

CURRENTS OF ELECTRICITY.

WHEN a difference of potential exists in two places connected by a conductor, or a series of conducting bodies, the electricity will seek to equalize the field and a current will flow between the two points. The difference of potential may be due to several causes, but whatever the cause the current will flow. The two places may be a few inches apart, as in a wire from a primary battery, or miles apart, as in a transmission system, or in the currents of the earth or air. They may be connected by a small copper wire, the pipes of the waterworks or gas company, the rails of a street railway, or by a combination of a large number of conducting bodies. This conductor may be of large capacity, of low resistance, or may be a poor conducting medium.

To designate the character of a current, and also a current with reference to its origin, various terms are used. Battery current, dynamo current, earth current, etc., are terms used to designate the current from a battery, a dynamo, currents flowing through the earth on account of a difference of potential at different points, etc. In the production of electricity for lighting and power, two kinds of current are generated, distinguished by the direction in which they flow. The continuous or direct current, which flows continuously in one direction, and the alternating or reversed current, which alternates the direction of its flow, are the currents used, and these two kinds include a number of classes. Both currents are further designated by the voltage; thus we have a 500 volt direct current, 110 volt alternating current, or any other volt direct or alternating current.

The alternating current may alternate the direction in which it flows ten thousand times a second, or twenty-five times a second; this is called the frequency of its alternations. The alternating currents are also distinguished by the number of phases in a given period. When alternating currents are generated by transmission considerable distances, so that a current of higher voltage is used on the transmission lines than can be used for lighting and other purposes, the transformer is used for securing a current of higher or lower voltage. The current flowing in the primary wire of the transformer is called the primary current, and that in the secondary wire the secondary current.

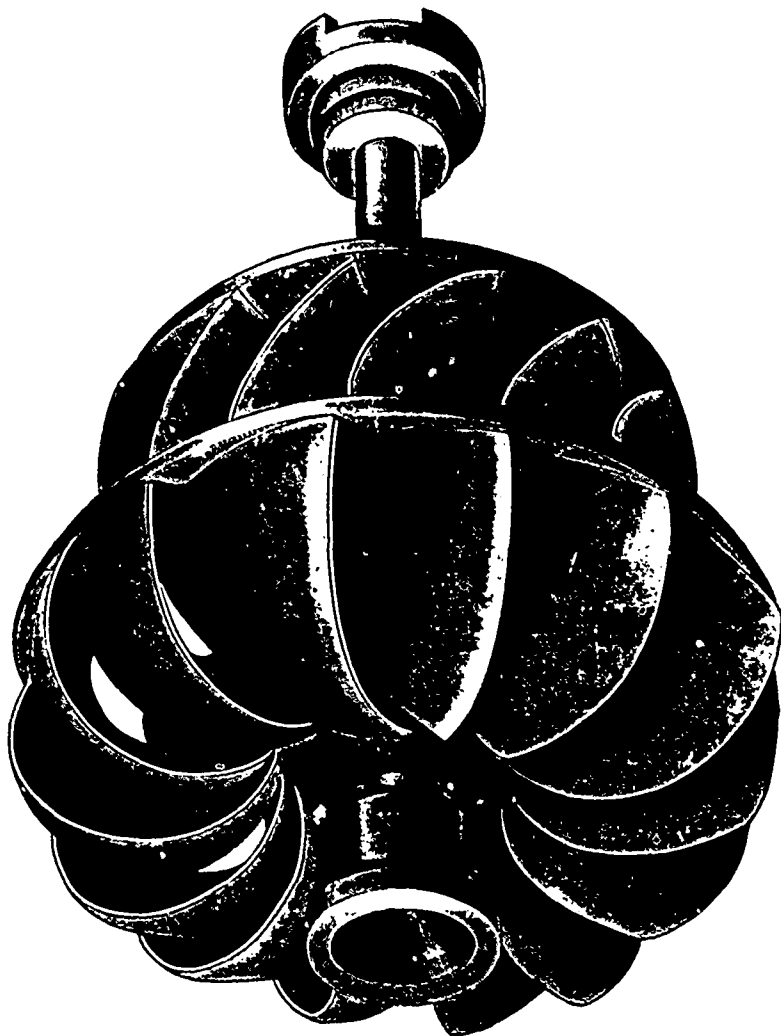
A constant current is an unvarying current. Although the voltage may vary, the amount of current does not change. In series arc lighting systems the current is universally constant. A constant potential current is a current whose voltage is constant, as found in the multiple incandescent lighting system.

One of the great discoveries made by Faraday was that of induction or induced currents. While experimenting with electricity and magnetism he found that if he took a wire, joined the ends and moved it rapidly in front of a magnet, a current would be induced in the wire. This action of the magnet is called electro-magnetic induction. The current is called the in-

duction or induced current and it is upon the principle discovered by Faraday that all dynamo electric machinery is based. If we take a coil of wire and a bar magnet and pass the magnet rapidly through the coil, a current will be induced in the coil, or if we move the magnet into the coil and then withdraw it we will have a current flowing first in one direction, and as we withdraw it, in the other. The more rapid the motion the stronger the current.

This discovery was soon followed by another of equal importance—that a current of electricity whose strength is changing in one conductor could induce a current in another conductor forming a closed circuit, and that a current brought near a conductor and then removed would induce a current in the second conductor. Suppose we have two coils of wire, the terminals of one connected to the terminals of a primary battery and the terminals of the second connected to a galvanometer. If these coils are placed near together with a battery current flowing

through the first there will be no current detected in the second. If, however, we place a switch in the circuit of the first and open and close it rapidly, the galvanometer will show a current in the second coil. If we close the switch and make the coil approach and recede from the second coil, the second coil will have an induced current. Upon this principle are based the alternating current transformer and similar devices.—Electrical Industries.



IMPROVED WATER-WHEEL, REMOVED FROM CASE.

TESTING MOISTURE IN STEAM.

A METHOD of testing the amount of moisture in steam has been discussed by the Institution of Engineers and Shipbuilders, Scotland. The principle in this case, more particularly applicable to marine engines, consists in comparing the saltiness of the steam with that of the water in the boiler. The test, as explained, is carried out by means of nitrate of silver, and the reac-

tion is so delicate that, with only 1 per cent. of salt in the boiler, 1 per cent. of priming water can be accurately determined to the second decimal. To one part of salt boiler water there is added 100 parts of pure condensed water, and into this is poured a small quantity of concentrated solution of yellow chromate of potash; then a nitrate of silver solution containing about 1.10 per cent. of this salt is slowly added. With each drop the salt water turns locally orange red, but this color disappears at first; later on, when all the salt has been acted on, the whole fluid changes color from pale yellow to orange. The quantity of nitrate solution is noted, and then the experiment is repeated on the condensed steam from the engine, undiluted with distilled water. The ratio of the quantities of nitrate of silver solution used in the two tests expresses the amount in per cent.

Mr. Theophile Viau, the chief promoter of the electric railway scheme between Hull and Aylmer, states that the construction of the road will certainly be commenced this summer, probably within the next month.