one 10 links above this, and one at top of rod, giving a clear distance of 25 links between the outside targets. The targets were formed of bright tin, and black rubber tacked on the rod. The tin reflecting light and the black rubber absorbing it, the division between them was very distinct. The lower targets, 10 links apart, were only used in measuring short distances, the outer targets, 25 links apart, being used in all other cases. If a distance of say 40 chains be measured on a piece of level ground or upon the ice, and the number of turns of the micrometer screw required to move the horizontal wire of the telescope from one target to another be noted, then as the base is very short as compared with distances to be measured, it may be considered to represent the arc which subtends the angle at the instrument, and this angle will vary inversely with the radius or distance. As, however, at different distances from the instrument the difference of refraction of the targets will vary slightly, it is necessary, in order to prepare an accurate table for reducing the observed readings to distances, to notice the actual readings at each chain of distance from 5 chains up to 50 chains, and interpolate the readings for differences of 10 links. The distances corresponding to any observed readings can then be at once obtained by inspection. To determine differences of level and establish grades on preliminary railway and other surveys, the telescope must be provided with a good spirit level, and the horizontal wire adjusted to define a horizontal line when the bubble is at zero. Then if we note the point on a rod at the distance of say 500 feet where this line strikes, and turn the micrometer screw through one revolution, the distance between the two points on the rod being measured, 1-5th of it is the rise or fall in 100 feet for one turn of the screw, and we can now prepare a table giving the number of turns required for various grades, also of the rise or fall in feet at different distances; these tables should include the effect of curvature and refraction. We also require a target rod consisting of two pieces sliding upon each other, in order that the piece carrying the targets may be pushed up or down, so that the lower target can be set at the height of the telescope above the ground, and clamped in position. The distance between the targets may be 5 or 6 feet, and a table for reducing observed micrometer readings to distances can be prepared in the manner already described. We are now prepared for surveying and obtaining the levels and distances along any preliminary line without the use of the chain or any other instrument. The mode of proceeding will be as follows: The instrument being set up at the starting point of the survey, and carefully levelled, the direction of the line is fixed by readings of the horizontal circle, the bubble of telescope level brought to zero and reading of micrometer noted, then the lower target being adjusted to the height of the telescope, the rod-man proceeds along the line and holds the rod at all points where any marked changes of inclination occur, the distance to each point being determined from readings on the targets; also the difference between the micrometer reading for level zero and the reading on the lower target gives the difference of level by consulting our table. We may also obtain the direction, distance, and difference of level of points on either side of the line referred to the Instrumental Stations, and without planting any stakes except at these stations, collect the necessary data for preparing a plan, profile and cross sections of the line, from which a location can be decided on, which would then be chained, staked and levelled in the usual way.

THOMAS MONRO, PRESIDENT CANADIAN SOCIETY CIVIL ENGINEERS.

Thomas Monro, President of the Canadian Society of Civil Engineers, is an Irishman by birth, and came to Canada in 1850. He was immediately employed under Thomas C. Keefer on various surveys—Montreal and Kingston Railway, St. Lawrence Bridge (now the Victoria), Montreal water works, etc., until 1854. From 1854 to 1856 he had charge of a portion of the G.T.R. construction at Prescott. From 1857 to 1859 he was assistant engineer on the Hamilton waterworks, and resident engineer on the Hamilton and Port Dover Railway. From 1860 to date he has been in the service of the Canadian Government as an engineer. During this period of over 35 years Mr. Monro has been engaged in some very important works, a *resumé* of which is as follows: In 1863 he was appointed one of the Government inspectors of railways, and in 1864 specially sent to report on the best means of supplying water to the Parliament and Departmental buildings at Ottawa. In 1868-9 he examined the east coast of Lake Huron and north shore of Lake Erie, with a view to the establishment of harbors of refuge, and also made a partial examination of the east end of the Dawson route as a proposed means of water communication with the interior. In 1870-71 he located the present new Welland Canal. The next year he was appointed engineer in charge of the Welland Canal enlargement between the lakes. This work was, however, subdivided, and Mr. Monro superintended the construction of the new line of canal north of Allanburg, on which all the lift locks are situated, and remained in charge up to the end of 1888, the canal being deepened to 14 feet. In 1889 he was specially sent by the late John Page to survey and report upon the question of locating a new canal between Lakes St. Louis and St. Francis. After much opposition this canal, named by Mr. Monro the "Soulanges Canal," is now in course of construction on the line recommended by him, and from his designs and specifications. Several important changes have been made in the plans of locks, weirs, etc., which it is believed will result in facilitating the passage of large vessels, and, by the general introduction of concrete, reduce the cost of the works. Mr. Monro has