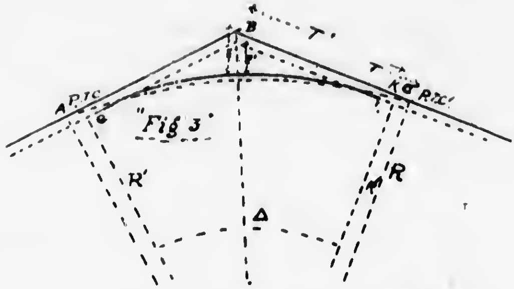

If the front tangent has not been located, in beginning the circular curve proceed as follows. Set up transit at offset distance inside the tangent, or at the P. C.; backsight to a point similarly offset; then run the curve as usual. At the P. T. the operation will have to be reversed. If, on the contrary, the front tangent has been fixed, T^1 and not T, must be measured from the vertex to locate a point from which to lay off F from the P. C., $T^1 = (R+F) \tan \frac{\triangle}{2}$, and is found, from fig. 2, as follows:

$$T^1 = HB + HO$$
$$= R \tan \frac{\triangle}{2} + F \tan \frac{\triangle}{2}$$
$$= (R+F) \tan \frac{\triangle}{2}$$
$$\text{or } = T + F \tan \frac{\triangle}{2}.$$

Here we have $\triangle$, D and F given.

As the figure indicates, the circular curve is moved parallel to itself to a distance F, from its former position, in order to make room for the transition curve. The new curve then has an external distance, with reference to the old tangent, equal to or slightly less than the old, the offset being small. Thus $E^1 \overline{\overline{<}} E - \frac{F}{\cos \frac{\triangle}{2}}$. From Searles' Table VI we may take the E for a 1° curve; divide this value by E^1 for D^1, and then change the latter value enough to avoid fractional minutes, before finding the length of the curve and T^1.

In case the new curve should fit the roadbed better by extending as far outside the old curve at centre as inside at the P. C. we would have:

$$E^1 = E - \frac{F}{\cos \frac{\triangle}{2}} - \frac{F}{2}.$$

Another important case arises where a transition curve is to be put in on old track, the new track being same length as the old. This is to prevent cutting the rails. In fig. 3 let

$$BC = T = R \tan \frac{\triangle}{2}$$
$$\text{and } BK = T^1 = (R^1 + F) \tan \frac{\triangle}{2}.$$

The arc AC = length of old track
$= R\triangle^\circ$ arc 1°
and arc $GL = R^1 \triangle^\circ$ arc 1°.

Now, the length of new track from A to C, the transition curve being put in, is equal to $GL + 2\,(BC - BK) + 2\,(e + e^1)$, therefore by substitution we get $R\triangle^\circ \text{ arc } 1^\circ = R^1 \triangle^\circ \text{ arc } 1^\circ + 2\,R \tan \frac{\triangle^\circ}{2} - 2\,(R^1 + F) \tan \frac{\triangle}{2} + 2\,(e + e^1)$, therefore

$$R^1 = \frac{R\triangle^\circ \text{ arc } 1^\circ - 2\,(R - F) \tan \frac{\triangle}{2} - 2\,(e + e^1)}{\triangle^\circ \text{ arc } 1^\circ - 2 \tan \frac{\triangle}{2}}.$$

The following will show the use of the above equation. Find the data for a transition curve where the track is already laid on a 6° curve, 800 ft. long.

Taking 25 ft. of transition curve per degree we have $c = 2 \times 150 = 300$. Then from the tables we get F=3.92 ft.; $(e + e^1) =$