

**THE INDUCTORIUM, OR,  
INDUCTION COIL; BEING A  
POPULAR EXPLANATION OF THE  
ELECTRICAL PRINCIPLES, PP. 1-111**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649477043

The Inductorium, or, Induction Coil; Being a Popular Explanation of the Electrical Principles,  
pp. 1-111 by Henry M. Noad

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Cover @ 2017

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**HENRY M. NOAD**

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THE  
INDUCTORIUM,  
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A Popular Explanation  
OF THE  
ELECTRICAL PRINCIPLES

ON WHICH IT IS CONSTRUCTED.

WITH THE DESCRIPTION OF A SERIES OF BEAUTIFUL AND  
INSTRUCTIVE EXPERIMENTS,

ILLUSTRATIVE OF

THE PHENOMENA OF THE INDUCED CURRENT.

*Minchin*  
BY HENRY M. NOAD, PH. D., F.R.S., F.C.S., &c.,

LECTURER ON CHEMISTRY AT ST. GEORGE'S HOSPITAL.

*Author of "The Student's Text Book of Electricity," &c., &c.*

THIRD EDITION.

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PUBLISHED FOR THE PROPRIETOR BY  
JOHN CHURCHILL & SONS, NEW BURLINGTON STREET.

M.DCCC.LXVIII.

## PREFACE TO THIRD EDITION.

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THE second Edition of this work having been sold in a very short time, I have delayed the issue of the present Edition in order that I might perfect a new form of apparatus, the *Dynamo-Magneto Machine*; a description of which will be found at page 34.

I have also inserted a description of a new Ozone Generator which will be found at page 114.

W. LADD.

11 AND 12, BEAK STREET,  
REGENT STREET, W.



## PREFACE TO SECOND EDITION.

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THE object of this little book is to place in the hands of persons possessing or desiring to possess an Induction Coil (or *Inductorium*, as it has been called by the German Physicists) a clear and succinct account of the Electrical principles on which the instrument is constructed. Also to describe the various apparatus used, and the principal experiments to be made therewith.

It has been written at the request of, and for Mr. Ladd, the well known successful manufacturer of these machines. That some such work was wanted has been fully proved by the rapid sale of the first impression. In the present Edition, without materially increasing the size of the book, I have endeavoured to trace the progress of the development of this wonderful instrument, which promises to become a powerful means of research in many physical inquiries.

# THE INDUCTORIUM, OR INDUCTION COIL.

## 1.—DISCOVERY OF ELECTRO-MAGNETISM.

IN the year 1820, Professor Oersted, of Copenhagen, announced his famous discovery of the reciprocal force exerted between magnetic bars and wires uniting the opposite terminals of a voltaic battery, and thus laid the foundation of a new science—that of Electro-Magnetism. The discovery of the Danish philosopher was thus simply stated:—When a properly-balanced magnetic needle is placed in its natural position in the magnetic meridian, immediately under, and parallel to, a wire along which a current of voltaic electricity is passing, that end of the needle which is situated next to the negative side of the battery immediately moves to the *west*; if the needle is placed parallel to and over the wire, the same pole moves to the *east*. When the uniting wire is situated in the same horizontal plane as that in which the needle moves, no declination takes place, but the needle is inclined, so that the pole next to the negative end of the wire is depressed when the wire is situated on the west side, and elevated when situated on the east side. To assist the memory in retaining the directions of these deviations, Ampere devised the following formula:—“ Let any one identify himself with the current, or let him suppose himself lying in the direction of the positive current, his head representing the copper and his feet the zinc plate, and looking at the

needle; its *north* pole will always move towards his right hand."

### 3.—ELECTRO-MAGNETIC ROTATION.

Reasoning on the fact that this action of a conducting wire on a magnet is not a directly attractive or a repulsive one, Faraday was led to the conclusion that if the action of the voltaic current could be confined to one pole of the magnet, that pole ought, under proper conditions, to rotate round the wire; and conversely, if the magnet were fixed and the conducting wire moveable, the wire ought to rotate round the magnetic pole; both of these phenomena he realised, and described the apparatus for exhibiting them in the "Quarterly Journal of Science," Vol. XII., p. 283 (January, 1822). Ampere subsequently caused a magnet to rotate round its own axis; and Barlow devised an ingenious apparatus for exhibiting the rotation of a conducting body round its axis.

### 3.—THE GALVANOMETER.

Shortly after the discovery of Oersted, Schweigger, a German physicist, applied it to the construction of an apparatus for indicating the direction and measuring the intensity of voltaic currents. This instrument is called the multiplier or rheometer, or more popularly the galvanometer. In its original form it consisted of a rectangular coil of silk or cotton-covered copper wire, in the centre of which was suspended, on a pivot, a magnetic needle, and a card graduated into 360 degs.; the instrument being so placed that the needle lies parallel to the coil; on causing a current of electricity to circulate through the latter, the needle becomes violently affected, even by very feeble currents, it being