

THE POLLAK AND VIRAG TELEGRAPH.

The recent invention by Pollak and Virág of a system of rapid telegraphy is destined, perhaps, to exert a vast influence upon our present methods of transmitting messages electrically.

Herr Pollak was formerly a telegraph agent in a small Hungarian city, and it was only during his leisure hours that he found time to study electric technology. In Virág, who was at the time an examiner in the Hungarian Patent Office, he found an earnest collaborator. Both men have devised various improvements on the electric telegraph; but of all their inventions none is more interesting than their system of rapid telegraphy.

In the system in question, a perforated tape is used, which passes around a wheel electrically connected with the telegraph line. The perforations of the tape are disposed in two lines, of which one lies above, the other below an unperforated central line. The upper line corresponds with the dashes, the lower with the dots of the Morse alphabet. Over the perforated strip are secured two metal brushes, one of which is connected with the positive, the other with the negative pole of a galvanic battery. These brushes, when depressed, will pass through the perforations, and, coming into contact with the wheel, will close the circuit and cause a positive or negative current to flow through the wheel

to the receiving station, thereby swinging a mirror to the right or to the left as the positive or negative current energizes the electromagnet with which the mirror is connected. The light of a small incandescent lamp which falls upon this mirror is reflected to the right or to the left, according to the direction of the mirror's oscillation, and is concentrated to a point by a convex lens. This point of light falls upon a piece of sensitive paper, producing a series of lines which are located either above or below a central line, and depending upon which of the two brushes of the transmitter is forced into the perforated tape. The paper after having been developed, reveals characters above and below the central imaginary line, which characters correspond with those of the Morse alphabet.

The telegraph is said to be faultless in operation. Between 10 and 12 o'clock P. M. recently, telegraphic communication was opened between Berlin and Ofen-Pest. The Berlin instrument was operated by Herr Pollak; the Pest apparatus by Herr Virág. Representatives of the Hungarian, French, and American governments were present during the trial at the Pest station. A message of 220 words was transmitted in nine seconds, which corresponds with a speed of 88,000 words per hour. The development of the sensitive paper was accomplished in 4-5 minutes. The signs were sharp and clear.

Floating Stones.

Prof. Erland Nordenskiöld, who is the son of the Arctic explorer, recently observed while engaged in scientific research in South Patagonia a most curious sight while rowing in the long and narrow channel of Ultima Esperanza on the southwest coast of Patagonia. He observed fragments of slate floating on the surface in large and small clusters. There were a great many of them, and at one cast of the net he gathered in 700 pieces. The stones had evidently drifted out from the beach, which was covered with similar fragments which had fallen from the slate cliffs.

The surface of the stones was dry, and when it became wet the stones sank immediately. Their specific gravity was 2.71, while that of the water was 1.0049. It was found that small gaseous bubbles were attached to the under-surface of the floating stones, and these bubbles were also found on stones at the fringe of the beach, where they were being continuously washed into the sea when floating away. The greasy surface of the slate fragments undoubtedly helped to keep them afloat by preventing the water from coming in very close contact with them. Prof. Nordenskiöld believes, besides

It will be known to most of our readers that the ordinary method of making a profile is to run a level through the country over a line that is laid out by means of the transit and engineer's chain, and take the levels at more or less frequent intervals along this line. These levels are then pricked off on cross-section paper, and a line joining them will represent the true vertical topography of the country along that particular route. Here we see two distinct operations, one in the field, the other in the office. They are both, of course, somewhat tedious and call for exercise of considerable care to prevent errors from creeping in.

The "Orograph" consists of two substantial carriage wheels, one following the other in a single track, supporting between them, and on one side, a box of mechanism, and on the other a sort of cistern. This cistern is 24 inches in diameter and $\frac{1}{2}$ an inch deep. It is placed vertically and contains mercury. When in operation the "Orograph" must be held upright and not allowed to careen to either side.

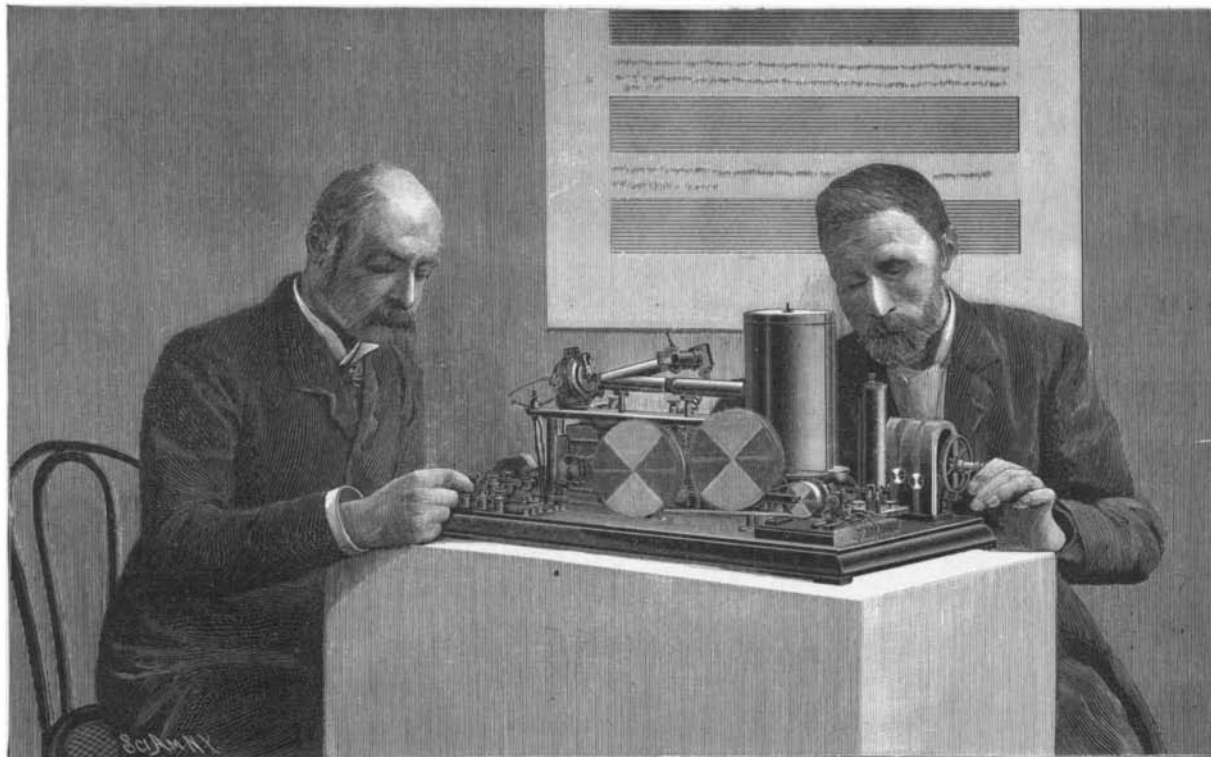
As stated, the object of the machine is to draw upon paper an accurate profile of the ground over which it is rolled, thus furnishing the army engineers with all the results of a survey excepting the courses and general topography. The principles upon which the machine is constructed are those of the perambulator, operating in conjunction with a lever main-

tained continually in a horizontal position by floating upon a cistern of mercury. This lever is 24 inches in length and $\frac{1}{2}$ an inch thick, with floats attached to each end, and has free motion in a vertical plane on a horizontal axis.

The principles upon which the reduction of surface distance to true measurement is accomplished are that, if the surface measure of any portion of ground be called radius, the true horizontal distance will be the cosine of the angle of inclination or grade of the surface, and the difference of level will be the sine of the same angle. In accordance with these principles an arm or crank is made to move in a slot, or elongated hole, in such a manner as to give it a motion corresponding to such sine or cosine. The machinery by which these principles are made to operate consists of a circular disk, revolving by connection with the perambulator with a velocity proportionate to the surface

passed over, and of an adhesion wheel whose plane is perpendicular to the plane of the disk, and whose circumference is tightly pressed against, and so receives motion from it, the distance of its circumference from the axis of the disk being made to vary as the cosine of the inclination or grade of the surface passed over by the Orograph varies. This varying motion of one wheel against the face of another is effected by an arm from the axis of the horizontal lever, moving in a slot, which, together with a parallel motion, sustains the adhesion wheel against the circular disk from which it derives its motion. The adhesion wheel, moving according to the true horizontal distance, communicates motion by means of an endless screw and by ratchet-work to wheels which register all distances up to a hundred miles.

Another arm from the axis of the horizontal lever, moving in a slot perpendicular to the former one, varies the position of two adhesion wheels pressed against two circular disks in a manner similar to the former, but varying in proportion to the sine of the angle of inclination. The two adhesion wheels just mention



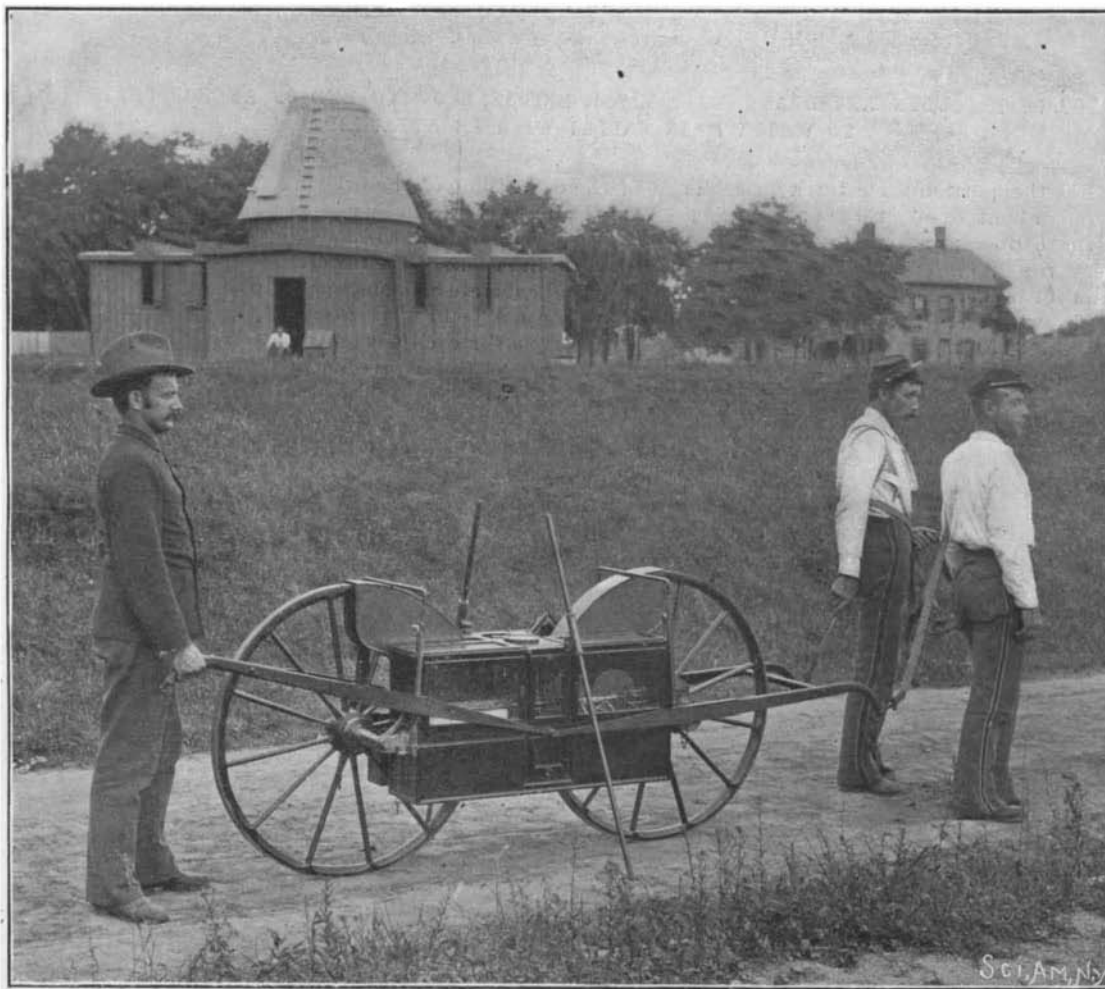
THE POLLAK AND VIRAG RAPID ELECTRIC AND PHOTOGRAPHIC TELEGRAPH SYSTEM.

the visible bubbles, they were surrounded by an envelope of gas supported by an insignificant coating of algæ, by which they were enveloped. The new strata they are now forming at the bottom of the sea may have a considerable admixture of these fragments representing a far distant geological age.

THE "OROGRAPH," AN AUTOMATIC PROFILE RECORDER.

BY W. F. COFFEY, LONG ISLAND CITY.

The curious machine herewith illustrated was made for the engineering corps of the United States army, and is owned by a detachment of this corps stationed at Willett's Point, Long Island. It is essentially a surveyor's instrument, and is intended to take the place of the engineer's chain and level in the important work of making a profile of any road or stretch of country over which a surveying or reconnoitering party is passing.



THE "OROGRAPH"—AUTOMATIC PROFILE RECORDER CONSTRUCTED FOR THE UNITED STATES ARMY.