

ment. It therefore follows that, to obtain the best results with a telemeter, a really first class telescope, with powerful lenses, is necessary, and any telemeter telescope not fulfilling this condition should be promptly rejected. The instrument used by the writer gives a very clear reading at 1,200 feet distance (horizontal). It may here be noted that the distances obtained by telemeter pairs are in all cases horizontal ones between rod and instrument.

For setting out railway curves, the maker combines a graduated horizontal circle with the gradient limb or cam at a small additional cost, thus adding to the instrument's efficiency. For setting out distances the subtense method is used, based on the following rule:—

If any two integers whatever be taken and used as divisors into the distance required, the result will be a gradient pair, which, being applied as any ordinary pair, will give on the rod a subtense in feet that is equal to the difference between the two selected integers.

Example (selected integers 2 and 9)

$$\begin{array}{r} \text{Distance } 150 \text{ feet } \div 2 = 75 \\ \text{'' } 150 \text{ '' } \div 9 = 16\frac{2}{3} \end{array} \left. \vphantom{\begin{array}{r} 150 \\ 150 \end{array}} \right\} \text{Gradient pair.}$$

Difference 7 giving subtense 7 feet.

METHOD OF WORK.

The gradient pair is 75 and $16\frac{2}{3}$; set up and send out rodman in direction of required line; move index to 75 on gradient limb and take reading, which assume to be 10.42 feet; unclamp and set index at $16\frac{2}{3}$ and take second reading, which should be 3.42 feet, if the rod is exactly 150 feet from instrument; but as this is most important in ordinary work, it will be found necessary to move the rodman nearer or further until the subtense representing distance required is read on rod. Where distance to be set out is a constant one, a table of subtenses, with integers and resultant gradient pairs, can be easily prepared beforehand. The greater the subtense the more accurate the "setting out" will be.

Regarding the accuracy of telemeter levels, the writer's experience is that the checking in is not usually so close as with an ordinary level, but that there is a certain amount of "give and take," which limits the difference to within 1 foot in any distance of consequence, such as 75 to 100 miles. The rodman is a most important factor in obtaining satisfactory results, and should be selected with careful judgment. A rod-level should always be attached to the rod in the field, as a truly vertical position at right angles to the line of sight is absolutely necessary, or, in other words, a plumb-line suspended at the side of rod should strike the