

SESSIONAL PAPER No. 25b

KLOTZ—INSTRUMENTAL EQUIPMENT.

Transit.—The transit (Fig. 1) is by T. Cooke and Sons, and known as No. 504 of their catalogue, 1900, with slight modifications. This instrument was specially ordered for the Transpacific longitude, and was received only a short time before departure for Vancouver, where it was mounted for the first time, and the large inequality of pivots discovered. It has an object glass of three inches, clear aperture, and is mounted in a tube of double conical shape with dew-shade; focal length about 36 inches, axis $1\frac{1}{2}$ inches in diameter, Y's $1\frac{1}{2}$ inches in width; the support of each end of the axis is two cylindrical segments having arcs $\frac{3}{4}$ inch long.

The telescope is provided with two $6\frac{1}{2}$ -inch setting circles reading by verniers to 20 seconds of arc. One of these circles is provided with a special arm for carrying the latitude level, when using the transit as a zenith telescope. Above the level there is a device for an attachable mirror, a strip of silver glass set in a metal frame. In using the transit as a zenith telescope the level readings cannot be satisfactorily read for stars near the zenith, as one end of the bubble will be directly behind one of the transit standards. To avoid parallax in reading the level, the mirror, secured at an angle of 45 degrees, and at the height of the eye, overcomes the difficulty.

A striding level is provided. The vial rests on cork tips, and is retained in position by light cork tipped springs. There is a glass covering to prevent sudden change of temperature of the vial. A single wooden knob on the level frame serves for handling the striding level. On account of the long legs it was found necessary to attach lateral legs to prevent accident from toppling over through gusts of wind or other cause. A dew-cap 6 inches long is used when observing. The eye-piece attachment carries a micrometer for the movable thread used for latitude work. The micrometer is divided into a hundred parts, equivalent to about 56 seconds of arc, so that by estimation to tenths of a division, about six-hundredths of a second of arc may be read. The eye-piece attachment with micrometer may be turned through 90° from the ordinary position when observing transits, in order to make the movable thread available for measuring zenith distances in latitude work. Instead of having a comb for counting the revolutions of the micrometer there is a small, toothed, geared and numbered wheel outside to effect the same purpose. This has the advantage of obviating erroneous counting which may happen with the comb in counting from left to right, instead of from right to left or vice versa.

Of the different eye-pieces with which the telescope is provided the same rectangular (erecting) eye-piece was used throughout. The eye-piece is set in a cross-slide with quick-traversing screw and milled-head.

There are on the diaphragm thirteen spider threads, two outside ones and then two groups of three each placed symmetrically about a middle group of five threads. The equatorial interval between two adjoining threads in a group is about 1.6 seconds of time. The illumination of the threads was effected through the hollow axis by an oil lamp, placed on an arm 9 inches long. To prevent unequal heating of the axis, a lamp was placed at each end of the transit axis. Lucca oil is found the most satisfactory for burning in the small instrument lamps.

The transit was supplied with reversing apparatus. The cast-iron stand rested on a base-plate and was supported by three large screws, one at one end and two at the other, fitting into spherical holes in the base-plate. For meridianal adjustment two opposing screws at the foot of the stand and near the supporting screws acted on a projection on the base-plate, the levelling was done by the single supporting screw at one end. The base-plate was not bolted to the cement capping of the pier. The weight of the whole instrument and plate was sufficient to retain the latter in a permanent position with reference to the pier.

Clocks.—Two clocks or rather chronometers were carried. They were adjusted to sidereal time. Both had break-circuit electrical attachments.

Dent No. 48419 had two-second breaks at the even seconds, omitting the 58th second break in order to indicate the 60th or minute break.