EXPERIMENT ON THERMO-ELECTRIC CURRENTS.

The classical experiment by means of which are rendered evident the currents that traverse a circuit formed of two metals when the solderings are at various temperatures becomes more striking when, instead of mounting a magnetized needle upon a pivot placed in a fixed circuit, the circuit is, on the contrary, rendered movable, the magnetic field being in an invariable position. The idea of this reversal of the experiment is far from being new, since it is upon this principle that is based the radiometer devised by Dr. D'Arsonval, and greatly improved in its construction by Mr. C. V. Boys. This radiometer is a very delicate instrument of measurement which requires exceeding care and great manual skill for its construction; but the apparatus that weare going to describe operates perfectly as a demonstration instrument, without the necessity of much attention being bestowed upon it.

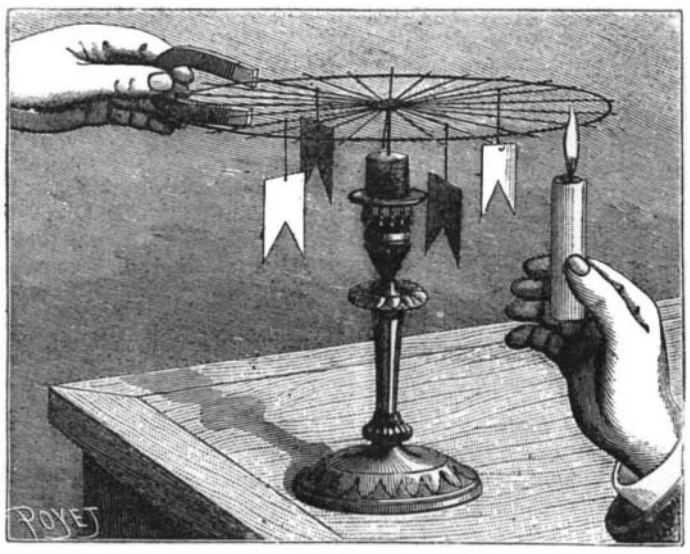
It consists of a simple wheel placed in equilibrium upon a needle and which the thermo-electric currents set in motion under the action of a magnetic field. This wheel is constructed with the greatest ease by bending into a circle a fine wire of an alloy of nickel and copper, found in the market under the name of white bronze or superior German silver. This alloy, when soldered to copper, has the property of giving considerable thermo-electric electromotive force, much less, doubtless, than that of bismuth or antimony, but it has the advantage of possessing a high point of fusion in addition to that of being able to be drawn out into fine wire—a condition essential for the operating well of the apparatus, the solderings of which become heated or cooled instantaneously.

The rim of the wheel having been closed by solder, there is fixed upon it a certain number of diameters of very fine copper wire insulated from each other, and which are soldered after their extremity has been wound around the German silver wire. One of these diameters receives in its center a small disk of metal in which a slight depression has been formed. The wheel having been placed upon a needle, through the intermedium of this depression, is regulated by means of little banners suspended from some of the radii, and which, while lowering the center of gravity of the wheel, permit of displacing it at will and rendering it horizontal.

Let us suppose, now, that we heat one of the solderings by means of a candle. A difference of potential will establish itself between the opposite solderings, and an electric current, traversing the diameter that ends at the soldering, will return, in bifurcating itself, through the rim. If we place a horseshoe magnet in such a manner that it shall embrace a portion of the diameter, in the half opposite the hot soldering, the magnetic field will act upon the radius at right angles with its direction. Since, however, the action upon the rim is exerted in the direction of the radius, it would be null even were the bifurcation unequal, and the wheel will begin to revolve under the action of the couple produced.

The revolution, which is slow when somewhat coarse wire is used, becomes very rapid, on the contrary, with fine wire, which, consequently, should be selected by preference in order to render the experiment as striking as possible. Wire of from one-tenth to two-tenths of a millimeter is perfectly adapted for a wheel of from eight to ten centimeters diameter.

This transformation of calorific into electric and mechanical energy is, it seems to us, the simplest that can be imagined.—La Nature.



EXPERIMENT ON THERMO-ELECTRIC CURRENTS.

The New Lighthouse at Cape Charles.

A new lighthouse has just been completed at Cape Charles on the northern entrance to the mouth of Chesapeake Bay, and on August 15 will display its great light for the first time. The new structure will replace the present light, which stands nearer the sea, and for years has flashed every few seconds at Cape Henry light on the south side of the bay, twelve miles distant. The new lighthouse is constructed on the skeleton plan, and looks very much like those seen off the Florida coast. The great revolving lens stands 180 feet high, and throws flashes of light at intervals, visible by a man standing on the deck of a vessel twenty miles at sea. The old lighthouse will continue to stand, and will serve as a day mark for vessels bound along the coast. The new light illumines the entire horizon and will show a group of four and a group of five white flashes every thirty seconds; thus, four flashes and a dark interval of about three seconds; five flashes and a dark interval of sixteen seconds.

THE CORNELL CREW IN ENGLAND.

That one of the youngest of our great educational institutions should this year has sent to England a crew to row for the Grand Challenge Cup, in a race on the historic Henley course, against the best crews of that country, attracted wide attention, as is invariably the case with such friendly international contests. Our illustration, from the Daily Graphic, represents the crew in their boat for practice on a day preceding the race. Their average age was 21; average height, 5 feet 11 inches; average weight, 160 pounds. The race was rowed on July 10, being one of a series of trial races, in which the crew of Trinity Hall, Cambridge University, were the opponents of the Cornell crew. The course was a mile and a fifth long, and the Cornell crew led in the race for nearly a mile, when their opponents passed them and won the race by the large lead of seven lengths. The race attracted almost unprecedented crowds of sightseers, and there were not wanting, in England or on this side of the Atlantic, energetic criticisms attributing the failure of the Cornell boys mainly to their style of stroke. It was what is known as the short, quick stroke, in which the oarsman exerts his strength on the oar when the latter is nearest to a right angle with the boat and favoring a quick recovery, but avoiding the beginning and ending of a long stroke, where the oar blades approach the sides of the boat.

Corrosion of Aluminum.

In order to ascertain the effects of the weather upon ordinary sheet aluminum, Professor A. Liversidge has had two shallow dishes made of one twenty-fifth inch gage metal, of the best commercial quality, and exposed on the roof of the laboratory, University of Sydney, from November 23, 1893, to December 7, 1894, or fifty-four weeks. The metal was made into basins so as to catch rainwater, and to give the salts, etc., which it might hold in solution, an opportunity to act upon the metal. The metal soon lost its brilliancy and became somewhat rough and speckled with large light gray patches; it also became rough to the feel, the gray parts could be seen to distinctly project above the surface, and under the microscope they presented a blistered appearance. This incrustation is held tenaciously, and does not wash off, neither is it removed on rubbing with a cloth. The raised parts are considered due to the formation of a hydrated oxide. Contrary to expectations, the cups had not lost weight, but had even increased. One weighing 13·91 grm. had increased by 0·104 grm., and the other, weighing 13·865 grm., increased by 0·080 grm. After boiling in water for some hours, and rubbing, the first still showed an increase of 0·77 grm. and the second of 0·055 grm. To ascertain the effect of common salt, a plate of the same metal, 3 by 4 inches, and weighing 19·829 grm., was repeatedly dipped in a solution of sodium chloride and allowed to dry for three months; this lost 0·019 grm., and after washing and rubbing dry 9·59 grm.

One reason for making these experiments is that Mr. H. C. Russell, F.R.S., the government astronomer, some years ago tried aluminum cups for a rain gage, but found that they were so quickly corroded through that he had to relinquish the use of the metal (if they had been gilt they might, however, have answered well enough). It is a very common thing to see aluminum recommended on account of its lightness and its assumed permanent luster; this assumption being due to the statements repeated from book to book, that aluminum is unaltered by exposure to the air, to the action of water, hydrogen sulphide, and only slightly by dilute acids. The absolutely pure metal may be permanent in the air, but the best aluminum ordinarily attainable is, in this respect (in Professor Liversidge's opinion), little, if at all, superior to zinc. The commercial metal does not retain its luster, but very rapidly acquires the appearance of old zinc. Recently it has also been found that aluminum is acted upon by sea water. Hence the claim, often advanced, that aluminum is a metal resembling gold or silver in the property of not oxidizing, rests upon the very slenderest foundation.—The Optician.

Bicycle Insurance Risks.

It is now quite a business to insure bicycles, tricycles and unicycles. The insurance is written on the machines themselves, guaranteeing their owners against damage by accident or loss by theft. The possible hazard in this business, it is suggested, will be largely affected by the style of dress which may become popular among lady devotees of the wheel. Another intimation finding some currency is that the accident insurance companies have found the cost of carrying individual accident risks largely increased by the more general use of the bicycle, and it is hinted that the medical examiners of the life insurance companies may before long have something to say as to the effect of stooping and chest contraction from bicycle riding upon this class of risks.

THE CORNELL UNIVERSITY CREW ON THE THAMES, ENGLAND.