

be satisfactorily compared with the results deduced from observations on aberration and on the satellites.

The attention of physicists has been powerfully attracted to the experiments on the velocity of the transmission of electricity, recently conducted in the United States by Walker during the course of his electro-telegraphic determinations of the terrestrial longitudes of Washington, Philadelphia, New York, and Cambridge. According to Steinheil's description of these experiments, the astronomical clock of the Observatory at Philadelphia was brought to correspond so perfectly with Morse's writing apparatus on the telegraphic line, that this clock marked its own course by points on the endless paper fillets of the apparatus. The electric telegraph instantaneously conveys each of these clock times to the other stations, indicating to these the Philadelphia time by a succession of similar points on the advancing paper fillets. In this manner, arbitrary signs, or the instant of a star's transit, may be similarly noted down at the station by a mere movement of the observer's finger on the stop. "The special advantage of the American method consists," as Steinheil observes, "in its rendering the determination of time independent of the combination of the two senses, sight and hearing, as the clock notes its own course, and indicates the instant of a star's transit (with a mean error, according to Walker's assertion, of only the 70th part of a second). A constant difference between the compared clock times at Philadelphia and at Cambridge is dependent upon the time occupied by the electric current in twice traversing the closed circle between the two stations."

Eighteen equations of condition, from measurements made on conducting wires of 1050 miles, gave for the velocity of transmission of the hydro-galvanic current 18,700 miles,* which is fifteen times less than that of the electric current in Wheatstone's rotatory disks. As in Walker's remarkable experiments *two wires* were not used, but half of the con-

* Steinheil, in Schumacher's *Astr. Nachr.*, No. 679 (1849), s. 97-100; Walker, in the *Proceedings of the American Philosophical Society*, vol. v., p. 128. (Compare earlier propositions of Pouillet in the *Comptes Rendus*, t. xix., p. 1386.) The more recent ingenious experiments of Mitchel, Director of the Observatory at Cincinnati (Gould's *Astron. Journal*, Dec., 1849, p. 3, *On the Velocity of the Electric Wave*), and the investigations of Fizeau and Gousselle at Paris, in April, 1850, differ both from Wheatstone's and Walker's results. The experiments recorded in the *Comptes Rendus*, t. xxx., p. 439, exhibit striking differences between iron and copper as conducting media.