NOTES ON STAKING OUT TRACK CONNECTIONS.

The solution of maintenance engineering problems in railway work is well treated in an article published in the January 24, 1913, issue of the Railway Age Gazette. This article is written by W. H. Wilms, and is here given in full.

The ordinary field book is of slight value to the engineer engaged in maintenance work in the solution of track problems. None of the problems presented in such books have been solved with a view to practical application. Following the methods outlined in these books, it is not uncommon, for instance, to see new sidings staked with the initial curve tangent to the centre of the track from which the turnout leads, although a little study will show that the curve is not necessarily tangent to the frog, and unless it is tangent, an elbow must be thrown in the curve, or a piece of tangent introduced, depending on whether the curve beyond the frog is of less or greater degree than the curve back of the frog. In either case, the siding presents a bad appearance and in case of an extremely sharp curve and close quarters, the engineer would probably find the siding could not be operated until relocated. The only field book that has attempted to treat track problems with a view to practical application by means of a so-called "reference curve" makes such problems really more complicated than they are. In the following notes only such problems as commonly occur in practice are given, leaving it to the ingenuity of the engineer to modify these methods to meet his particular requirements in more complicated cases. While no claim to originality is made in the solution of these problems, it is believed a number of them will be new to not a few engineers.

Switch Leads.—From both the operating and maintenance standpoints the installation of turnouts leading from curves is to be avoided whenever practicable. When the installation of a turnout on the outside of a curve is unavoidable, the switch leads should be made straight wherever it is possible

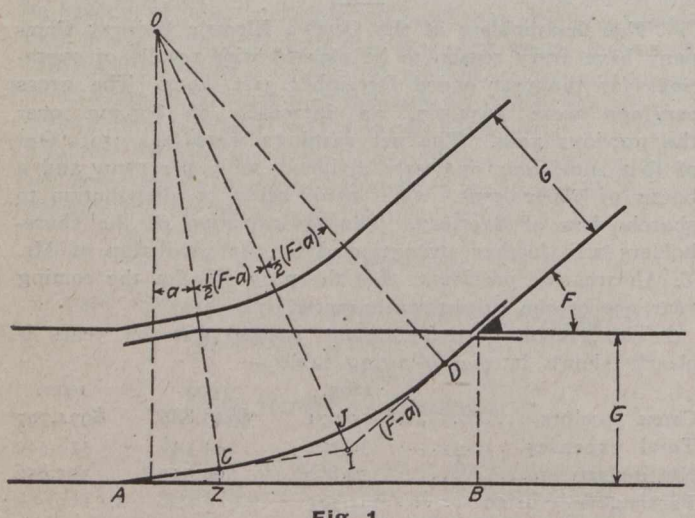


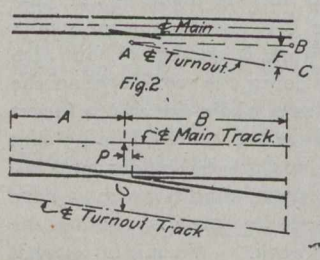
Fig. 1.

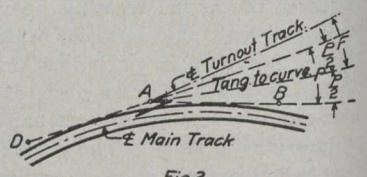
to do so, as the benefits in safer operation and decreased maintenance of the switch by using straight leads are very pronounced. Often a slight change of alinement or the substitution of a different size frog will readily effect this.

Of equal importance is the reduction to a minimum of the curvature in the leads of a turnout on the inside of a curve. This also can often be effected by slight changes in alinement and the substitution of a higher frog number.

Also, for similar reasons, the alinement of the turnout track immediately beyond the frog is of importance. Where a curve is necessary it should, if possible, be of the same degree as the curvature in the lead; otherwise there results the objectionable feature of a change in curvature in a very bad place, which not only looks bad but is apt to be a constant source of trouble in operation and maintenance. This is especially true where the curvature is sharp and connections close.

In order to obtain a solution to such problems as the above where the alinement of the switch lead is taken into consideration, it is quite necessary to know the actual length and degree of curve of the leads of the road's standard turnouts from straight track. Knowing the length of switch rail,





No.	Angle.	A	B	C	D	p	Lead.

Fig. 4.

spread at heel of switch and length of frog from theoretical point to toe, the length and curvature of the lead are readily obtained from the following formulas:

(From Manual of Am. Ry. Eng. Assoc.).

F = Frog angle
W = Length of wing rail of frog
S = Length of switch rail
H = Heel distance of frog
G = Gauge of track
R = Radius of centre line of lead curve
a = Switch angle

$$\text{Lead dis. AB (Fig. 1)} = (S - W)\frac{\sin \tfrac{1}{2}(F - a)}{\sin \tfrac{1}{2}(F + a)} + G \times \cot \tfrac{1}{2}(F + a)$$

$$\text{Radius of lead curve} = \frac{G - H - W \times \sin F}{\cos a - \cos F} - \frac{G}{2}$$

Having once computed this data from the road's standard frog numbers, the engineer should place it in his field book for future reference.

Significance of Stakes.—Due to the fact that many track foremen and supervisors have to work to stakes set by many different engineers, some of whom make it a practice to set stakes indicating the location of a frog on the rail line at the theoretical point and others who set such stakes on the centre line of track opposite the actual point, costly mistakes sometimes result. To avoid such trouble, it is a good plan to have some definite system of marking and setting stakes, and after the tracks have been staked out to go over the layout with the track foreman and explain to him the significance of the stakes, so that when track laying begins there will be no chance for mistake or confusion. In most cases it is unnecessary to take into consideration the difference between the theoretical and actual points in the location of a frog. There are a few cases, however, where a failure to observe this difference would result seriously. For example, in the location of the frogs of a No. 10 crossover between parallel straight tracks, 13 ft. centre to centre, where the track is straight between frogs, the distance from theoretical to actual point of a No. 10 frog with a ½-in. point is 5 in. Now, if stakes are set for theoretical points and the foreman sets the actual point of frogs to these stakes—a thing he is very likely to do unless the significance of the stakes has been explained