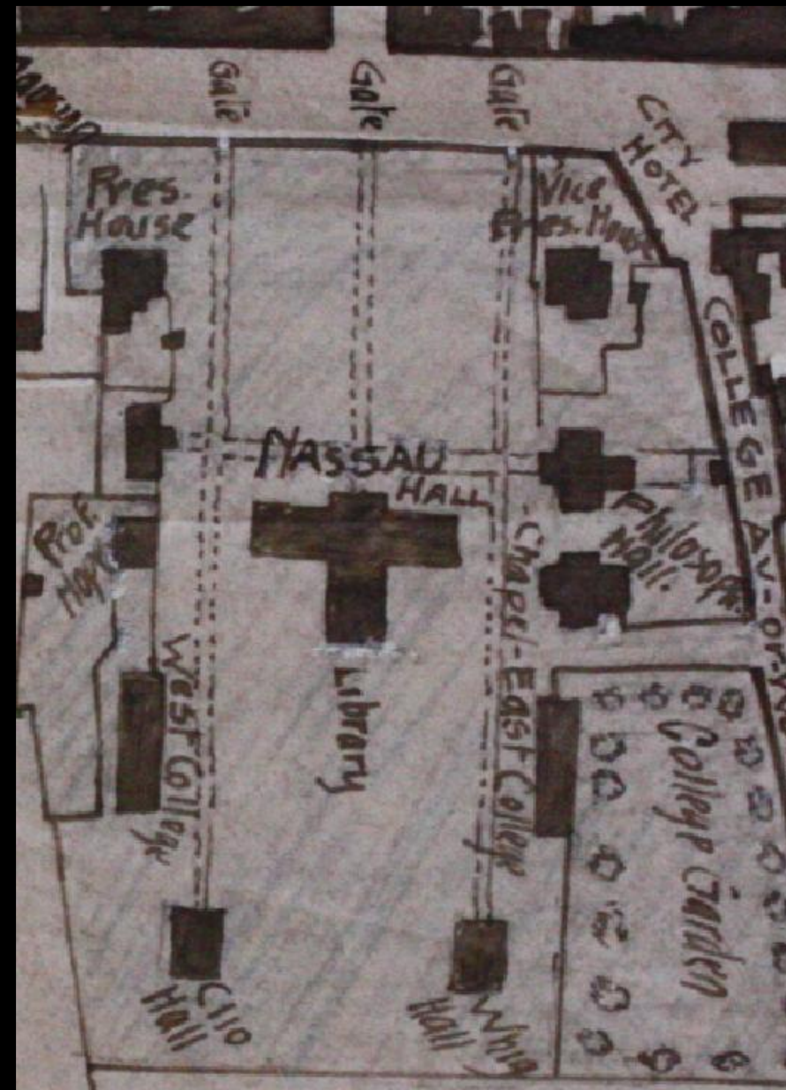
Map 1852 - 1859



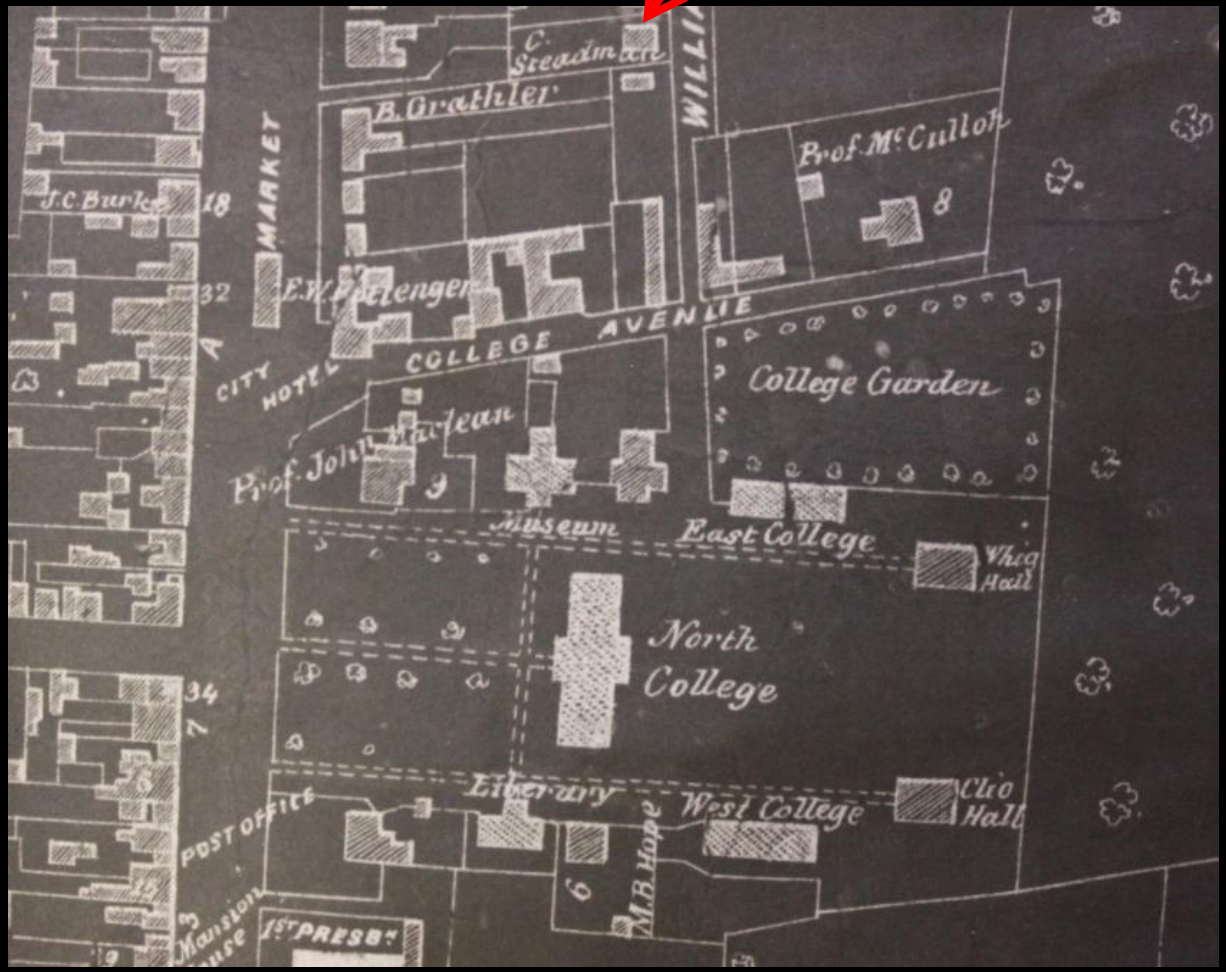
Map 1852 - 1859

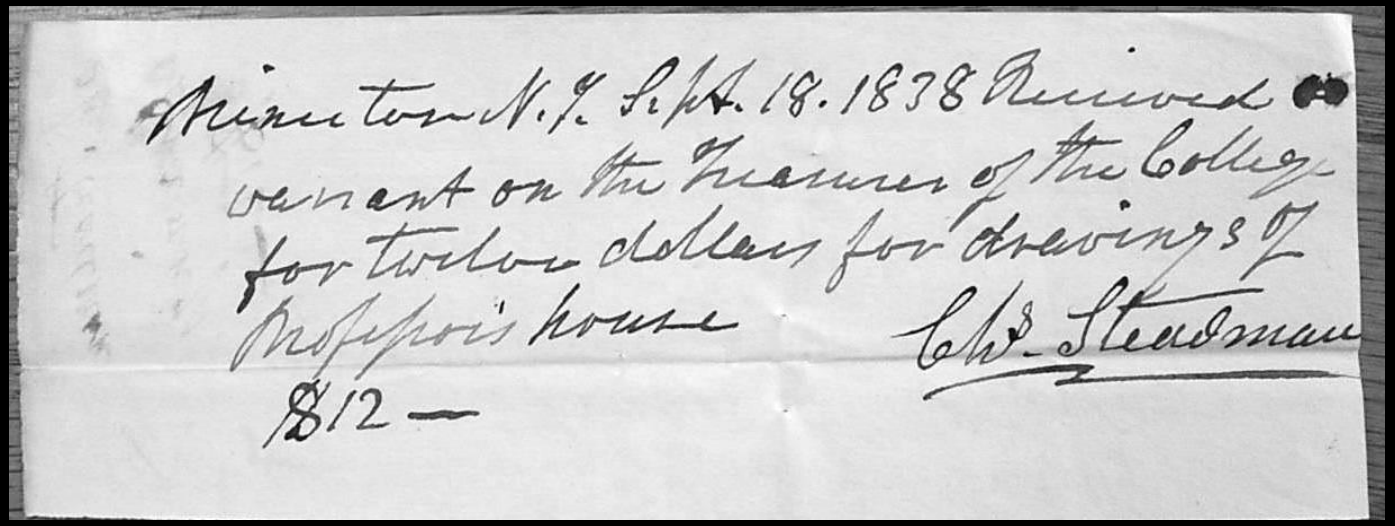


Map 1852 - 1859


Gate
Gate
Gate
CITY HOTEL
Pres. House
Vice Pres. House
NASSAU HALL
Philosoph. Hall
Library
West College
Chapel
East College
College Garden
Clio Hall
Whig Hall

Charles Steadman





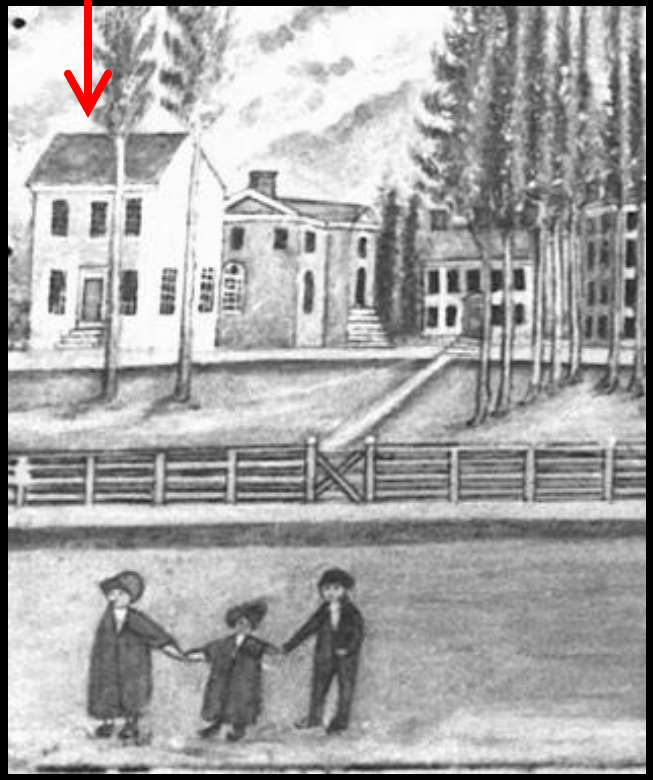
Princeton N.J. Sept. 18. 1838 Received payment on the Treasurer of the College for twelve dollars for drawings of Professor's house

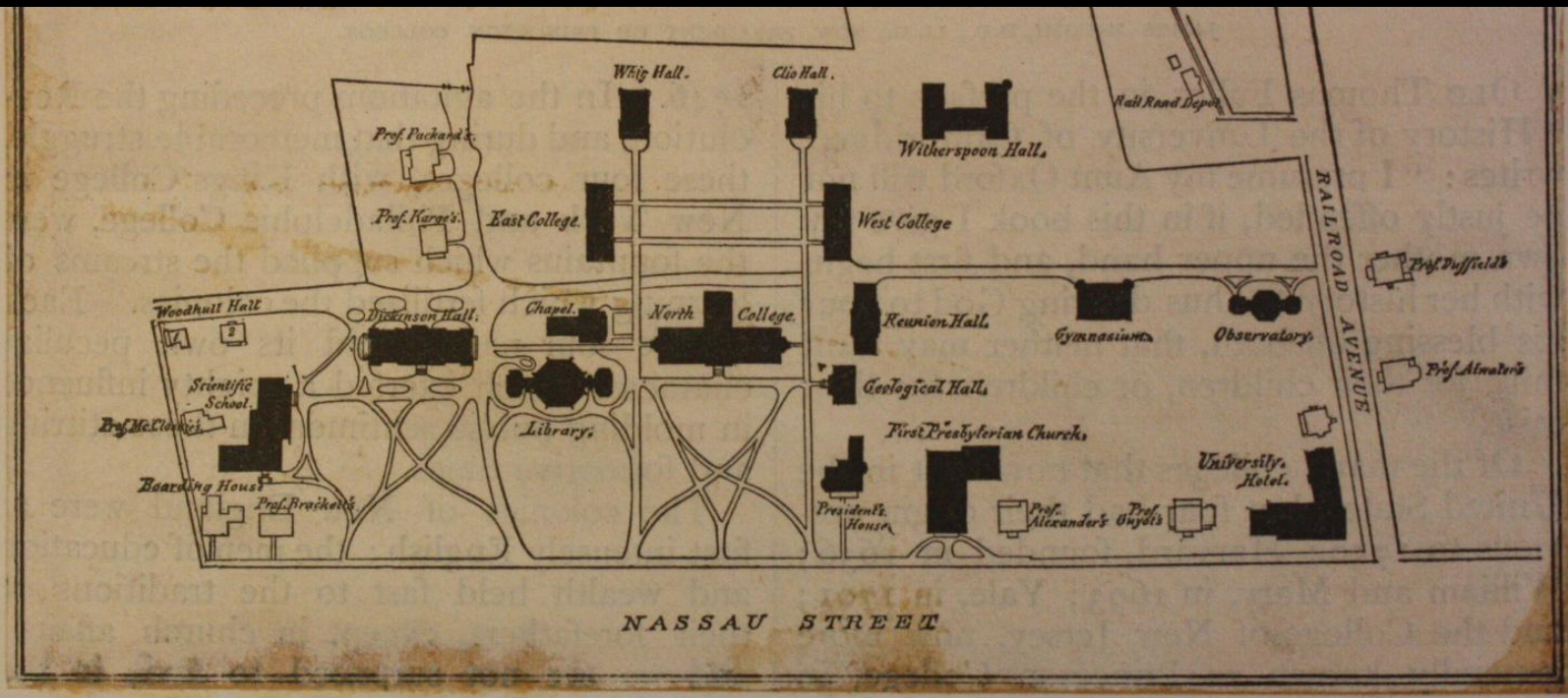
Chs. Steedman

$12—

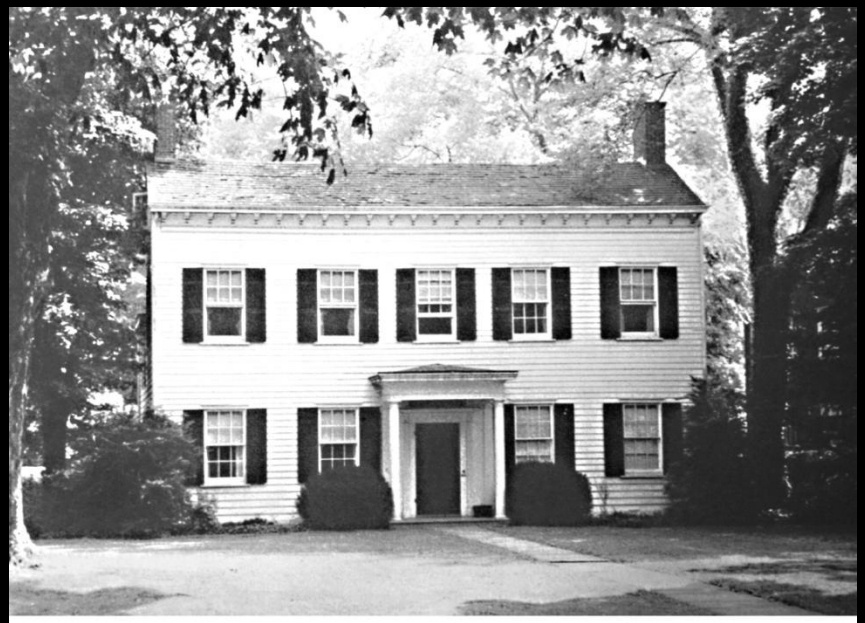

Front View

Vice President's House





SCRIBNER'S MONTHLY MARCH 1877 ARTICLE ON PRINCETON

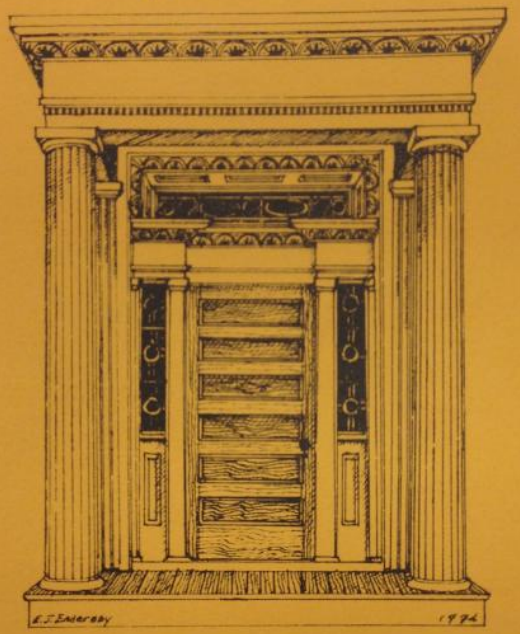


Top: 44 Washington Road

Bottom: Joseph Henry House

The Historical Society of Princeton

• presents •



A Candlelight Walking Tour

CHARLES STEADMAN HOUSES and Their Neighbors

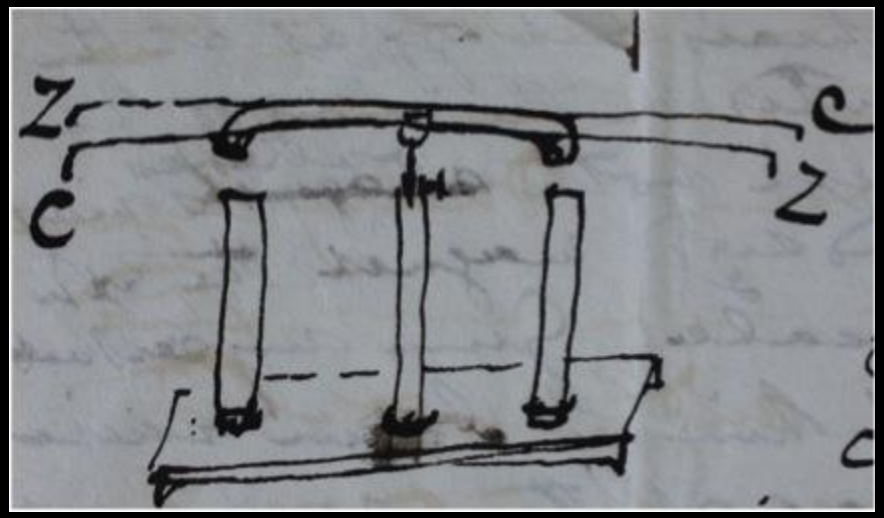
• 7 April 1974 •

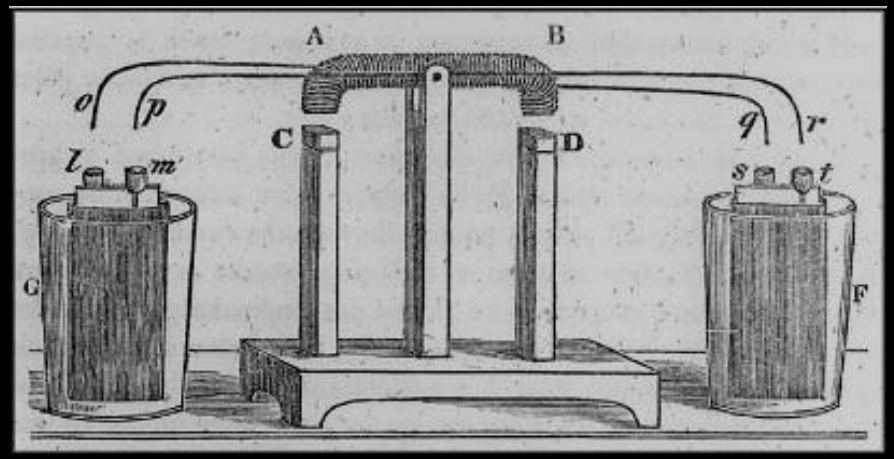
4–8 p.m.

West side of Alexander Street – all Steadman Houses

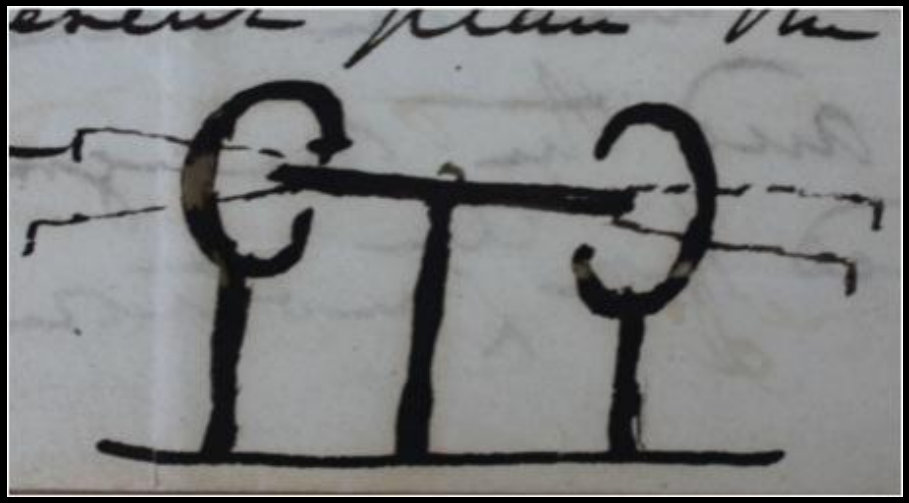
36 and 40 Mercer Street – 36 Mercer James Green
40 Mercer – Steadman’s daughters

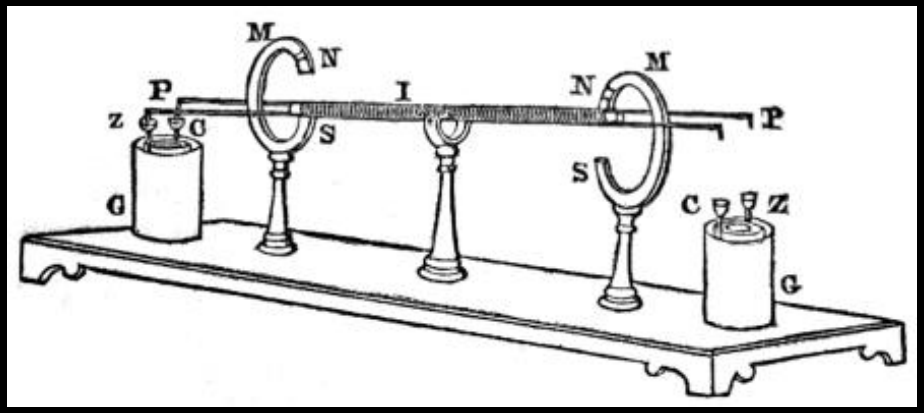
Albany Motor - 1831





Princeton Motor - 1835





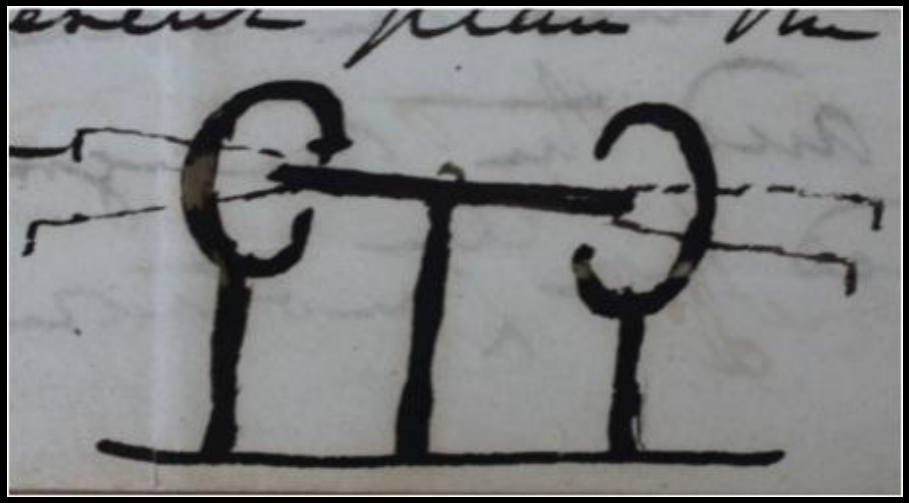
Pole Reversal Motor

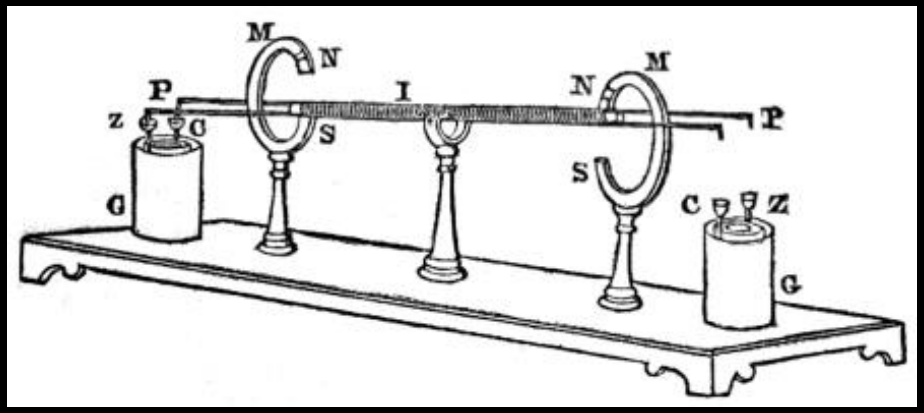
Henry writes to Silliman

I have lately succeeded in producing motion in a little machine by a power, which I believe has never before been applied in mechanics – by magnetic attraction and repulsion.

The article in its present state can only be considered a philosophical toy, although in the discovery and invention it is not impossible that the same principle, or some modification of it on a more extended scale, may hereafter be applied to some useful purpose.

Princeton Motor - 1835

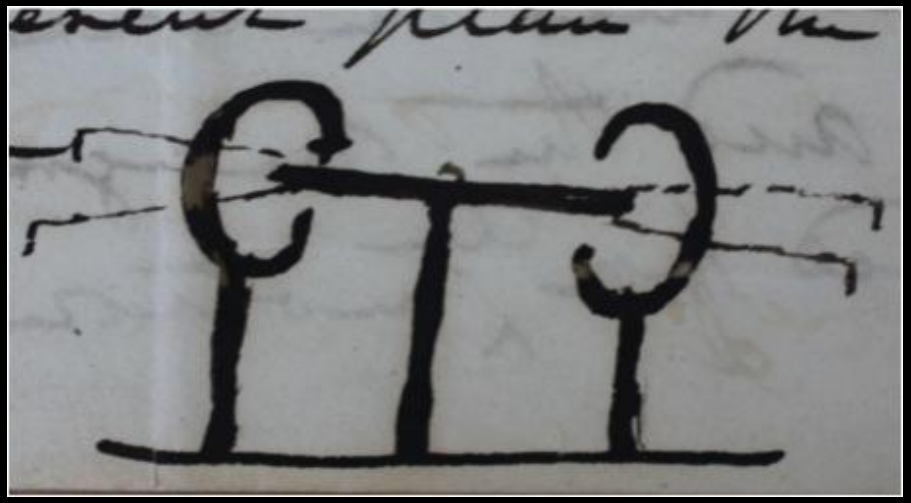


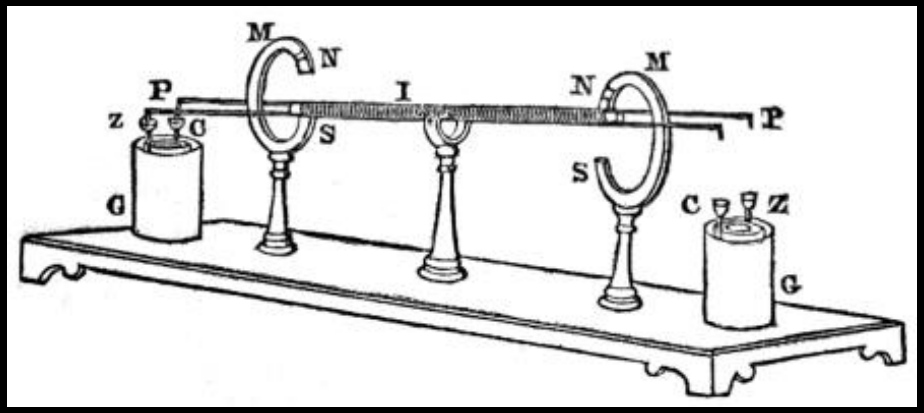


Pole Reversal Motor

Early Albany Magnet & Battery

Princeton Motor - 1835





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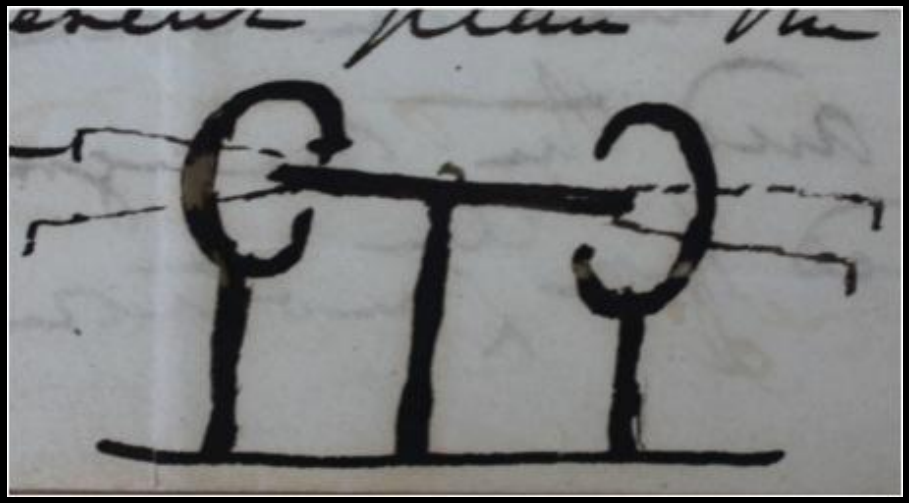
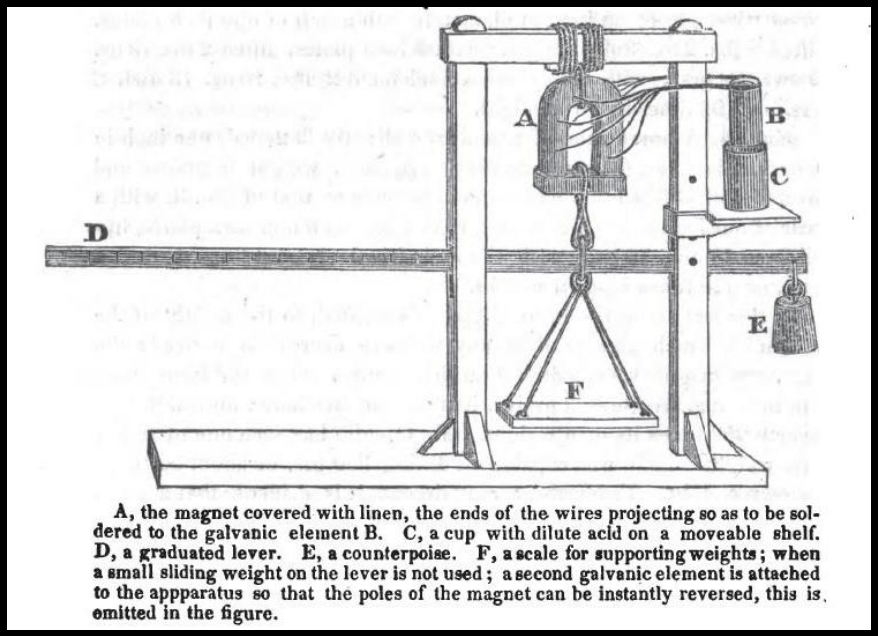
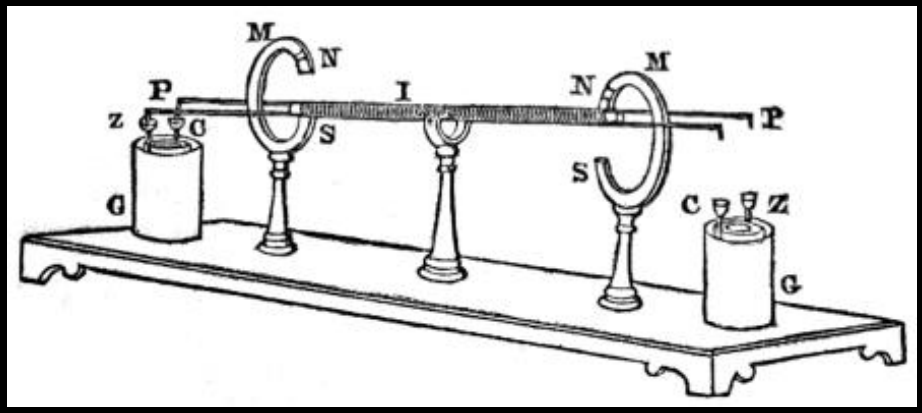


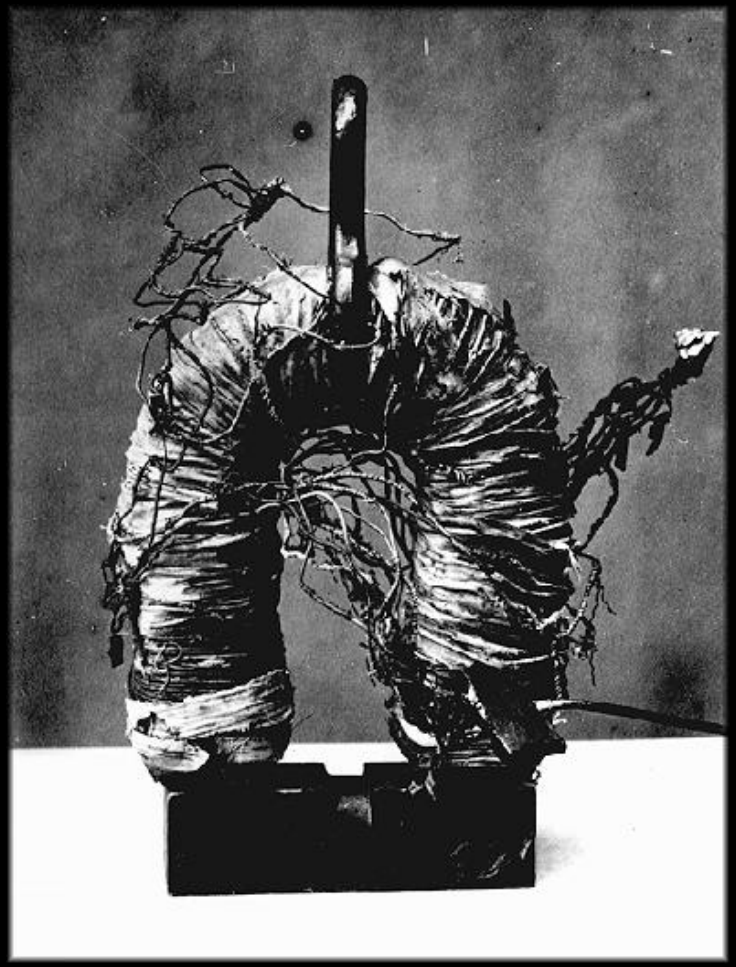


A, the magnet covered with linen, the ends of the wires projecting so as to be soldered to the galvanic element B. C, a cup with dilute acid on a moveable shelf. D, a graduated lever. E, a counterpoise. F, a scale for supporting weights; when a small sliding weight on the lever is not used; a second galvanic element is attached to the appparatus so that the poles of the magnet can be instantly reversed, this is omitted in the figure.



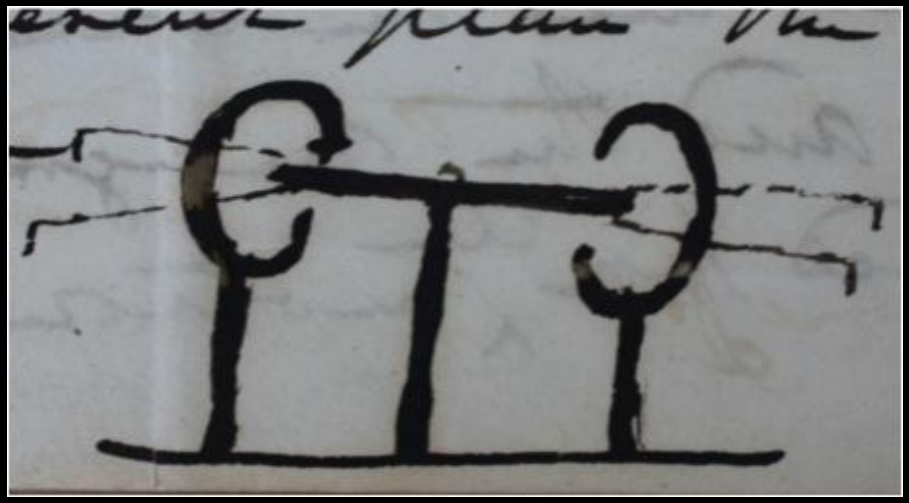
Pole Reversal Motor

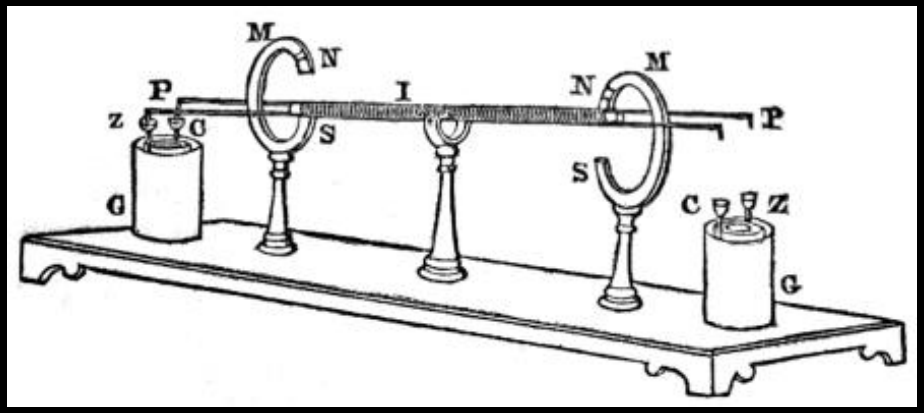
Albany Magnet - 1829



21 Pounds - Lifts 750 Pounds

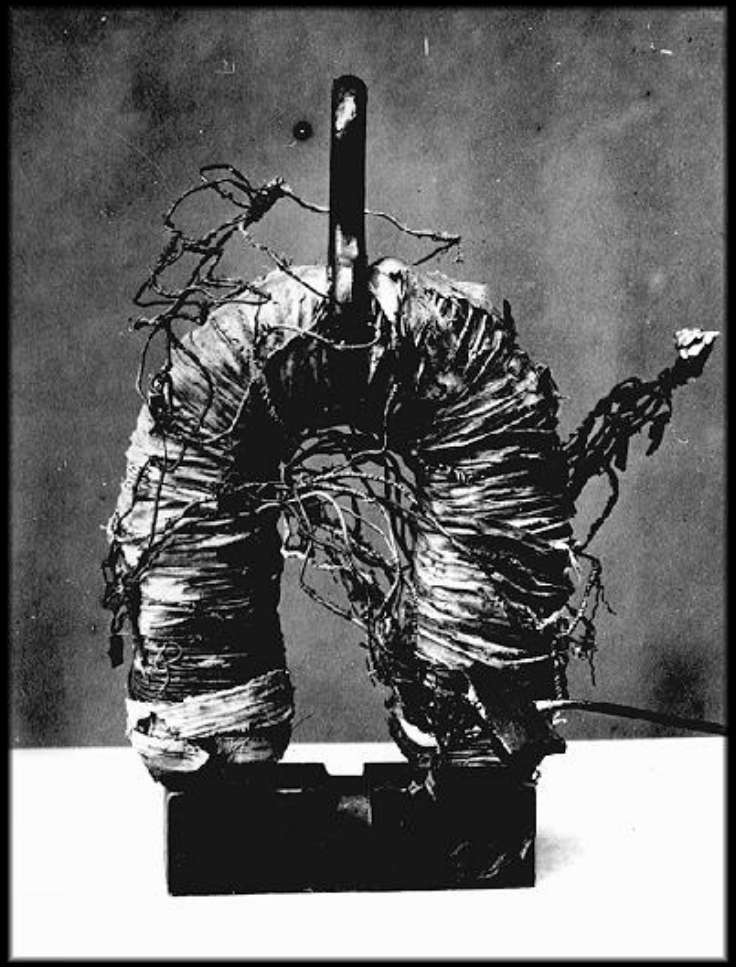
Princeton Motor - 1835





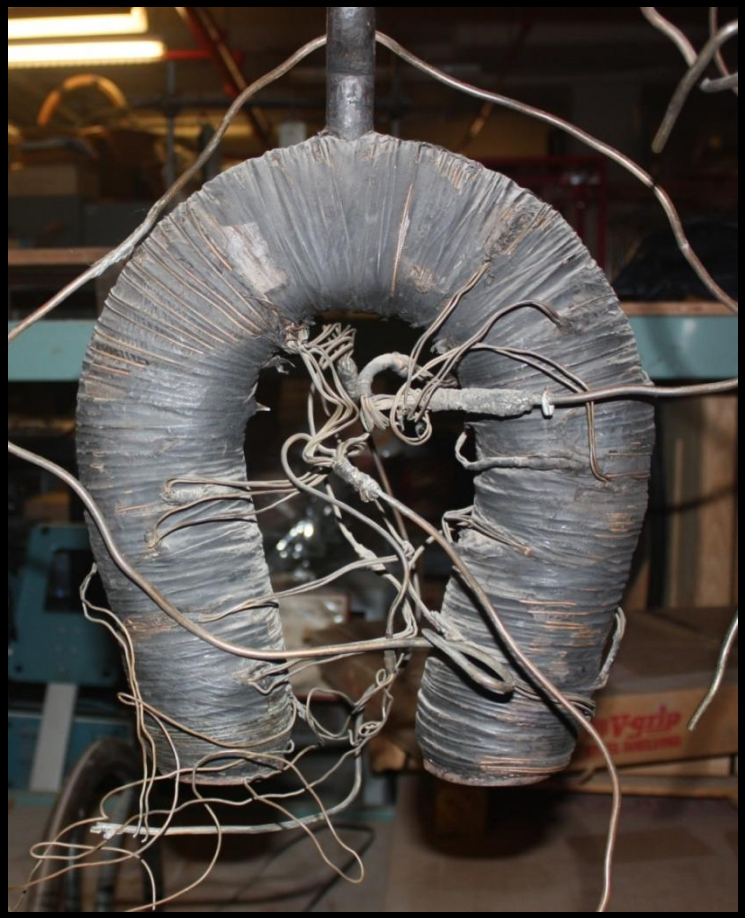
Pole Reversal Motor

Albany Magnet - 1829



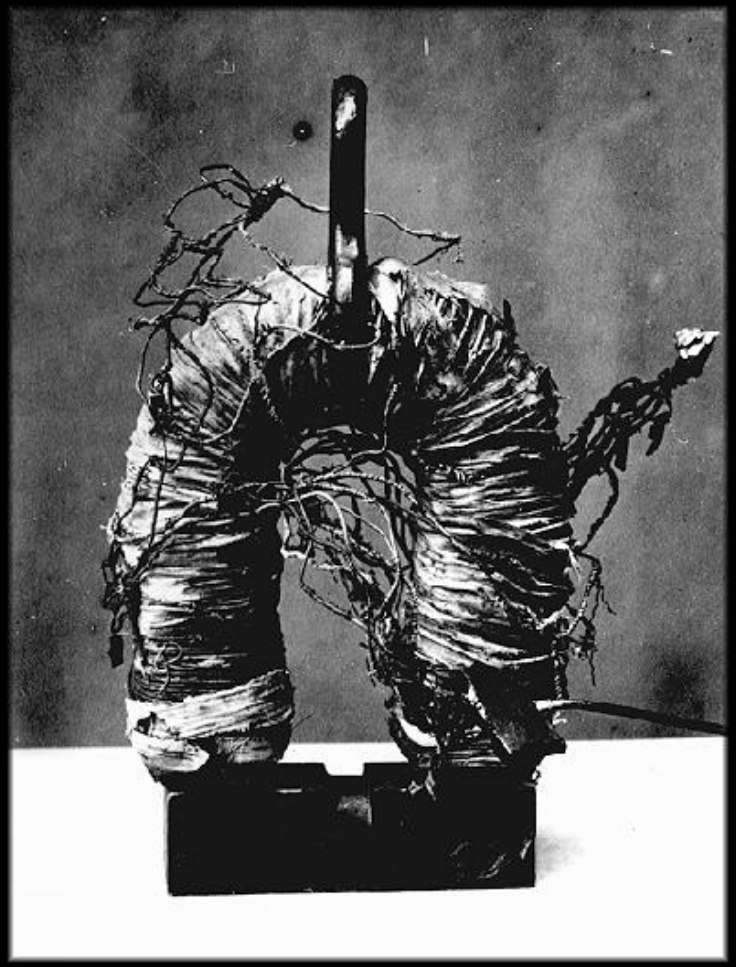
21 Pounds - Lifts 750 Pounds

Princeton Magnet - 1833



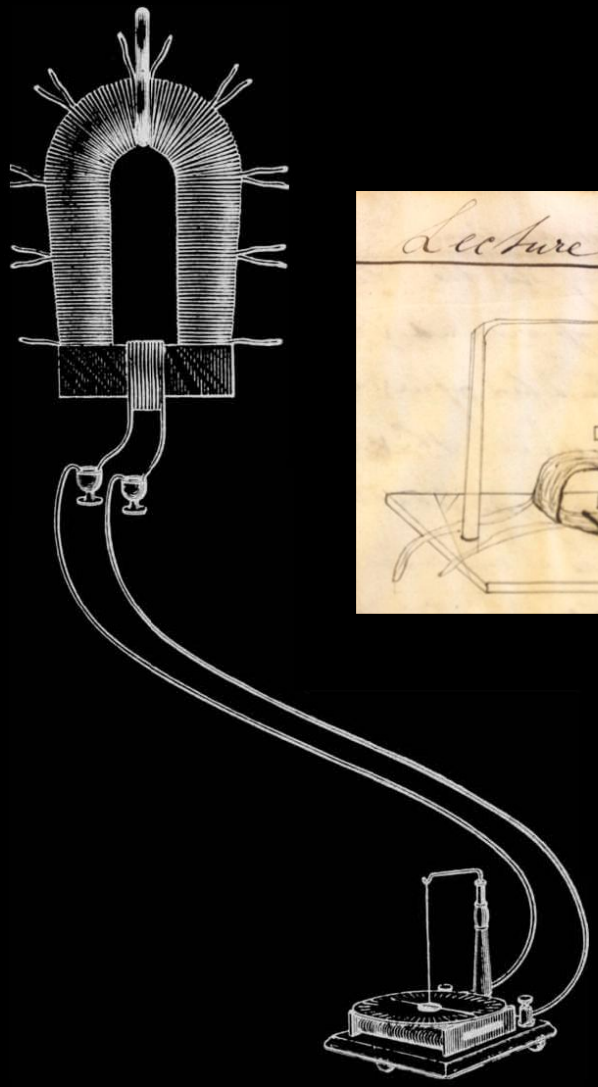
100 Pounds - Lifts 3500 Pounds

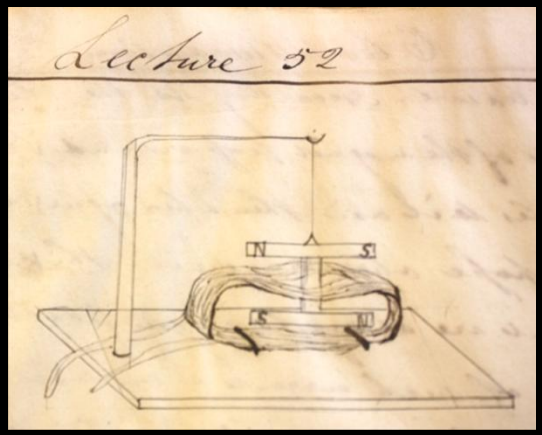
Albany Magnet - 1829



21 Pounds - Lifts 750 Pounds

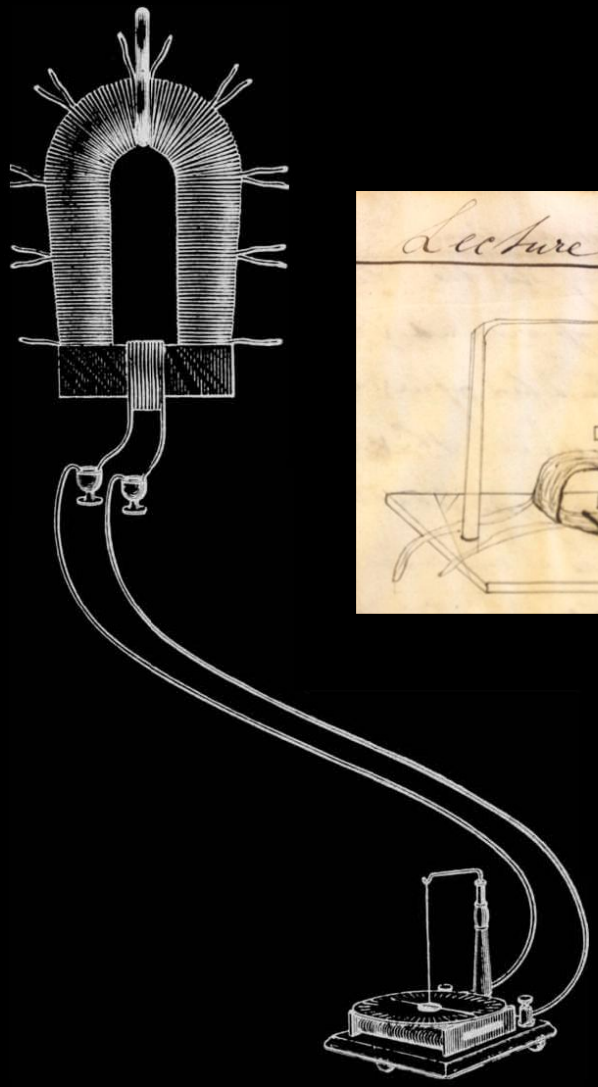
Albany Transformer - 1831

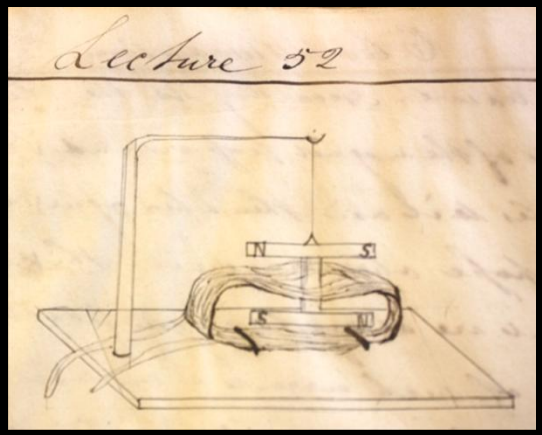




Albany Transformer - 1831

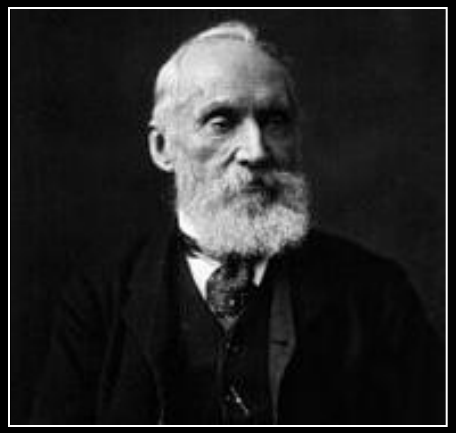
Mary Henry: Galvanometer made by Henry while in Albany and the one probably used in the great discovery of magneto-electricity



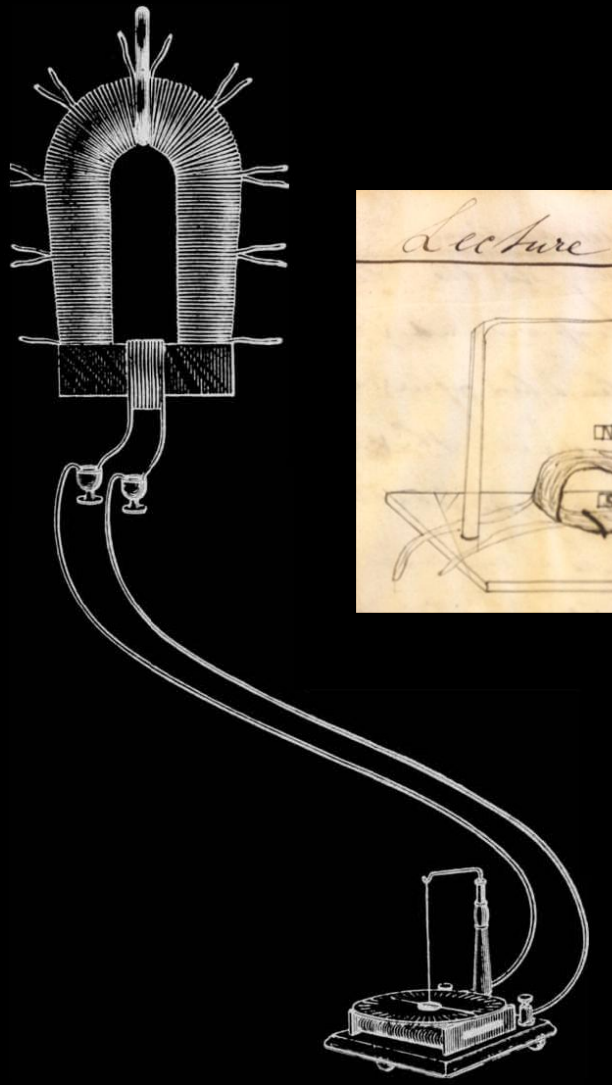


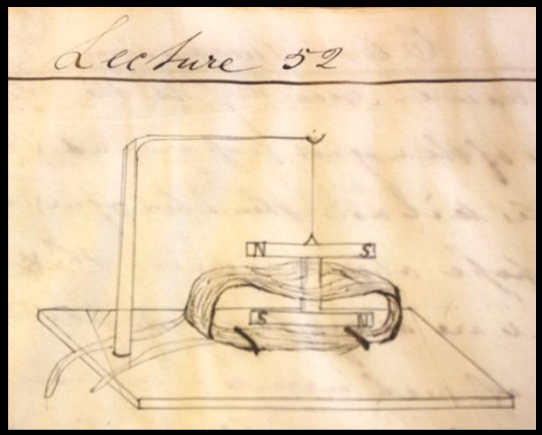
Lord Kelvin in Philadelphia - 1884

I cannot sit down without again reflecting on the men whose lives have been patterns to the world. There is none more remarkable perhaps than the man of this country, Joseph Henry, who ended his days here. He and Faraday were patterns of scientific investigators. In some degree they went parallel and made similar scientific discoveries. Henry, indeed, preceded Faraday in the great discovery of the electro-magnetic induction between unmoved conductors.



Albany Transformer - 1831



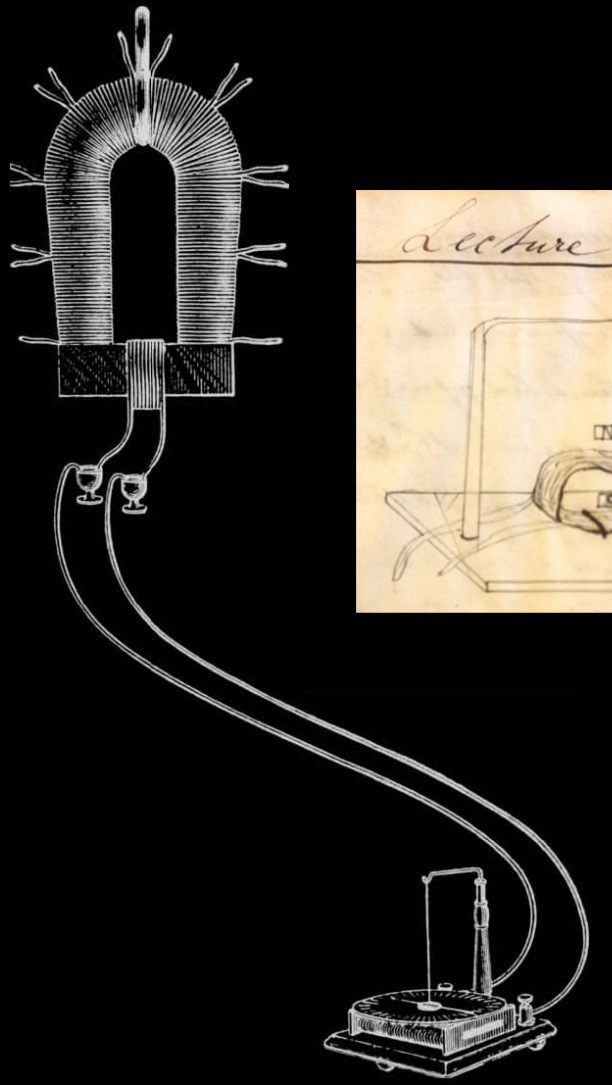


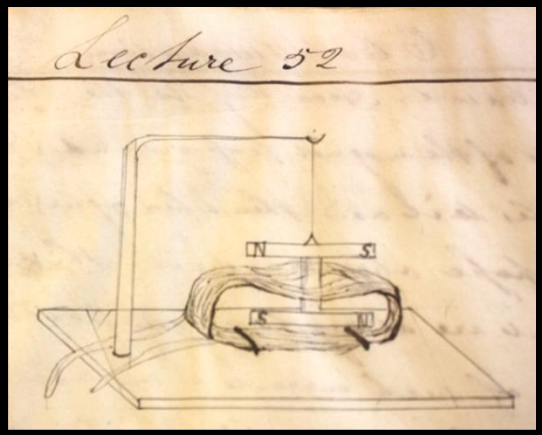
Lord Kelvin in Philadelphia - 1884

Henry gave the warmest welcome to all practical applications of his discoveries. He sought to make none himself, not because he superciliously despised the applications of science to the public good, but because his own convictions constrained him to go on in pure science; because he felt … it would have taken him from his work to have devoted himself at all to the practical applications of his discoveries.

But what a beautiful trait of character it is to see what a kindly welcome he gave to those who did make the practical applications. He saw what might be done, but deliberately left it to others.

Albany Transformer - 1831





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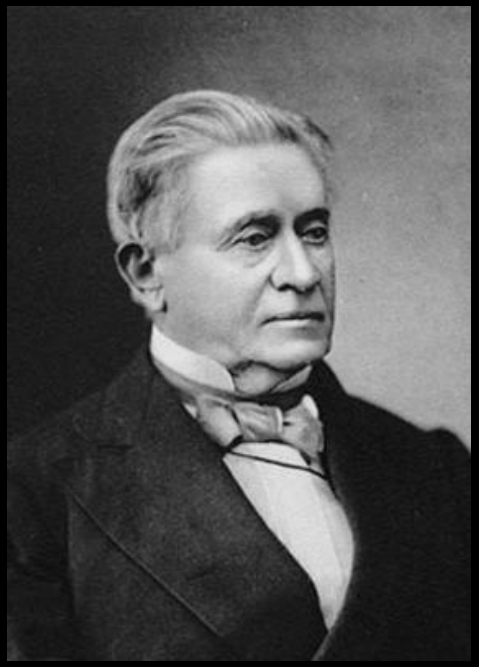


Henry tells Bell to “Get it” when Bell says he does not have the electrical knowledge necessary to overcome his difficulties. Bell tells parents – I cannot tell you how much these two words have encouraged me.

Scientific

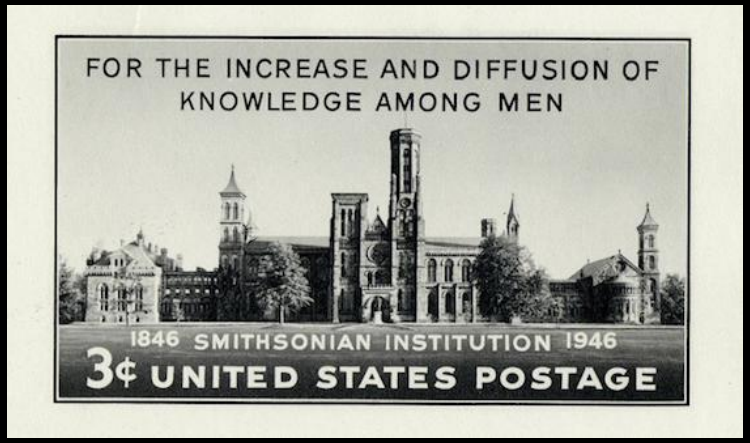
- Electromagnetism
- Magneto-electricity

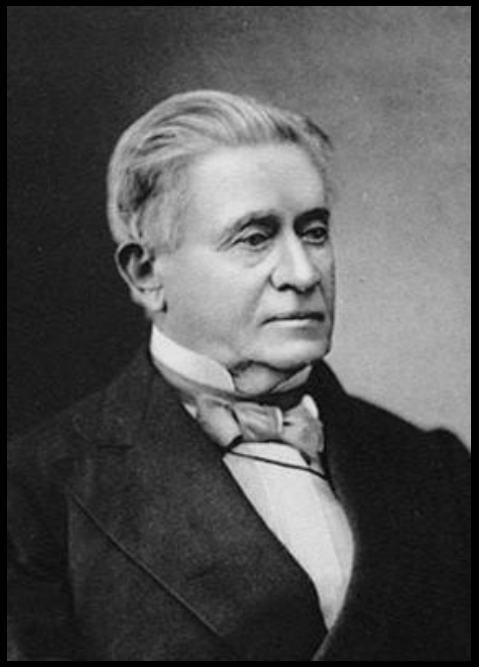
Social

- Telegraph
- Telephone
- Electric Power

Symbolic

- Teacher/Scholar and
- Public Servant





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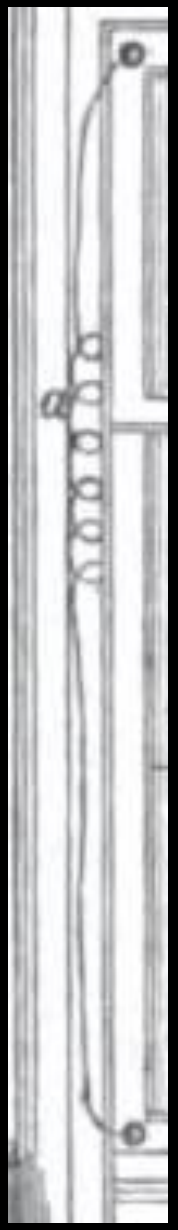
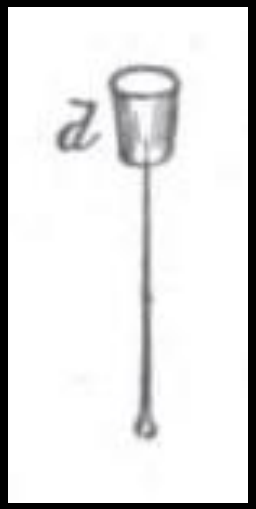
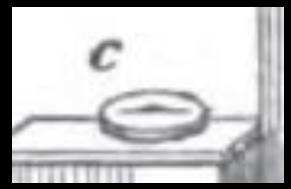
The first detection of Radio Waves - 1843







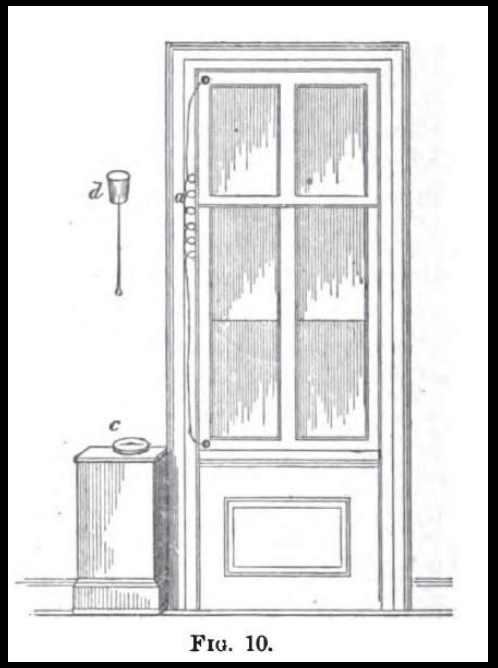


FIG. 10.

Purpose – we all live in Princeton – this is about Princeton – local history that spills over to the national and international scenes – much of Henry's work was done in Princeton.

Who is Joseph Henry ? Why should we care ?

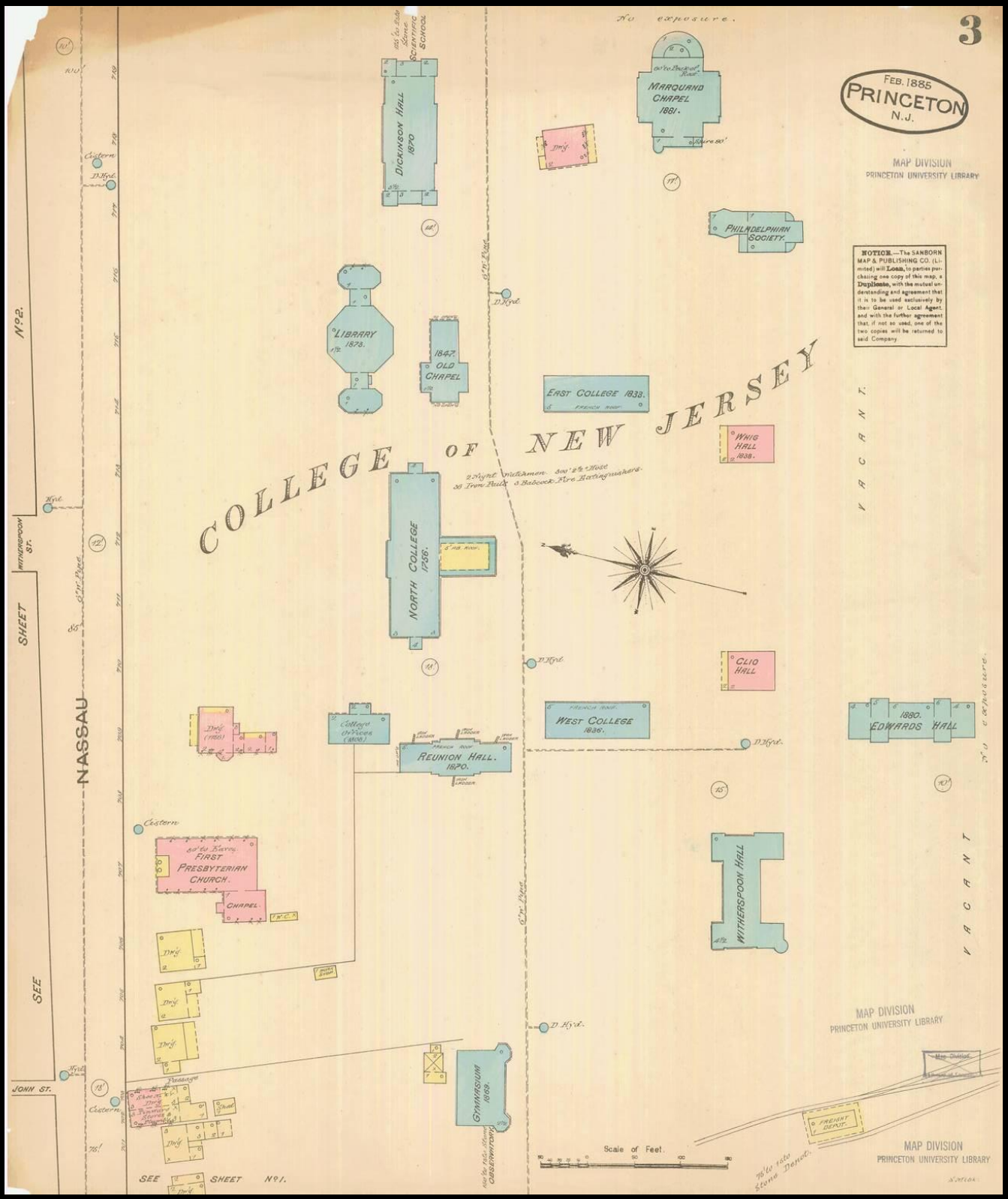
The Joseph Henry House (his second house – constructed in 1838) National Landmark – who designed it ? – Not Joseph Henry as the myth – likely Charles Steadman. Greek Revival and Federal. House now located to the northeast of Nassau Hall – moved three times – close to the original location of the VP House. **JH House looks like many of the houses in Princeton –** many of the houses in Princeton look alike.

Henry's Campus Plan – a big deal – an orderly plan for the placement of buildings in the central campus during a period of campus expansion – Building Committee – Rev. Eli Cooley, James Green, Pres. James Carnahan.

Telegraph – another big deal – and it is connected to Princeton – telegraph line between Henry's lab and his 1st house – first to use the earth as a pathway. Also Henry's electric motor – another big deal – work started in Albany and continued in Princeton. Also Henry magnetized steel sewing needles as detectors. He also made the strongest magnets.

Henry's experiment to detect radio using sewing needles – this is interesting but obscure – done in his 2nd house.

Henry and Bell – Henry inspired Bell – led to the Telephone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Scale of Feet.
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