In this table but few innovations will be observed. *c* is made equal to *ch; dh* and *zh* are used for the sonant *th* and *sh;* and *h* is placed where it belongs, before the *w* in the combination *wh*. The letters *q* and *x* are not needed, but may still be used to avoid the awkward *kw* and *ks*.

In teaching this alphabet to children, and in spelling, the two characters which represent the long vowels and diphthongs should be pronounced as one sound, and not separately.

The following extract will give an idea of the appearance of the printed page in this system:—

Soundz at Ievning.

Swiet waaz dhe sound, hwen oft, at ievning'z kloez,
Up yondur hil dhe villaj murmur roez.
Dhair, az I past with kairles steps and slo,
Dhe mingling noets kaem sofnd from belo;
Dhe swaen responsiv az dhe milk-maed sung,
Dhe sobur hurd dhat loed tu miet dher yung,
Dhe noizi gies dhat gabbld o'r dhe puel,
Dhe plaeful cildren just let lues from skuel,
Dhe waac-dog'z vois dhat baed dhe hwispring weind,
And dhe loud laaf dhat spoek dhe vaekant meind;—
Dhies aul in swiet konfyuzhun saut dhe shaed,
And fild iec pauz dhe neitingael haed maed.

OLIVER GOLDSMITH.

My object in this paper is not to present a finished system, but to show that the spelling reform is practicable, and to suggest a modification of the alphabet which will bring the desired relief. The time and energy wasted by a child in learning to spell would, if otherwise employed, be sufficient to give him an ordinary education. Let us do something at once to relieve education of this great burden.

The plan here proposed has the following additional advantages:—

1. The printed and written pages have no very unfamiliar look.
2. Print and script are easily read at sight by one who sees them for the first time.
3. One can learn in a few minutes to write in this system.
4. Its adoption will make no existing books obsolete or useless except a few primary school books.
5. It will give no special offence to the philologist.
6. It will lead easily to a better and more philosophical phonetic system.

ELECTRICAL NOTES.

The displays of high-voltage electricity which formed so prominent a feature of the late electrical exhibition held in the Crystal Palace, are not absent from the present one, but neither the display of Professor Elihu Thomson nor that of the Westinghouse Company approach, so far as spectacular effect is concerned, the exhibitions of Messrs. Siemens and Mr. Swinburne at the Crystal Palace. These latter were truly magnificent displays. They were, however, produced by high potentials obtained in the ordinary way, by transforming up, and on this account the experiments of Professor Elihu Thomson possess much more interest from a scientific point of view. The method used by the latter, as most electricians are aware, consists of passing a very rapidly alternating current through a few turns of a coarse copper wire wound round a glass tube placed in oil. Close to the coarse wire primary is wound a secondary of finer wire, and in this a very high voltage is induced by the current in the primary. This secondary current is also of very high periodicity, and all the Spottiswood and Moulton effects can be produced with it.

Owing, probably, to the resonant qualities of the room in which the Westinghouse exhibition takes place the noise of the discharge produces a very disagreeable effect on the nerves, even of those accustomed to working with high-potential discharges, so much so that one cannot help wondering at times if the powerful surgings in the ether do not directly excite the nerves as a battery does. It is true that in most of the high-frequency experiments no such effect is observed, but this may be because the quantity of current is in general very small. Meantime the coat-tails of the spectators can be seen, as Rudyard Kipling would put it, "crawling with invidious apprehension."

One of the signs of the times is the exhibit of electrical heating and cooking apparatus shown by the Ansonia Electric Company in the gallery of the Electrical Building. Here we see all manner of utensils, baking ovens, gridirons, chafing dishes, saucepans, coffee pots, etc., all arranged so that by simply attaching a plug to an ordinary lighting circuit they are put in operation at once. The subject is such an important one that the writer has thought it best to go into it more in detail (*vide infra*). Meanwhile it may be mentioned that the exhibit is well worth a visit.

The new Helios arc lamp, exhibited by the same firm, will also attract attention. This may be said to be, perhaps, the first thoroughly successful arc lamp for alternating currents. It is almost absolutely noiseless, and almost absolutely steady, more so than most direct-current lamps. These results are accomplished by the use of a low potential and of especially soft carbons.

It will be remembered that some years ago Mr. Edison brought out the kinetoscope. In this instrument a combination was made of the well-known zootrope and the phonograph, so that at the same time that the motions of the moving object were seen, the accompanying sounds were heard. The apparatus was exhibited at some of the charitable entertainments in New York through the influence of Mrs. Edison, but since then comparatively little has been seen of it. It has now been more fully developed and forms a part of the Edison exhibit in the gallery of the Electrical Building.

Among the instrument-makers the exhibit of Messrs. Queen & Co. stands preëminent. Their display is on the ground floor near the entrance, and includes almost every kind of electrical instrument made. A number of new instruments have been lately brought out by the firm. First among these we may mention Professor Ryan's electrometer, for use in making alternating-current curves. This instrument, which has already been described in the electrical papers and has been in use for some time at Cornell, consists of an electrometer whose needle is charged through a very fine platinum or silver wire to the potential of the alternating current machine, at any part of its revolution, by means of the ordinary commutating device. So far it does not differ very greatly from the ordinary electrometer. It is a zero instrument, however, and is brought back to its original position by the action of a current in a surrounding coil of wire, which acts on a small magnet fastened to the electrometer needle. The instrument being once standardized, the potential can be found by measuring the current passed through the surrounding coil, and this, from the nature of the operation, is a very short process. While the instrument has been known for some time, this is the first occasion, we believe, that it has been placed on the market.

It is to be hoped that some firm will do the same for the dynamometer method of Dr. Duncan, which has been used with so much success at Johns Hopkins.

Another very fine instrument is the cylindrical bridge. It is a very mechanical piece of work, and looks as if it could be depended on. With the Carhart commutator, standard ratio coils, and one of the new Ayrton-D'Arsonval galvanometers the electrician has a most complete apparatus for the measurement of resistances to almost any degree of accuracy.

These latter instruments (the Ayrton-D'Arsonval galvanometers) will probably interest the electrician more than anything else in the line of measuring apparatus. With electrical railways running in every direction near one's laboratory, the path of whose earth returns varies from day to day, with every sprinkle of rain or difference of temperature, the use of an ordinary sensitive galvanometer has been entirely out of the question unless in the neighborhood of a very strict law and order society, when a little work might be done by getting up to the laboratory at some unearthly hour on a Sunday morning. For this reason the tangent galvanometer has faded from the scene, and is now only used as a means of illustrating certain principles of electricity, its place being taken by Lord Kelvin's balances. And now the Thomson galvanometer must go before these new instruments, for the difference in sensibility is so small that there is practically no advan-

tage in using the Thomson, even under the most favorable conditions, and under ordinary circumstances there is no comparison between them, the D'Arsonval type being absolutely unaffected by external magnetic disturbances. Moreover, a good Thomson costs at least $400, and an Ayrton-D'Arsonval only about $70.

Whether this form of galvanometer will be equally satisfactory when used for ballistic measurements does not, as yet, appear. There does not seem to be any reason why, with a good design and a containing tube of hard rubber instead of silver, it should not be perfectly satisfactory.

Several sets of improved portable testing instruments for measuring capacity and insulation of cables, etc., are worthy of attention. Full sets of the instruments of Lord Kelvin are also shown.

Another exhibit, which may well make an American feel proud of the work which is being done in this country, is the display of the Weston Instrument Company. True it is that Mr. Weston is an Englishman, but the perfection of the instruments is due, not only to Mr. Weston's ingenuity, but also, to a large extent, to American machine-shop practice. No other country can hope to compete with us until they learn to use the fine and accurate machine tools which fill the instrument shops here. The writer had the opportunity a short time ago of visiting some of the more celebrated European works for the making of electrical and physical instruments. There was not a universal grinder to be seen in them, and in only one was a modern milling machine to be found, and then but a single one. All the last touches were put on by hand, and the result may be seen in the instruments themselves, where every screw has to be marked, because no screw will fit accurately into any hole except the one it is made for, and no two parts of the same type of instrument are interchangeable. In Europe, all the fine work is done in the assembling, here the greater part is done before the instrument reaches the assembler's hands. Probably there is no instrument in the world whose mechanical make-up is so perfect as an ordinary Weston voltmeter. A number of new designs are shown, and the new laboratory standards are especially fine.

The long-looked-for manganin wire bridges have begun to appear, the smaller portable testing sets being now on exhibition. This manganin wire is, as the reader is probably aware, the invention of Mr. Weston, having been discovered by one of his assistants, Mr. John Kelly, while experimenting on that line. There are a number of varieties of this alloy, which is formed of different proportions of copper, nickel, and manganese. Some of these have a negative coefficient, others a slight positive one, and an intermediate class, no temperature coefficient at the ordinary temperatures of working. The researches of the German Government Standardizing Bureau have shown that the alloy is a permanent one, and that it is well adapted for use in standard resistances. It is understood that new bridges of the latest improved form, with four and five dials, are soon to be put on the market, made of this wire, and accurate to a small fraction of a per cent. Another new thing, soon to be put out, is the Weston cadmium standard cell. It is well known by those who have done work on solutions that the solubility of a number of the cadmium salts is the same at all temperatures within the ordinary range of working Also that there is a relation between the solubility and the voltage production of a solution. Mr. Weston has utilized this property of the cadmium salts to form a cell (of a similar nature to the ordinary Clark cell, but with cadmium substituted for the zinc and zinc salts), whose temperature coefficient is practically nil. It is claimed that considerable usage has shown that it is very reliable.

As regards the electrical fountains, there is little to be said of them in spite of the great secrecy in which they are wrapped by the officials in charge. The principle is the one generally used, i.e., the projection of a beam of light so as to strike the walls of the jets from the inside, and so be reflected up along the inside of the column of water. Some slight mechanical ingenuity has been exercised in the means of feeding the carbons of the electric arcs, otherwise there is little of interest in the mechanism itself. The display, however, is very pretty, and it may be worth while to give a hint as to the best means of seeing it, as follows:—

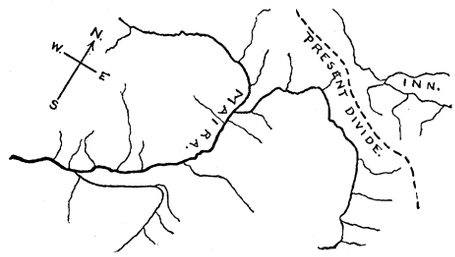
Take the electric launch at the wharf on the Liberal Arts side of the bridge connecting the Administration Building with the Liberal Arts Building, at about 8.30 or 8.15 in the evening (the exact time depending upon the time the electric fountains begin to play, the time of starting should be about 45 minutes before they begin). This will bring the launch back to the basin containing the fountains just about the time they are in full operation, and, as the boats make two turns round this lagoon, opportunity is afforded for a long view of the display. Moreover, the voyage around the other lagoons gives one a beautiful view of the grounds and buildings from the water. The illumination of buildings is well under way by that hour, and the long ride on the water is very enjoyable after the heat of the day. The writer has been informed by those who have had the opportunity of comparing the two, that even the most gorgeous sights of Venice do not enter into comparison with the view thus obtained. R. A. F.

A NEW INSTANCE OF STREAM CAPTURE.

BY HUNTER L. HARRIS, CAMBRIDGE, MASS.

The action of a rapidly flowing stream in cutting back into the drainage area of another, of less gradient, and, finally, capturing some of its headwaters, has been prettily described in the columns of this journal by Prof. W. M. Davis of Cambridge, under the name of "A River-Pirate." In this notice he describes an instance of such action occurring in eastern Pennsylvania, and alludes also to other instances, one of which is that occurring in the Upper Engadine of Switzerland.[1]

By keeping in mind the principles governing the cutting power of streams, we may easily picture to ourselves the conditions which would result from the excessive action of one stream over



that of a near neighbor. Briefly, the more active stream, by virtue of its greater activity, would begin to enlarge its catchment basin, its headwaters eating their way gradually backward, and so pushing the divide farther and farther into the region formerly drained by the relatively weak stream. In process of time, the aggressive stream may actually tap some of its neighbor's headwater members, and, since the divide migrates unevenly, this tapping may occur either at the head, or at some point lower down on the invaded stream. If at the head, we may have a short inverted stream, which possesses few marks by which we may afterwards read its history. But if the connection takes place lower down, as is often the case, a peculiar back-set direction is given to the stolen tributaries which have been thus forced to discharge their waters through a new main stream of reverse direction. They may be compared to the barbs upon an arrow, the body of the arrow representing the pirate stream. This then constitutes a peculiarity by which we may easily recognize instances of such capture. But other evidence should be sought, such as the former comparative activity of the two principal streams, indications of the former course of the stolen tributaries, etc.

The case of the Upper Engadine mentioned above may be taken as typical. Here the aggressor is the Maira, flowing southwest, and it has not only taken a goodly part of the drainage area of the Inn, which has an opposite direction of flow, but has also appropriated at least three of its tributaries. The Maira is considerably more rapid, and hence more active, than the other. The accompanying sketch, taken directly from one of the maps of the Swiss official topographic survey, shows the characteristic form of the resultant drainage system.

[1] Vol. xiii., 1889, p. 108. See also R. de C. Ward, "Another River-Pirate," vol. xix., 1891, p. 7.