

The electric telegraph.

From the earliest times, men have known how to communicate with those living at a distance, especially in times of urgency, by means of the fire-signal. When, however, from hill to hill, over a whole landscape the beacon flames arose, these signals could communicate no very definite information. It could only be learned that some great event had occurred. Vastly more useful, therefore, were the telegraphs, which most of us may have seen, and which by varying the positions of their arms represented letters, syllables, and whole words, and so rendered a regular conversation possible between individuals separated by a hostile army, or other insurmountable obstruction. Still the language, which these telegraphs exchanged with one another from one tower, or steeple, to another, before the eyes of the enemy, or thousands of the curious, depended upon an agreement between those, who had to converse by these means; to them alone was it intelligible. Others, who lacked the key, could only guess at the meaning of the quickly changing positions of the machine.

These common telegraphs came first into use in Spain and France. The first telegraphic post was made (by M. Chappe,) from Paris to Lille, a distance of 30 miles, and consisted of 12 telegraphs. The erection of this line of telegraphs was soon followed by many others, in and out of France. The advantage which they afforded for the speedy transmission of intelligence was unquestionable. The conquest of Quesnay was by this means made known in an hour's time in Paris. By the present, greatly improved construction of the telegraph, only half that time would be required to convey intelligence over the same distance. At night telegraphic communications are made by illuminating the apparatus, or by a preconceived disposition of lights. It is apparent, however, how often the state of the weather must interrupt such operations, and how easily a blunder at one of the stations, might occasion mistake.

Of a quite different character are the telegraphs, of which we now propose to speak. By their means it is apparently impossible has been made easy. Two persons, living fifty, or indeed hundreds of miles apart, may now communicate their thoughts in words, not, as in the case of the ordinary telegraph, in the space of an hour, or a half hour, but instantly, as if they were seated at the same table. And could a connection by copper wire be established between St. Petersburg and Pekin, and the loss of power, which the electric fluid would sustain in such a space, be avoided, then might a person in the capital of China receive intelligence from Russia in 1½ sec., and even the man in the moon, if our electric fluid could be carried hither, would hear from the earth in the space of a second, for the transmission of thought by the method is swifter than light. The electric fluid travels in this way about 288,000 miles in a second, a ray of light only 192,000 miles. But in addition to this surpassing speed, such a mode of communication has quite other advantages over the ordinary telegraph. That which is communicated to a distant point, is not seen by thousands of eyes, but only at the destined place does it make itself known. The course which the word, thus expressed, takes in the invisible form of an electric discharge, is hidden under the earth, or inclosed in the metal of the wire, passing high over the roofs of cities. But when it reaches its goal it announces itself, not only to the eye by the common telegraphic sign, but also to the ear. He, with whom another communicates in the still, midnight hour, sits perhaps sunk in thought at his desk, or has fallen asleep—the sound of a little bell arouses him; he listens, the sounds now of a lower, then of a higher, toned bell are repeated, the number of bell strokes, and the difference of the sounds have meaning; first a deep sound, then quickly succeeding, a higher, and then again a low note, represent an A; a low note succeeded by two high notes and again a low note signifies B; a low note, followed by no high note, and a high note followed by no low note signify, the first E, the last J; three low notes, following one upon the other, stand for D. Thus, by the number and variety of sounds, every letter of the alphabet is expressed. Between the letters occurs a short pause, between the words the interval is longer. Thus rapidly, as an intelligent child may make out words by spelling, does it become possible by practice to understand the language of bells.

But suppose that the person to whom the distant intelligence comes, is not awakened by the first stroke of the bell, and has lost the first part, or the whole even, of what is thus communicated. Still the loss is not irreparable. He finds, upon approaching the table, at which his magical telegraph is arranged, that everything, which he had failed to hear, is set down there in visible characters. He finds a letter, written not indeed in ordinary characters, but in points, the peculiar position of which, (corresponding to the different notes of the bell,) and their combination represent alphabetical

signs, marked, like the sounds, with regularly occurring intervals between the letters and the words.

It is hardly necessary to remark that this mode of communication is in a much greater degree than the ordinary telegraph, independent of the state of the weather. There is indeed yet more in the power of the individual who thus communicates his thoughts. By different wires, connections may be formed with various points, of which one may be only 2 miles, another 5, a third 8 miles distant towards the east, and still others may lie towards the south, or the west. A communication may be made to one living 5 miles to the eastward, which concerns neither those at 2 or 8 miles distance, nor those at the south or west. It is only necessary to keep up the connection with the desired point, while the connection is suspended with all the other points, and the design is accomplished; just as an individual may personally visit another friend in his chamber, and hold with him there a confidential conversation, of which no one else, far or near, has any knowledge, so may he, who speaks through the electric current, direct his speech to an individual 5 miles off, and at all other points connected with the station not a bell shall sound, or a mark be made on the paper.

It will be asked, how and where such a many-sided contrivance has been arranged? It has been completely achieved by C. A. v. Steinheil, in Munich, whose ingenious telegraphic apparatus has commanded the admiration of friends and stranger. The means, by which the telegraph is set at work, and kept going, is very simple, but at the same time extraordinarily powerful. It is based entirely upon the diversion of a magnetic needle or rod from the direction which it takes from the magnetism of the earth, by being subjected to the influence of the electro-magnetic action of a coil of copper wire. The movement varies according to the direction in which the current passes, in the one case the motion is from left to right, in the other from right to left; and this motion is quicker and stronger, the more powerful the current. When the current from the point where its discharge terminates, has run through a longer or shorter space, it sets the ends of the little magnetic rod oscillating quickly and powerfully towards one or the other direction, and the ends of the magnet strike on little bells of glass or metal, and thus produce a perceptible sound, and motion is also given to a little vessel, filled with ink, and terminating in a little tube-shaped beak. Through the attraction of the sides of this little tube a small drop of the coloured fluid, or ink, presses continually toward the mouth of the tube. A strip of paper, ruled with lines to distinguish the higher and lower tones, is attached to the apparatus, and by means of clock work, in constant motion, rolled off one cylinder and on to another, the paper coming in contact with the motion of the little marking instrument, fastened at the end of the magnet rod, in such a way that the rod, whose moving end projects beyond the rim of the apparatus, makes a black mark upon the paper, according to the direction and place of the motion, now higher and now lower.

Upon the same principles in general are the telegraphs constructed which connect London with Windsor and Southampton, rendering instantaneous communication between those places possible. In order to send a current from one place to another, one wire only is necessary, if the wire be connected with the ground at its terminations. Along a line of railroad, the iron rails may be used instead of the ground. For the current, which passes along the wire, will return by the ground or iron rails, which are good conductors.

In such phenomena as the motion of the electric fluid and of light, which the mind of man has taken into his service and learned to use at will, we have a type of the difference between the action of the mind and the body. Electricity and Light, although possessing power to penetrate space to an extent almost immeasurable, are indeed both material agents, and yet, distance and time are almost annihilated by them; the connection they establish, although by the material means of a metallic conductor, is miraculously direct and intimate. But what must that uniting attraction of souls be, which requires no corporeal medium, but darts instantaneously through an all-uniting spiritual element from one disembodied spirit to another! Even now the director of an electric telegraph, although confined by the burthen of a body to a certain spot, is able at pleasure to converse with a distant friend, and be present with him in thought and will. What will not be possible when this confinement to the conditions of our planet shall fall away!—*Manual of Science, Schubert.*

The Moon and its Light.

The consideration of the warming property of the sun's light leads us to that of the non-warming quality of that luminary which, next to the sun, is the most important to our planet. Along with the apparent revolutions of the sun, the course and place of the moon