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RAILWAY SWITCHES AND TRACK LAYOUTS

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In the past few years a great deal of attention has been paid to the design of railway switches and turnouts. It is not so very many years ago since railway engineers put in "any old thing" for a switch, whereas in these days of scientific refinement it is a subject which is dealt with on a proper mathematical basis. It is not the writer's intention here to deal with a number of abstruse mathematical calculations, but to give a general description of the construction of switches and their assembling in groups to give yard layouts, and the problems that railway men have to contend with in designing these layouts.

A brief description of the construction of a standard switch with the names of the various component parts is first necessary. Referring to Fig. 1, the switch is made up of two switch points "aa," a frog "b," two guard rails "cc," and the connecting or closure rails "d," the through rails "ee" are called the stock rails; "ff" are the points of the switch, "gg" the heel of the switch, "h" is the toe of the frog, and "i" is the heel. The distance from the point of switch "f" to the point of frog is called the "lead."

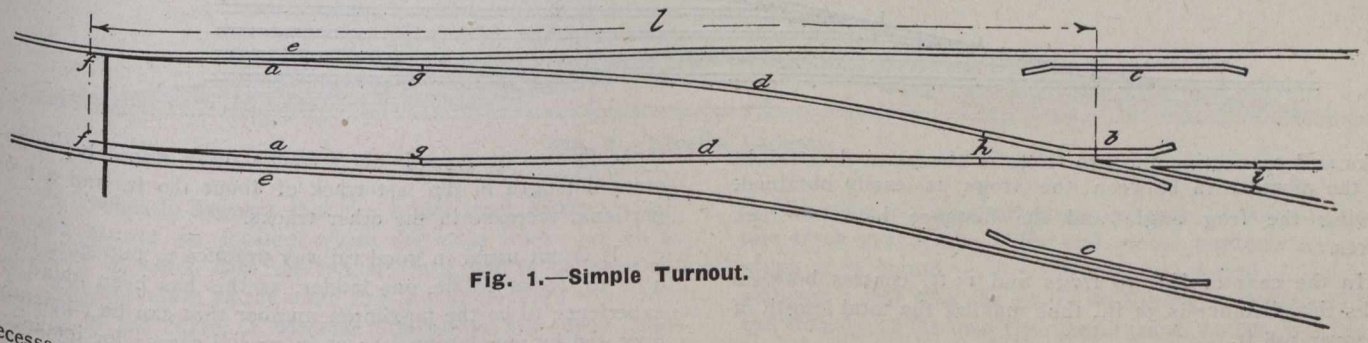

Fig. 1.—Simple Turnout.

Attached to the inside of the outer rails opposite the frog are two guard rails, varying from 8 to 12 feet long, placed there to control any side-play of the wheels passing over the frog, and so preventing the flanges mounting the rail instead of passing the point of the frog in the flangeways provided.

These guard rails are usually made from standard rail and are fastened to the running rail and the ties by special castings. The ends of the rails are splayed outwards to facilitate the passing of the wheel flanges into the flanges.

The two features which vary in different switches are the angle of the frog, and the lead. The frogs are always designated by a number, which denotes the inclination of the turnout rail to the main track, e.g., a No. 7 frog means that the two legs are inclined at an angle of 1 in 7. Now, the frogs in general use for ordinary railway work are as follows:

Frog No.	Angle.
6	8°–48 ft.
7	8°–11 ft.
8	7°–9 ft.
9	6°–22 ft.
10	5°–44 ft.

The No. 6 frog is only now being used in very exceptional cases, as it has been found to require too sharp a curvature to be able to accommodate the large equipment in general use; the No. 7 frog is also being largely discarded except on branch lines and freight tracks. The No. 8, 9 and 10 frogs are in general use, and in some cases frogs as flat as the No. 12 are used, such as for main line connections from a through main line to a local.

The switch points are usually made about 15 feet long, but a number of roads are adopting the 16-ft. 6-in. points in order to give an easier riding switch. They have a "throw" of 6 inches at the point, and at the fixed end there is a distance of 5½ inches from guage line to guage line of the two rails.

Now, after the frog and the points are selected they have to be connected with a curve on one rail and a piece of straight track on the other, or even a curve on both rails, as the case may be, but taking the case of one straight track and the curved turnout, the switch points and frog have to be spaced at such a distance apart that a curve of uniform radius will be tangential to the heel of the switch and the toe of the frog. The distance apart of the point of switch and the point of the frog (the lead) and the equivalent radius and degree of curve is given in the following table, for use with 15-ft. switch points:

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