PROF. HENRY'S APPARATUS

13. Commutator made by Henry.

GALVANISM.

ELECTRO MAGNETISM.

STURGEON ELECTROMAGNETS were the common kind before Henry made the improvements that first made him famous. The Sturgeon type magnet had an iron core covered with insulating wax and wound with one layer of wire. Thus it could not produce as large a magnetic field as Henry's which could be made with many layers of wire, since Henry hand-insulated his wires with thread. In Henry's day pre-insulated wire was not available.

34. Long straight coils to represent bar magnets.

GALVANOMETERS

DOUBLE POLE—DOUBLE THROW SWITCHES
invented by Henry.

GALVANOMETERS

GALVANOMETER MADE BY HENRY, constructed with two oppositely oriented permanent magnets which are suspended in the combined field of the coil and the earth. One being inside and one outside, they feel torques in the same direction, increasing the sensitivity of the galvanometer. As the current in the coil is varied the deflection of the permanent magnets varies and is thus a measure of the current.

COIL FOR STATIC ELECTRICITY EXPERIMENTS. To show that static and current electricity are manifestations of the same phenomenon, Henry did induction experiments using charged conductors as sources. Much better insulation is necessary for static electricity with its very high voltages, so the coils are on opposite sides of the glass form. His actual results were somewhat confusing presumably due to residual leakage through the glass.

CRUIKSHANK'S TROUGH is essentially a wooden box containing a large number of copper and zinc plates connected in series. When in use, the trough is filled with an electrolytic solution and produces the high voltages needed for Henry's "intensity" magnets. Those on display could produce about 50 volts, and have fairly high internal resistance.

MODEL OF THE EARTH'S MAGNETIC FIELD
built by Henry to demonstrate to his students how it could be produced by surface currents.

D. C. MOTOR probably due to Henry. Note his use of files as permanent magnets. Here the lower and upper troughs are filled with mercury and a potential is applied across them. The interaction of the resulting flow of current along the wires with the magnetic field of the permanent magnets causes the wire to rotate.

ELECTROMAGNET AND HAMMER used by Henry as a telegraphic receiver (Memorial of Joseph Henry, p. 149). A bell was mounted above the hammer so that when the magnet was activated by a current it would lift the hammer and ring the bell.

INDUCTION COIL probably due to Joseph Henry. The metallic contact was dragged across a file to form an interrupter (Sci. Writing, Vol. 1, p. 109). The making and breaking of the contact produces an induced voltage across the coil.

STUDENTS' NOTEBOOKS FROM JOSEPH HENRY'S LECTURES

POLARIMETER

INDIVIDUAL BATTERY PLATES used by Henry. They were suspended in a series across beakers containing electrolytic solution.

TELEGRAPHIC RECEIVER made by Henry.

EARLY ELECTROSTATIC MACHINE. The charge is built up by turning the crank which causes the glass to rub the fabric. The charge is then drawn off through the metal points and is stored on the large metal bulb.

THERMOPILE USED BY HENRY as a detector in his solar telescope for studying sunspots.

LETTER WRITTEN BY JOSEPH HENRY TO S. B. Dod in 1878 describing his research while at Princeton. In it he tells of his invention of the telegraph in 1830. He had a telegraph line between his home and his laboratory in Philosophical Hall which he used to tell his wife when he was coming home to lunch.

Henry described this battery in his letter to President Maclean dated October 9, 1833, just before leaving Albany to come to Princeton. ". . . It will be very powerful as it consists of 88 zinc plates surrounded with copper each 9 inches by 12 immersed in 8 troughs. . . ."

EARLY ELECTROMAGNETIC MOTOR built by Joseph Henry. This is of similar design to the first such motor which was invented by Henry in 1829.

ELECTRICAL MACHINE OWNED AND USED BY PROFESSOR JOHN MACLEAN, PROFESSOR OF CHEMISTRY AND NATURAL HISTORY IN PRINCETON COLLEGE 1795-1812. IT BECAME THE PROPERTY OF MR. HENRY E. HALE OF THE CLASS OF 1860 AND WAS PRESENTED TO THE MUSEUM BY HIS SON, DR. HENRY E. HALE OF THE CLASS OF 1892.

18. Galvanometer

PROF. HENRY'S APPARATUS

17. Armature used by Henry to obtain the electric spark by the induction of electric currents.

PROF. HENRY'S APPARATUS

19. Double coil used to show the induction of an electric current by means of a current

AM18815

Henry, Joseph, 1797-1878.

Lectures on Natural Philosophy, notes by Albert Schriver, Class of 1848. 1 vol., illus.

Purchased 1/13/66 of W. Penn Book Service, $25.00.

To be cataloged as separate.

Field Museum mss. [bd.]

PROF. HENRY'S APPARATUS

21. Wire spirals used by Henry to magnetize needles by the discharge of a Leyden jar, and to prove that the discharge of such a jar is oscillatory.

PROF. HENRY'S APPARATUS

18. Wire coils made by Henry. With them he repeated Faraday's experiment of the induction of an electric current by means of a magnet.

MUSEUM

In these three glass cases are pieces of apparatus with which Joseph Henry observed the effects of magnetism and of electromagnetic induction over 100 years ago. Henry was the co-discoverer with Michael Faraday of electromagnetic phenomena. The other cases contain apparatus of historical interest.

#1. Sturgeon's Type of Electromagnet.
Possibly Constructed By Him in 1826.
(Philosophical Magazine, Vol. 11, p. 195).

PROF. HENRY'S APPARATUS

16. Permanent magnet used by Henry to exhibit the induction of electric currents.

PROF. HENRY'S APPARATUS

1. Electromagnet of the Sturgeon pattern.

Invented by Sturgeon in 1826.

PROF. HENRY'S APPARATUS

12. Galvanometer made by Henry.

PROF. HENRY'S APPARATUS

2. Electro–Magnet of the Sturgeon pattern.

Invented by Sturgeon in 1826.

PROF. HENRY'S APPARATUS

14. Commutator made by Henry.

PROF. HENRY'S APPARATUS

10. Magnet and hammer used for ringing bell, in one of Henry's earliest electro-magnetic
graph lines.

CRUICKSHANK'S

TROUGH.

Made in London, and presented

by Chas. F. Mercer, 1809.

16. Galvanometer

15. Galvanometer .

13. Model of magneto-machine

#37.Electromagnet With Two-Layer Coil
The Wire Was Coated With Red Paint and
Then Wound on the Insulated Core.

Professor James Hare's "Calorimotor"
Battery. About 1820. Used by Joseph
Henry. (Henry's Scientific Writings,
Vol.lp.241). First Type to Use Inter-
leaved Plates in Order to Obtain Low
Resistance and High Current Capacity.

PROF. HENRY'S APPARATUS

8. Electromagnetic motor made by Henry.

PROF. HENRY'S APPARATUS

15. Armature wound with wire to exhibit the induction of electric currents, used with Magnet No. 16.

PROF. HENRY'S APPARATUS

22. Cylinder with tinfoil spirals used by Henry to prove induction of electric currents by the discharge of a Leyden jar.

#8. Henry's Electromagnetic Engine, 1837. (Memorial of Joseph Henry, p. 149.) This is Slightly Modified From Original Form of 1831. (Scientific Writings, Vol. 1, p. 55).

Recognized as Being First Type of Electric Motor.

Chruickshank's Trough. 1801.
(Nicholson's Journal,Vol.4,p.223).

#24. Permanent Magnet Made From Files, Such as Used in Henry's Electromagnetic Experiments.(Sc.Writings,Vol.1,p.109).

C67156

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Princeton University

Joseph Henry's lectures on natural philosophy, notes by Albert Schriver '48; Stephen Alexander's lectures on natural philosophy, notes by George Gray '59. 2 vols.

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#4. Henry's Later Low Resistance Electro-Magnet, Called "Quantity" Type on Account of Its High Current Capacity. (Scientific Writings, Vol. 1, p. 113).

#2. Sturgeon's Type of Electromagnet.
Probably Constructed By Joseph Henry.

#12. Intensity Magnet of Many Turns.
Using Two Conductors in Parallel.

Battery Plates Used by Henry in His Early Experiments. (Scientific Writings, Vol. 1, p. 4).

39

#39 - A. Spiral for Magnetising Needles to Determine Direction of Current Discharged Through the Coil. Turns Reversed at the Center of the Spiral.

#11. Example of Electromagnetic Rotation.
Probably Due to Henry as Files are Used
for Permanent Magnets as in Exhibit #24.

#9. Electromagnetic Hammer Used by Henry as a Telegraphic Receiver. (Memorial of Joseph Henry, p. 149).

#10. Telegraphic Receiver and Relay.
1833-36. (Report of Smithsonian Inst.
1857, pp.111-2).

Volta's Galvanic Pile. 1800.
(Phil. Mag. Vol.7,p.289).

#3. First Type of Henry's Electro-Magnet, Using One Layer of Insulated Wire. 1829. (Scientific Writings, Vol. 1, p. 39).

#32. A True Air-Core Transformer, Probably the First to Have Been Built. About 1840.(Scientific Writings, p. 118).

#5. Henry's "Intensity" Type of Electro-Magnet. (Scientific Writings, Vol. 1, p. 113).

Induction Coil Probably Due to Joseph Henry on Account of the Use of a File as Interrupter. (Sci. Writings, Vol. 1, p. 109).

Exhibit E. Ampere's Double Spiral for Study of Magnetic Action of Current in Earth's Field. 1821. (Annales de Chimie et Physique Vol.18,Fig.8).

#45. Thermo-Couple Used to Study Sun Spots.
(Memorial of Joseph Henry, p. 155)

#39 Spiral for Magnetising Needles to Determine Direction of Current Discharged through the Coil.