GUIDE TO THE PRACTICAL ELEMENTS OF ELECTRICAL TESTING

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BY

J. WARREN.

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PREFACE.

In the following descriptive series the writer does not purpose setting down original ideas on the above subject, but aims rather at a compilation of the most useful electrical tests and the manner in which they may be practically conducted, together with a summary description of the principal apparatus involved, on the lines of such a popular work as Kempe's "Handbook of Electrical Testing;" but, contrary to the general rule in the above and similar text-books, eschewing all mention of the theory underlying the various processes therein described, which, although a necessary adjunct to the training of the electrical engineer proper, is, nevertheless, somewhat of a hindrance when prompt reference to the manner of conducting a certain test is necessary.

For theoretical considerations on the following paragraphs the reader is therefore referred to Kempe's "Handbook" and kindred works. The diagrams and blocks illustrating the text have, in all cases, been rendered in as clear and comprehensive a form as possible, the usual symbols being employed to represent batteries, keys, etc., a rudimentary knowledge of electrical principles being necessarily assumed on the part of the reader.

The author begs to tender his sincere thanks to Messrs. Nalder Bros., Elliott Bros., J. Pitkin, R. Paul, Evershed and Vignoles, Cowans, the India Rubber, Gutta Percha, and Telegraph Works Company, and James White, for the loan of the major portion of the blocks illustrating the pages to follow. His thanks are also due to the publishers

who have been indefatigable in their efforts to assist in the compilation.

In concluding the series, the writer ventures to hope that its contents will prove of practical utility to the practical man, for whom they are mainly written, and that their present compilation in book form will serve to fill a vacant space in the library of such members of the electrical profession as require a brief but practical treatise on the various methods and applications of electrical testing, without the concomitant theoretical and mathematical proofs which usually accompany kindred works on the subject.

Great care has been exercised in the compilation of this series to render all formulæ, etc., correctly, and the author will esteem it a favour if those of his readers who may note errors in the subsequent context will, by drawing his attention thereto as promptly as possible, assist in the eradication of such errors from future issues.

J. Warren.

CONTENTS.

THE PRACTICAL ELEMENTS OF ELECTRICAL TESTING.

Instruments and Apparatus.

Galvanometers.—The most essential unit in an electrical testing outfit of almost any description is undoubtedly the galvanometer, an instrument which is constructed in many varied forms, and whose indications, modified by the local conditions under which it is working, are taken as visible records of the results of the experiment or test in which it performs its office.

The principle underlying the action of all galvanometers is as follows:—A magnetic needle, N S, Fig. 1, is suitably supported at the centre of a coil, *a b*, which may consist

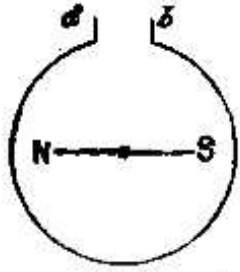

Fig. 1.

of one or many turns of wire, in such a manner that, when in its normal condition, *i.e.*, when in the earth's magnetic meridian, it assumes the condition shown in the figure, it lies in a plane with the coil. If, however, an electric current be passed round the coil *a b* in either direction, the needle, N S, following a well-known law, tends to set itself at right angles to the plane of the coil, and the measure of this tendency, as indicated by suitable means,

is an indication of the current passing through the coil *a b*, either directly or indirectly, according to the secondary principles of the particular form of galvanometer under consideration. In some types the action is reversed, the needle (in the form of a permanent magnet or otherwise) being fixed and the coil movable, but, in either case, the fundamental principle remains the same.

One of the simplest types of galvanometer used in practical testing, and that only for very rough indications of the existence of a current, as in simple continuity tests, for example, is the ordinary linesman's "detector," which is made up very simply with a view to portability and rough handling.

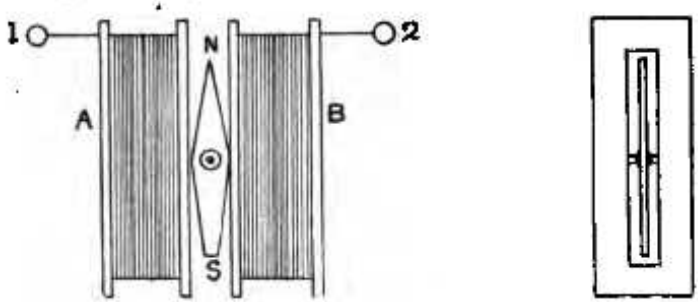

FIG. 2.

Linesman's Detector Galvanometer, by the India Rubber, Gutta-Percha, and Telegraph Works Co., Ltd., Silvertown.