

TELEGRAPHING WITHOUT WIRES.

Some recent experiments by Professor Loomis, which will be adverted to presently, recall to our mind some of the interesting ones made years ago, serving to re-awaken interest in a matter that, although well known, had not received the attention it deserved, owing to the rapidity with which one discovery in electricity was following in the wake of another. We refer to the almost constant traversing of telegraph wires by earth currents. One of the experiments to which we refer was made by M. Bouchette on the left bank of the Rapt-de-Mad, a small stream in the Department of the Moselle. Putting to the earth the two ends of a wire 1,100 feet long, he sent through it the current from a battery of two Bunsen cells. On the right bank a line of equal length, having a galvanometer in circuit, was also put to the earth at its two ends. When the battery circuit was closed the needle of the galvanometer was thrown violently against one of its stops; when the current was reversed the needle flew around to the other. This showed clearly that the current which traversed the galvanometer circuit depended entirely upon that from the battery, yet the two circuits were separated by a distance of 300 feet, including the intervening stream.

The subject was taken up a little later by M. Bourbouze, who has obtained some very important results. He demonstrated the existence of earth currents by connecting a delicate galvanometer with the gas and water main of his laboratory. He varied his experiments by connecting the galvanometer with a body of water and with a metallic plate buried in the ground. In one of his researches it occurred to him to put one pole of a battery to the earth and to connect the other with a body of water. On pressing down his key, the galvanometer of the former circuit was at once deflected, and remained permanently so. The battery current was interrupted, the needle returned to zero; the current was reversed, the needle swung round in the opposite direction. It is evident that in order to obtain good results the earth currents must be neutralized, as they tend to increase or diminish the deflection. This is easily done. When the balance is obtained the existence of any other current, however transient, is at once detected.

The first experiments of M. Bourbouze were made near the Pont d'Austerlitz, Paris. One of the wires was connected with the earth and the Seine. A battery consisting of 600 cells (copper sulphate) was placed near the Pont Napoleon, one pole being to earth and the other connected with copper plates immersed in the Seine. Care having been taken to adjust the galvanometer in the former circuit, it was found that when the current was made the needle was deflected 25° and even 30°. The same experiments were repeated at Pont St. Michel, near St. Denis, with like results.

The possibility, therefore, of transmitting signals to distant points without the use of wires would seem to be conclusive; and whatever doubts may have existed on the subject will be dispelled by the success that has recently attended the investigations of Professor Loomis, of Yale College. His experiments were made in the mountainous regions of West Virginia, between lofty peaks. For his purposes he used kites, a copper wire being substituted for the usual kite string. The kites were raised to a considerable height, when it was found that signals sent along one wire were transmitted by aerial currents to the second, ten miles distant. It was also discovered that continuous aerial currents exist at this altitude capable of serving the purposes of the telegraph, except when interrupted by violent atmospheric disturbances.

COLOR-BLINDNESS IN ITS RELATIONS TO THE SAFETY OF THE TRAVELING PUBLIC.

It is not very reassuring, in view of the possibility of serious accidents on the sea or on railroads through the failure of pilots and engineers to note danger signals, to read—as the result of a most careful scrutiny—that five per cent. of the population of Germany, England, France, Sweden, and probably also of other countries, are color blind; and that, moreover, such persons develop to a wonderful degree the power of acquiring terms of color as well as normal-sighted people by the aid of external signs, and up to a certain point are very clever at concealing this defect. This matter is considered of great importance, and has received much attention in Europe. On one of the great French railroads it has been the practice since 1855 to examine candidates for employment in regard to their power to distinguish colors. As this practice of the company was well known, it is presumable that those who sought situations were unaware of any visual defect; and for this reason the result of the examinations must be considered surprising, for the proportion of those found to be color blind was ten per cent!

Dr. Stilling, of Cassell, has just published a valuable set of charts for the use of railways and shipping companies in testing the color perceptions of those in their service. These are an improvement on a former set issued by him, but based on the same principle. They are so far based on the complementary idea, which is of the more consequence, as is well set forth by the author, that complete color blindness is rare. The cases otherwise run into two groups, marked off by the relations of the primary colors. The man who is red blind is also green blind; the man who is blue blind is also yellow blind. The red of the spectrum appears to the red-green-blind people as dark yellow; green up to a certain limit in the spectrum appears as pale yellow, and beyond that limit blue. The violet of the spectrum appears to them dark blue. There is on the part of many of this class an entire blindness for red light as light, and not only want of sensibility for the

color red. Dr. Stilling's tables are skillfully printed in small squares or figures of different colors, and the candidate is asked to count the number of these squares from point to point. If color blind he will be unable to do so. This is a very interesting subject, and its investigation in our own country might possibly set at rest the question as to the cause of many a collision of the past, both on land and water.

THE ELECTRIC LIGHT IN PHOTOGRAPHY.

It often happens that photographers are restricted and hampered in their work by want of suitable light; that is, a steady and uniformly diffused one, in which the actinic rays are in their proper proportion. This occurs chiefly in work conducted under conditions unfavorable to the use of the natural light of the sun, as for instance in cloudy weather or at certain hours of daylight. Sometimes, too, it is desirable to obtain a photographic representation of places partially or wholly inaccessible to sunlight, as in mining excavations or in the interior of peculiarly constructed buildings; and not infrequently the darkest hours of the night are the ones in which the delineation, if practicable, would be the most serviceable. Many suggestions and experiments have been made to obviate this difficulty. The magnesium light, the lime light, and the electric light have been employed in various ways, but without giving complete success, the main objection in each case being that the rays are, with the ordinary methods, too strongly concentrated, thus producing pictures in which the lights and shades are not only too sharply marked, but also too local, the effect of the blinding glare being also decidedly unfavorable to the expression of the unfortunate sitters called upon to face it. Before us is a photographic portrait taken in London by what is known as the Van Der Weyde light. The sitting was had at midnight, a fact which by no means appears in the result. The photograph is more than up to the average standard of excellence, combining a well-defined sharpness of outline with a uniform diffusion of light and shade. Mr. Van Der Weyde, an artist, formerly of New York, after two years of experiment, has succeeded in producing a successful adaptation of the electric light to photography. The light employed is produced by a dynamo-electric machine, with the usual carbon points. The sitter is screened from the direct rays, and receives only those from a parabolic reflector. The rays are made convergent, uniform (and consequently soft and pleasant) by means of a Fresnel lens, which throws an evenly distributed beam over a sufficient space to include the subject. It seems reasonable to believe that the new process is something more than a mere hint, and that it might be successfully applied, with suitable modifications, to all parallel branches of the art.

"THAT IS NEAR ENOUGH."

When we see a piece of work laid down with the remark "That's near enough," we know at once that it is not a first-class job. The employer may say "that's near enough" because he has taken the work at a price that he cannot afford to do good work at, or it may be a temporary repair in which time is of more consequence than first-class workmanship. If a workman makes use of the remark we know that he has little pride in the job, and is satisfied to do inferior work; while if an apprentice says "that's near enough," we conclude that he is not likely to make any reputation as an expert or good workman.

Suppose a professor of mathematics were to say twice 2½ are 4; it might be near enough for the purpose to which he applied it, but it would not be near enough to maintain, much less to stake, his reputation as a mathematician upon.

The difference in time necessary to convert the quality of a job from that denoted by "that's near enough" into that expressed by "that is a first-class job" may be sufficiently worthy of consideration in many cases; but the confidence, expertness, experience, and interest in one's work the latter gives and leads to, represent the best spent time an apprentice or workman can possibly employ, because such practice soon enables him to turn out first-class work in the same time formerly required to finish the job in a "that's near enough" style, and therefore converts him from an inferior or ordinary into a superior workman.

"That's near enough" has led to hundreds of so-called accidents, which have come down to us as mysteries. It makes hot bearings, throws shafting out of line, causes nuts to come loose, bolts to fall out, shafts to break, brings in the plumber to disturb the peace of our homes, leads to scamping, to botch work, and finally to ruin.

When the hands can lay down a piece of work and say "that's near enough," the spirit of emulation has gone; the very expression is a confession of indifference as to quality without an equivalent or gain as to quantity.

DANGEROUS SMOKE AND DRINK.

Several physicians of this city have united in pointing out the dangers incident to the smoking of cigarettes, which practice is now becoming much more prevalent than it has been at any former time. Where a few years ago there was but a single brand of cigarettes—the Cuban—there are now 358 different kinds in the market, some composed of tobacco of varying degrees of vileness, descending down to stuff little better than dirty refuse.

It is stated that not one fiftieth as much of the mucous surface of the body is covered by cigar smoke as by the inhaled smoke of a cigarette; that in persons of nervous temperament cigarette smoking produces constitutional effects, and is prolific of vertigo, dimness of vision, dyspepsia, and bron-

chial diseases. Old pipes are known to be directly poisonous, and we published not long ago the formidable list of deleterious chemicals which are taken into the system when cigars are smoked. In the present instance the reader might reperuse that list and add to it pyrogallic and pyroligneous acids from the paper envelope of the cigarette, besides the fumes of the decayed paste with which that envelope is fastened.

Adulterated or rather miserable imitations of wines and liquors are also becoming very common. Recently an establishment in this city was seized by the sheriff, and a well known druggist was requested to analyze the compounds sold under the name of wine. The results are interesting. Here, for instance, is port wine concocted of new cider, cherry brandy, alum, spirits, alkanet root, and tartaric acid. Cherry brandy, of spirit, sugar, and oil of bitter almonds, the last probably from coal tar. Out of 45 gallons of so-called old bourbon whisky, 40 gallons were alcohol flavored with saltpeter and fusel oil. The concoctions are bad enough, but the expert thought that they were not so injurious as pure liquor, an opinion with which most people, we imagine, will hardly agree.

THE SHOP CLOCK.

The shop clock is not usually classified as a special tool, but it performs special services which no other tool in the shop can perform. It furnishes the data to make up the amount for each man's envelope on Saturday night. It reproves the tardy workman who, as he enters the shop where the other men are busy at work, glances hastily at its face and looks anxiously around to see if his entrance is observed by proprietor, superintendent, or foreman. He feels under the clock's surveillance until his coat is taken off and his tools are in his hands, and if still unobserved he feels that he has cheated the clock.

When a face anxiously seeks the shop clock every hour or so, the thoughts are usually anywhere but upon the work, the hands are unwilling and the employer is not getting justice. When the hands of the clock mark five minutes before the time for ceasing work we may find the unscrupulous workman washing his hands with his employer's benzine or machine oil, or leaving his work to heat water to wash in. The lazy workman is waiting because "it is no use to begin a new job five minutes before quitting time." The workman anxious to be anywhere save at work, is maneuvering to get near the shop door, ready to make a bolt when the clock strikes. When the clock does strike the quitting hour the careful workman puts away his tools or finishes some little detail that will take but a moment if done at once, but would occupy much more time if not at once finished. While some of these careless workmen have laid down their tools just where they happened to stand when the clock struck, others may have departed leaving their machines running, with the prospect of a smash up if they are not on hand in the morning when the machinery starts; and others still may have left their gas jets burning. If clocks could talk it would be a great boon to foremen.

THE BULLION PRODUCT OF 1877.

From Wells, Fargo & Co.'s annual statement of precious metals produced in the States and Territories west of the Missouri river, including British Columbia and the west coast of Mexico, during 1877, we learn that the aggregate yield was \$98,421,754, being an excess of \$7,546,581 over that of 1876, which was the greatest previous annual yield in the history of the country. Arizona, Colorado, Idaho, Nevada, New Mexico, Oregon, Utah, and Washington show an increase, while there is a decrease in British Columbia, California, Mexico, and Montana; although it is possible that the falling off in Montana is more apparent than real. If the Comstock mines yield as much in 1878 as during the past year, the aggregate product of gold and silver will approximate \$100,000,000.

The gross yield for 1877, stated above, segregated, is in round numbers as follows: Lead, 5 per cent, \$5,085,250; silver, 48 per cent, \$47,206,957; gold, 47 per cent, \$46,129,547. Lead being an important element in what is termed *base bullion*, we might add that of Missouri and Illinois, with an approximate value of \$1,500,000; this, with the silver and gold of the Lake Superior region, Virginia, and North and South Carolina, amounting to, say, \$500,000, would swell the gross product to over \$100,000,000 for the year. The exports this year are the greatest known, namely, \$105,000,000 up to the 26th of December, the greatest amount in former years having been that of 1857, \$83,650,000.

The Color of Mars.

A ludicrous scene recently took place at the Royal Astronomical Society following the reading of Mr. Green's paper on the planet Mars, when a foolish person present started the theory that the red color of Mars was due to heat or rust. The President caused much amusement by announcing with much gravity that the lateness of the hour would unfortunately prevent a discussion of the point in question. The theorist appeared to be the only person present who was insensible to the joke.

A New Trade.

As a result of the Turkish war a business has opened in human jaws, which are collected in Bulgaria and consigned in large quantities to Paris. The lower jaws are selected, and their value depends upon the soundness, regularity, and whiteness of the teeth, which are extracted on their arrival and used for dental purposes.