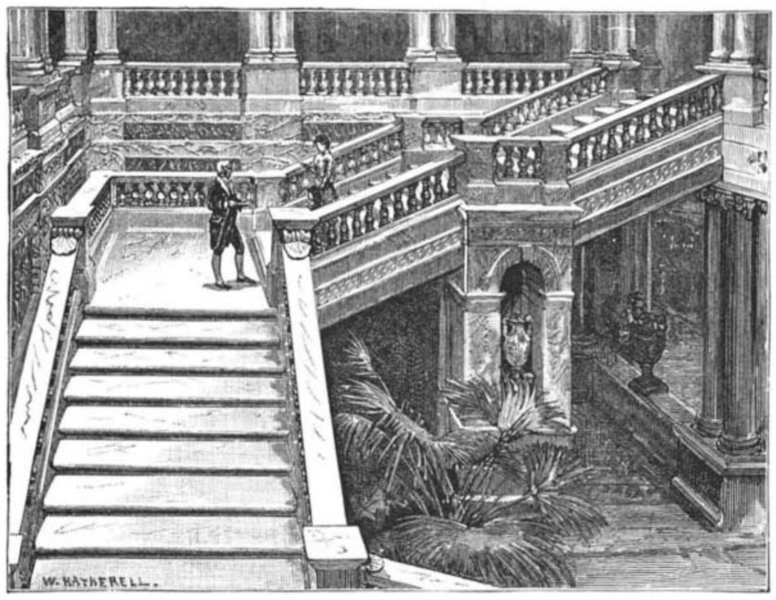
THE STAIRCASE OF A GREAT HOUSE.

Dorchester House, at Park Lane and Dean Street, London, England, is one of the most remarkable of the many large houses of that great city. It is a modern structure, replacing the old house pulled down in 1839, but the present building possesses the special interest of being the work of a series of artists who each designed his share of the whole. The central feature is a staircase of large dimensions, surrounded on the first floor by a wide corridor communicating with it by arches, the principal rooms being grouped around it on three sides. A visitor, on passing through the entrance hall, enters the lower vestibule, which is part of a wide corridor running transversely across the house, and paved with marbles inlaid in a pattern derived from one of Raphael's cartoons. From this vestibule the staircase is seen between coupled Ionic columns of pink granite, which support the gallery, the view being nearly that represented in our illustration. The marbles lining the walls by the side of the staircase are especially beautiful, being in large panels of a rich dark green, with an inlaid edging of red, the panels being separated from each other by projecting masses of a warm white marble, streaked with dark gray, which form piers carrying the plinths of the coupled columns of the first story. At the top of the stairs is a wide corridor or gallery, the galleries opening on to and surrounding the staircase being characterized by a picturesque grouping of coupled Corinthian columns supporting arches through which views of the different saloons are obtained. The exterior of the building is graceful and refined, though not presenting anything of striking originality.



GRAND STAIRCASE, DORCHESTER HOUSE LONDON.

A NEW ELECTRIC CURRENT METER.*

BY PROFESSOR G. FORBES.

At the present moment the mind of electrical engineers is much directed to the successful means of distributing electricity to a large district from central stations by means of that class of induction apparatus which has received the several names of "secondary generator," "transformer," and "converter." This is the only thoroughly worked out system available to the engineer for an extensive supply of electricity. Currents of an alternating character (*i. e.*, alternately positive and negative in direction, the alternations being at the rate of some hundreds per second of time), and of high tension or pressure, are by this system carried from the engine house, by comparatively thin and cheap wire conductors, to the points of supply. The only difficulty which has been met is in the designing of a suitable meter. There is absolutely no meter available that pretends to be reliable. The very best indicates a totally different result when the same current is passed through it, if the number of alternations of the current (*i. e.*, the speed of the dynamo) be altered. It was to overcome this source of trouble and to remove the last difficulty from an otherwise perfect system of electric distribution that the author undertook the labor of designing and perfecting the meter here described. Some idea of the work expended in bringing it to its present state of perfection will be gained when it is stated that the trial observations during the development of the instrument number nearly 10,000. Seeing that the only electrical actions available were those of chemical action, electro-magnetic action, and heat, that the chemical method is incapable of being used with alternate currents, and that all electro-magnetic meters must vary in their indications with the rapidity of the alternations, the author was led to base his instrument on the heat developed by an electric current. Such an instrument must be equally applicable to continuous currents and to alternate currents, whatever their rate of alternations. Thus a meter is obtained which is practically perfect and more simple in construction than any of those designed for a more limited range of uses.

The instrument is extremely simple, both in principle and in construction. It consists essentially of a flat spiral of iron wire with two terminals. Sometimes these two terminals are united to form one, the other being attached to the middle of the wire. Thus the instrument exhibited may be used as an accurate measure for currents from half an ampere or from one ampere upward. Above the conductor a set of vanes is pivoted. This consists of a circular disk of mica with a hole in the center, in which is fixed a pinion with a concentric ruby cup. Round the circumference of the mica disk eight small cylinders of pith are fixed at equal distances, and eight vanes inclined at 45° to the mica disk are attached to the pith cylinders, these vanes being made of the thinnest mica. This set of vanes is supported with the ruby cup resting on a steel point fixed to the base of the instrument. The pinion engages with the first wheel of a train of clockwork actuating the indices, which show upon two dials the number of revolutions made by the vanes. The action of the instrument is very simple. The electric current passing through the iron conductor creates heat, which sets up a convection current in the air, and this causes the vanes to rotate about the vertical axis and drive the clockwork. The number of revolutions indicated on the dials is, through a considerable range of currents, an exact indication of the number of coulombs or ampere hours which have passed through the conductor. The friction of the ruby cup on the pivot determines the smallest current which can be accurately measured, and the friction of the clockwork is imperceptible. The following table shows the performance of one of these vanes. The conductor used had a resistance of 0·1 ohm. The first line shows the rate at which the current was flowing through the conductor. The second line gives the ratio of current to speed of rotation, a ratio which ought to be constant.

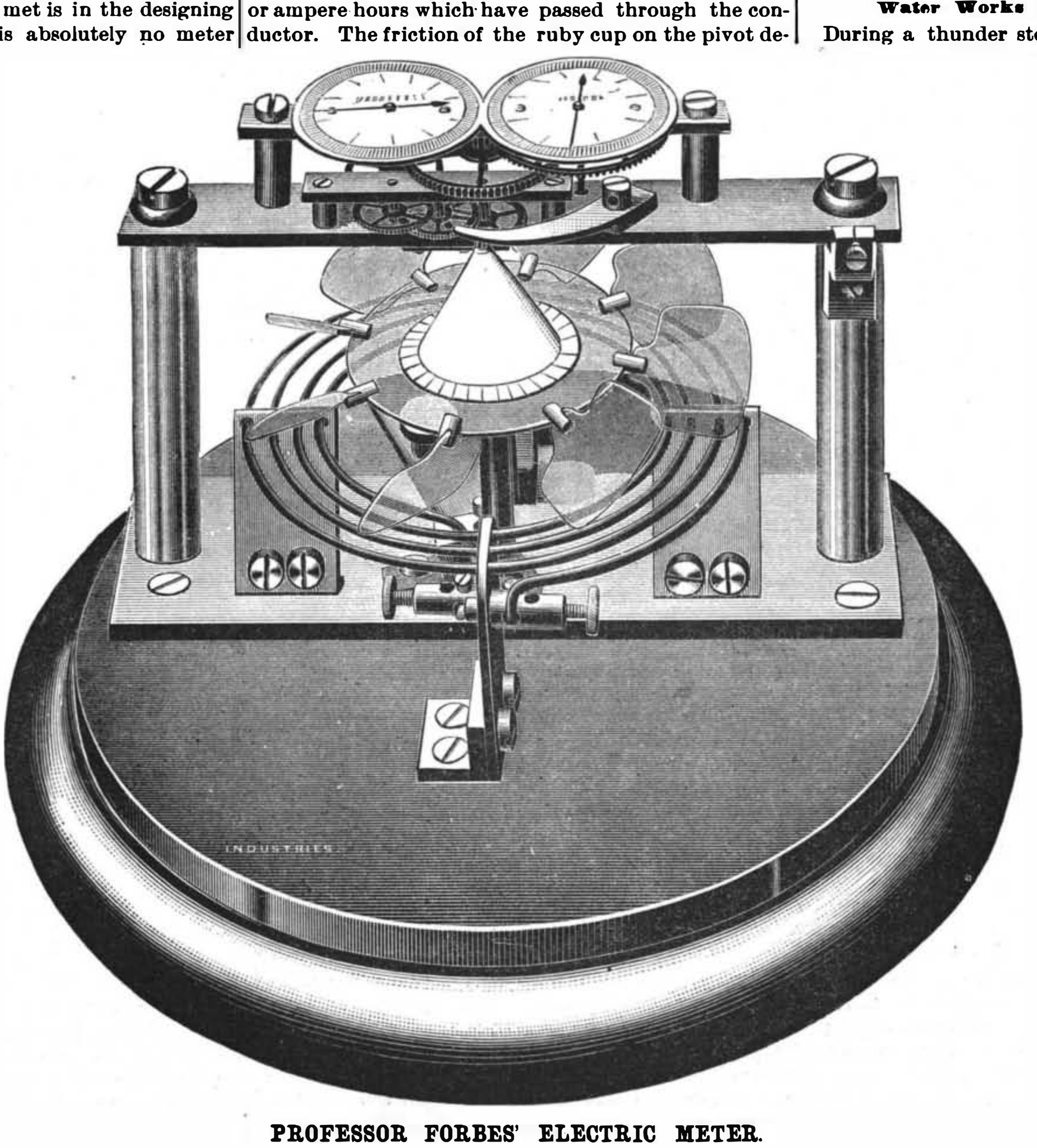
Current in amperes	·25	·35	·45	·6	·75	1	2	3	6	12
Ratio of current to speed	76	61·25	50·4	51	50·75	51	51	50·7	51	51·8

When using higher currents, the ratio is equally constant.

Sir William Thomson complimented the author on having practically solved a problem on which he himself had been working for a long time, but not with the same satisfactory results. He was nevertheless extremely pleased at the success achieved by Professor Forbes, because with the invention of a good and reliable meter one of the obstacles to central station lighting had been overcome. The difficulties of making a meter to correctly record alternating currents were very great, one of them being due to the action of the current upon itself. Even in continuous current instruments a slight variation in the strength of the current will sometimes cause an error due to self-induction. Thus, in one of his current balances, the slight variations in the speed of the engines introduced an element of error. Professor Forbes had, however, succeeded in devising a type of instrument in which the self-induction can be made as small as desired, and thus a degree of accuracy to within two or three per cent might be obtained, which is quite sufficient for practical purposes.

After several questions from other speakers, Professor Forbes replied that he found absolutely no difference in the working of the meter, whether it was traversed by an alternating or a continuous current. In fact, an alternating current seemed to introduce less apparent resistance than a misdirected current rapidly made and broken. The size of the glass cover he found to be of importance, the larger cover allowing the mill wheel to start with a smaller initial current. An instrument intended for a maximum supply of twenty lamps would start with half the current strength required for one lamp, and would register correctly from one lamp to twenty. The wheel work does not introduce any appreciable friction.

* Read before the British Association, September, 1887. From *Industries*.



PROFESSOR FORBES' ELECTRIC METER.

Water Works Struck by Lightning.

During a thunder storm on August 24, the water tower of the water works at Mount Vernon, N. Y., was struck by lightning and damaged, a hole being made in the side which allowed a considerable quantity of water to escape with great force. The supply was checked until the necessary repairs can be made.—*Sanitary Engineer.*

[At the time of the above alleged stroke, we sent an assistant to examine the structure, thinking it rather strange that so excellent a conductor as an iron tower, about 100 ft. high, well connected electrically with the earth, should be damaged by lightning. As a result of our inquiry, we learned that about three hours after the thunder storm above mentioned a small leak was discovered in the side of the tower about 65 ft. from the ground. The leak consisted of an empty rivet hole, through which the water was spurting. Our conclusion was the hole had been filled by a defective rivet, the inner head of which having fallen off, the water pressure then pushed out the bolt. There were no visible signs of any lightning stroke.—EDS. S. A.]

THE easiest way to make holes through an oyster or clam shell is to drill the holes with a hard, sharp steel drill, the same as used for drilling iron. Use the drill dry.