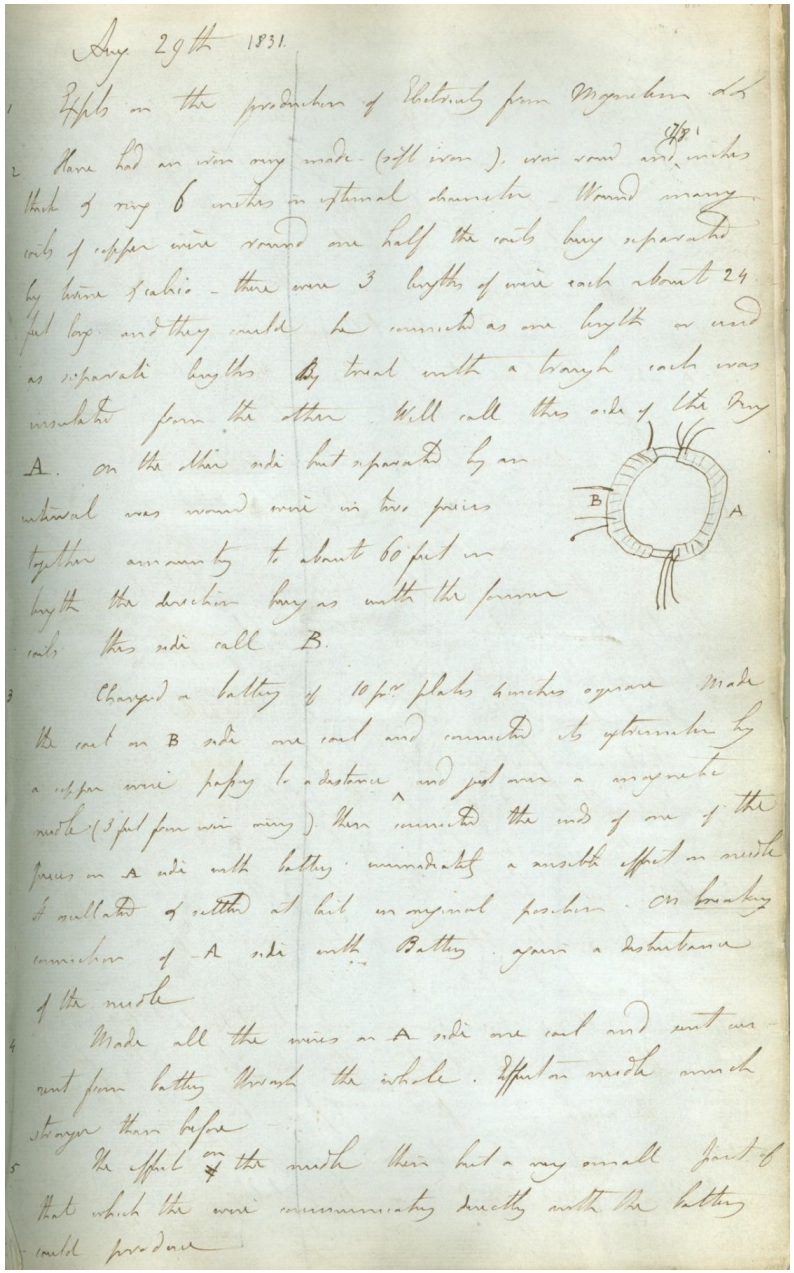
Faraday's notebooks: Electromagnetic Induction

The Royal Institution of Great Britain

Faraday's notebooks give an excellent record of his scientific research. He kept meticulous notes of each experiment and its results, writing up the rough notes he made while in the laboratory and sometimes illustrating the pages with small diagrams of his apparatus.



Aug 29th 1831.

Expts on the production of Electricity from Magnetism &c

Have had an iron ring made (soft iron), iron round and 7/8 inches thick & ring 6 inches in external diameter. Wound many coils of copper wire round one half the coils being separated by twine & calico – there were 3 lengths of wire each about 24 feet long and they could be connected as one length or used as separate lengths. By trial with a trough each was insulated from the other. Will call this side of the ring A. On the other side but separated by an interval was wound wire in two pieces together amounting to about 60 feet in length, the direction being as with the former coils; this side call B.

Charged a battery of 10 pr. plates 4 inches square. Made the coil on B side one coil and connected its extremities by a copper wire passing to a distance and just over a magnetic needle (3 feet from iron ring). Then connected the ends of one of the pieces on A side with battery immediately a sensible effect on needle. It oscillated & settled at last in original position. On breaking connection of A side with Battery again a disturbance of the needle.

Made all the wires on A side one coil and sent current from battery through the whole. Effect on needle much stronger than before.

The effect on the needle then but a very small part of that which the wire communicating directly with the battery could produce.

This notebook page (RI MS F_2_C) from 29th August 1831 records Faraday's construction of the apparatus with which he discovered electromagnetic induction.

While Faraday describes the making of the ring in its entirety here, the actual work would probably have taken much longer. A modern experiment to build a replica induction ring using original materials took 10 working days.

The original induction ring can be seen on display in the Faraday Museum.

Transcription

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3. Charged a battery of 10 pr. plates 4 inches square. Made the coil on B side one coil and connected its extremities by a copper wire passing to a distance and just over a magnetic needle (3 feet from iron ring). Then connected the ends of one of the pieces on A side with battery; immediately a sensible effect on needle. It oscillated and settled at last in original position. On breaking connection of A side with Battery again a disturbance of the needle.
4. Made all the wires on A side one coil and sent current from battery through the whole. Effect on needle much stronger than before.
5. The effect on the needle then but a very small part of that which the wire communicating directly with the battery could produce.