

THE ONE HUNDRED TWENTY FOOT PENDULUM AT MUNDELEIN COLLEGE

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From a point between the eighth and ninth floors in an unused elevator shaft of Mundelein College for Women, located on the north side of Chicago, a pendulum, the longest in existence, was suspended last June. It consists of a thirty-five pound chromium plated bob hung by piano wire, No. 35, from a bi-filar suspension known as the Longden suspension. It consists of two hard metal rollers about $\frac{3}{4}$ inches in diameter and about 4 inches long set at right angles to each other, one above the other. Separating the two rollers is a quartz plate $\frac{1}{2}$ inch thick and optically plane to within a half wave-length of the D line of Sodium. Held upright by this plate is a counterpoise to compensate for the difference in length of the pendulum in the two directions. This counterpoise may be run up or down on the threaded rod. When the counterpoise is properly adjusted, the period of the pendulum is the same in east-west as in north-south direction. The wire forms two loops at the top, one over each end of the upper roller which has shallow grooves cut near the ends, travels down the shaft for over 100 feet as a single wire, and near the bottom again forms two loops which carry the bob.

While the pendulum is swinging it travels over a recording table. This consists of a hard rubber top about 12 inches in diameter with an inlaid metal ring

about 8 inches in diameter. Graduations of 360° appear outside the metal ring. A platinum point projects from the lower surface of the bob and due to an electrical hook-up consisting of a high-voltage transformer and an interval timer, the circuit is closed every half hour. The circuit remains closed for 25 seconds during which time a spark travels from the platinum point through a sheet of sensitized paper to the ring in the top of the recording table, leaving several perforations in its path. The circuit is then broken for another half-hour period. The period of our pendulum is 12.258 seconds and its length about 123 feet.

While the pendulum is swinging the earth under it is rotating from west to east. To us it appears that the direction of the pendulum is changing. The rotation of the earth can be accurately measured by determining the displacement measured in degrees azimuth on the sensitized paper. Due to our latitude angle (Chicago, 42 degrees) the space swept through during consecutive half-hour intervals is 5 degrees. This angular velocity $\omega = 15^\circ$ per hour $\times \sin$ of the latitude angle, ϕ , and the time of one apparent complete revolution of the pendulum bob,

$$T = \frac{24^h}{\sin \phi} = 35^h.75$$