The back and foresights from station 50 are also taken and recorded in a similar manner as from station 49; but the intermediate sights to points Nos. 14, 15, 16 and 17 have to be treated somewhat differently from the intermediate sights taken to station 50 and to points $9\frac{1}{4}$ and $9\frac{1}{2}$ from station 49.

Point 14 is too high up to be levelled to in one sight, hence the inclination has to be measured by means of the scale of tangents and the micrometer screw, the horizontal distance has however been determined in the most expeditious manner possible, viz. by using the relation $R = 100 \times \overline{AB} = 100 \times 8{\cdot}543 = 854{\cdot}3$ feet.

Here by pointing the optical axis to the 0 at the foot of the rod, the scale reading: 0·39752 obtains. But when the telescope is truly horizontal the scale reads: 0·49925, hence the tangent of the inclination from the instrument to 0 is ·39752—·49925 — 0·10173 and the rise to $0 = 854{\cdot}3 \times (0{\cdot}10713) = 86{\cdot}9079$ feet, which being deducted from the collimation 11·0506 gives 97·9585 feet for the elevation of 0 at point 14. Again, point 15 is too far off to permit of a rod being used without a sliding target and the same remark applies to point 16. We therefore take in the case of point 15, the scale readings (a), (b), (c), (d) determined by the sliding targets A, B, C, D fixed at figures 12·84, 7·14, 2·58 and 0·30 feet on the rod, and perform in column 8 the numerical operations required to deduce the distance from the relation $R = \dfrac{\overline{AB}+\overline{AC}+\overline{AD}}{(\overline{ab}+\overline{ac}+\overline{ad})}$ which represents in this instance: $\dfrac{28{\cdot}50}{0{\cdot}01729} = 1648{\cdot}35$ feet.

The elevation of point 15 is arrived at by multiplying the tangent of the angle made by the optical axis when directed down to the target fixed at 0·3 above the zero on the rod, with a truly horizontal line, viz.: $(0{\cdot}50352—0{\cdot}49925 = 0{\cdot}00427)$ by the distance 1648·35. This gives us 7·03845 which number plus 0·3 viz.: 7·33845 ft. must be deducted from the collimation to obtain the elevation: 3·71216 ft. of the zero point of the rod at survey point No. 15.

When the point of which we desire to establish the position and elevation is one of only secondary importance, such as for instance No. 16, it is sufficient to make two scale readings, viz.: $(d) = 0{\cdot}50146$ and $(a) = 0{\cdot}49518$, when the relation: $R = \dfrac{\overline{AD}}{\overline{ad}} = \dfrac{12{\cdot}54}{{\cdot}00628}$ gives us the distance: $R = 1996{\cdot}81$.

In this case the elevation of the zero point is equal to:
$11{\cdot}05050—[(0{\cdot}50146—0{\cdot}49925 = 0{\cdot}00221) \times (1996{\cdot}81) = 4{\cdot}41295]—0{\cdot}3 = 6.33755$ ft., the whole of which is worked out in detail in column 8, where the figures can be easily turned to for verification, if found necessary.

So far, no correction for curvature and refraction was applied, it being assumed that the elevations arrived at proved sufficiently accurate for all purposes.

When, however, we desire to determine correctly the elevation of a water surface, such as that of the brook at point 17, or the height of some other important point from a station on the continuous double line of levels, it becomes necessary to take the effects of the earth's curvature and the refraction of the atmosphere, into consideration, and to apply corrections accordingly.