The local clock record on the cable fillet was necessary in order to be able to interpret the arbitrary signals sent from the other observing station and recorded by the cable siphon. In receiving signals there were two records on parallel lines on the fillet, the signals as shown by the cable siphon, and the clock beats shown by the other siphon. The trace of the latter was the foot-rule, so to speak, or scale for measuring the other. The two-second breaks in the line drawn by the clock siphon were projected vertically by a fine pencil lin on the line of the cable siphon and the relative position of the arbitrary signals measured by a glass scale, similar to the one described, but somewhat larger, as the two-second breaks on the fillet were made considerably larger than those on the chronograph sheets. The speed of the fillet is adjustable by the small motor.

Although the siphons were generally placed fairly opposite each other, that is, in the same perpendicular to the fillet, yet it was necessary to know their parallax. To attain this end the local clock circuit was put in connection with one of the cable keys, the one (positive) used for sending arbitrary signals. A special arm was attached to that cable key so that when the cable key was depressed to make circuit and send a signal into the cable, the arm would at that moment break the local clock circuit, hence record the time on the fillet. By comparing the relative positions to a vertical of the break made by the cable siphon with that of the other siphon for an arbitrary signal, the apparent parallax of the siphons is obtained. To this parallax there may be a small outstanding correction due to want of perfect adjustment, that is, that the make of the cable key absolutely synchronizes with the break on the clock circuit. To obtain the absolute parallax the metal frame carrying both siphons was given a slight sharp tap, generally with the back of a pocket knife. By this means there was a momentary simultaneous displacement of both siphons and the parallax obtained, and by comparison with the above, an adjustment, if necessary, made.

The correction was always a small quantity—if anything at all—and about one-hundredth of a second of time.

Observing key.—This was an ordinary American telegraph key mounted on a small piece of wood. The spring adjustment was made weak, and the platinum points about a fortieth of an inch apart. The same conditions were maintained throughout the work. The moment the key was touched the circuit was broken and the transit recorded, independent of the spacing between the points of the key, which is not the case in a make-circuit key.

SYSTEM OF WORKING.

Programme.

It was decided that for each final differential longitude there should be five mutually complete nights or their equivalent.

Time set.—A complete night's programme comprised twenty-eight stars, divided into four sets of seven stars each. One of the seven being a polar, while the others were distributed between the zenith and an equatorial zone.

Two of these sets—one clamp east and one clamp west—comprised a time determination, so that each night, when clear, there would be two independent time determinations, and a measure of the individual hourly clock rate obtained, beside the daily rate shown by the observations of successive days.

For the northern hemisphere the Berliner Jahrbuch has generally been used for the selection of stars, but for the southern hemisphere the British Nautical Almanac furnished the most suitable stars. Both were supplemented by the American Ephemeris and Connaissance des Temps. On account of the difference in longitude between any two stations, and for other reasons it was not practicable for the two observers to use the same sets of stars for the purpose of eliminating errors in right ascension, which in the standard stars alone used is supposedly a very small quan-