



THE
APPLICATION OF ELECTRICITY
TO
RAILWAY WORKING.

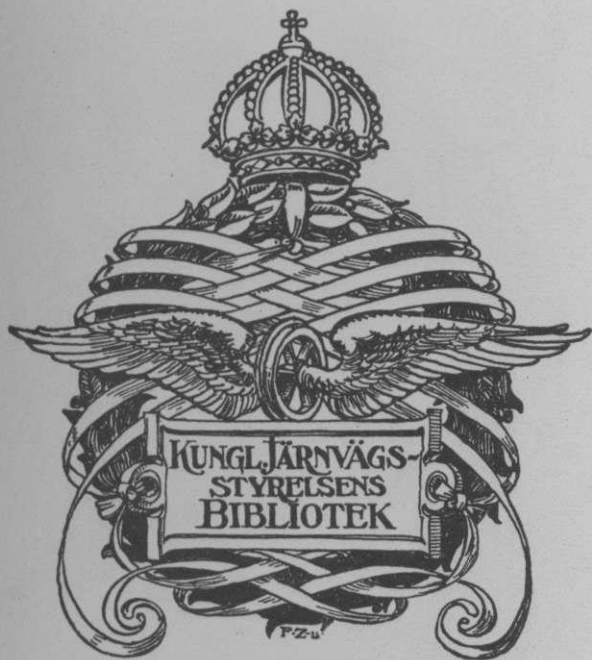


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INTRODUCTION.

THE application of electricity to railway working has now become of so extended and so diversified a character as to form almost a science of its own, and, as such, to lay claim to a work devoted to its purpose. Block-signalling, from having once been regarded as an obstruction to, is now the mainstay of, railway traffic; and it is not too much to say that no railway of any pretensions can conduct its traffic, with due regard to safety and despatch, without its aid.

Into railway working electricity is destined to enter far more largely than has perhaps ever been anticipated; and numerous are the ways and means by which it may be employed with profit alike to the service and the science. The character and form of instruments employed, the arrangement of circuits, the science of block-signalling, its application to junction working, station and siding protection, repetition of signals,—these are all points of interest alike to the railway

manager, to the telegraph engineer, and to the railway official generally; whilst, it is believed, they will present points of considerable interest to the general reader, and to others equally interested in railway working.

It is the object of this work to set before each and all alike—not more to the electrical engineer than to those less versed in the science, but equally interested in its application—not merely the uses to which electricity may be applied in the advancement and for the protection of railway traffic, but also the rules and principles which should regulate its practice.

Numerous as are the uses of electricity at the present day, each succeeding year, in furnishing fresh demands, produces fresh applications of it, and there is scarcely a channel of railway management or railway working in which, in its future, it is not destined to become an active agent. A scientific knowledge of its principles will become a necessity for all railway Telegraph-men; whilst even a superficial idea of its application cannot fail to be of the greatest use to others, whose duties lie more directly in the regulation of the traffic.

It must not, however, be inferred from what has been said, that it is intended this work shall be a treatise on electricity. Its province is *to render more familiar the application of electricity to the requirements of railway traffic*. With the sources of electricity, the means by which it is conveyed, or the principles which govern

its transmission from place to place, it has nothing to do. For it these are established facts, and beyond referring to them where absolutely necessary, in the most superficial manner, they will find no place in this book.

In thus marking out its path it is hoped the electrical reader will be placed at no disadvantage, whilst to the railway man, it will probably be more convenient for him to accept the fact, that the source by which the apparatus is worked exists, and that, subject to certain well-known and defined restrictions, it can be conveyed from place to place at the will of the officer whose duty it is to regulate its course.

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THE APPLICATION OF ELECTRICITY TO RAILWAY WORKING.

INTRODUCTORY TERMS.

1. **Electricity** is an agent pervading all bodies, the presence of which is rendered evident by its effects. It may be produced by friction, by motion, by heat, and it may be produced by chemical action.

2. A **voltaic Battery** is an arrangement of metals and liquids by which a *current* of electricity is produced.

3. A **Current** is the flow of electricity as it passes from one point to another.

4. For convenience in implying the **Direction of the current**, it is usual to speak of that proceeding from the copper pole of the battery as the *positive*, and that found at the zinc pole as the *negative* current.

5. All bodies are conductors of electricity. Metals conduct the best; dry air the least. Those which conduct best are termed **Conductors**, and those which conduct the least, or in other words offer very great

resistance to the passage of the current, are termed **Insulators**.

6. A **Circuit** is that means—generally, as applied to telegraphy, as the various kinds of metal wire, and the

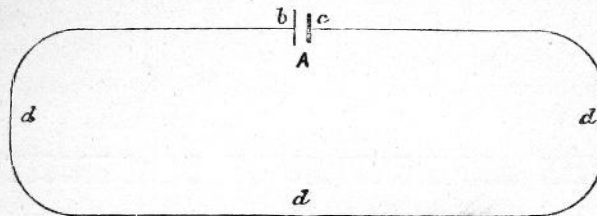


FIG. 1.

metal connections of instruments—by which the two poles, the positive and the negative, of the battery are joined together.

A (Fig. 1) is a battery, *b* is its positive or copper, *c* its negative pole, and *d* a wire,—the circuit—the means by which its poles are joined together.

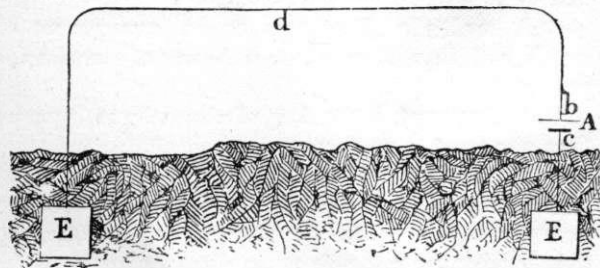


FIG. 2.

7. But the **Earth is also a conductor**, and where distance is an object the earth is made use of for

the return half of the circuit. Thus: (Fig. 2) let *A* be a battery, of which *b* is its positive or copper pole, and *c* its negative or zinc pole. Let *c* be terminated in the earth by means of a wire *d* and a metal plate *E*, and let *b* be similarly connected with a wire *d*, which let, in its turn, be also terminated in the earth by another plate, *E*. The current will traverse the conductor, *d*, as readily as though the connection between the plates *E, E*, were made by means of a metal.