Contents of this issue on page 715

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SUPERELEVATION OF BRIDGES.*

Superelevation of the outer rail for curves on bridges may be obtained by one of the following general schemes, or a combination of two or more of them:

1. By building the masonry bridge seats out of level or by using bevelled shoes of different heights under the bridge bearings, as in Fig. 1.

2. By building the stringers or girders supporting the ties so that their tops will be out of level (Fig. 2).

3. By capping the trestle bents, either pile or frame, out of level or the equivalent of using a tapered cap, a tapered shim on a level cap or by tilting a framed bent on inclined footings (Fig. 3).

4. By tapering the ties, as in Fig. 4.

5. By shimming under the ties, as in Fig. 5.

6. By shimming under the high rail, as in Fig. 6.

Thirty replies were received to a large number of circulars sent out by the committee and the first five methods above received approximately equal numbers of advocates. No. 6 has no supporters.

Ballasted-floor bridges are not here specifically considered. They solve the question of superelevation at once, without special consideration; although for bridges of this class on curves some provision should be made to prevent trackmen or the action of trains from throwing the rails from their exact prescribed position, else there may be trouble from improper clearance.

1. In Fig. 1 the girders are inclined from the vertical. For moderate elevation it is advocated by twelve replies. Some doubt the advisability of this inclination, on account of the action of the live load; but one thoroughly competent engineer considers that the girders in this position support the loads more conformably to the calculations. It is likely that high speed trains will strain the transverse bracing less, and slow trains more, than if the girders were vertical.

Several object to Sketch "a," on account of the difficulty of building the masonry. If of concrete, however, such difficulty is not apparent. Many advocate securing part of the elevation in this way and the balance in the ties.

Several replies class this scheme as bad practice. It is of course out of the question for truss spans.

2. Thirteen replies favor the scheme in Fig. 2. A few object to it on account of dapping the ties across the grain. Cases are numerous where ties have split when so dapped, necesitating bolts. The scheme is applicable to deck and through girders as well as to truss bridges.

3. The method shown in Fig. 3 applies only to timber trestles, either pile or frame. Fifteen approve one style or other of this figure. A few object to "a" as difficult framing or as being unsightly. Plans "b" and "c" require an excess of timber, and "c" furnishes a bad joint for inducing decay.

Plan "d" is advocated by only one reply. The purpose of this style seems to be to secure square framing.

The committee is not a unit on this matter, but those having the largest number of trestle bridges prefer Style "a," and experience no difficulty in its use.

4. Seventeen expressed approval of some style of tapered tie (Fig. 4). All should have a certain minimum depth under the low rail equal to the standard for the stringer spacing in its use.

Several members object to tapered ties of any kind, holding that the regular stock size for straight-line bridges should be used in all cases to simplify labor and material carried for repairs.

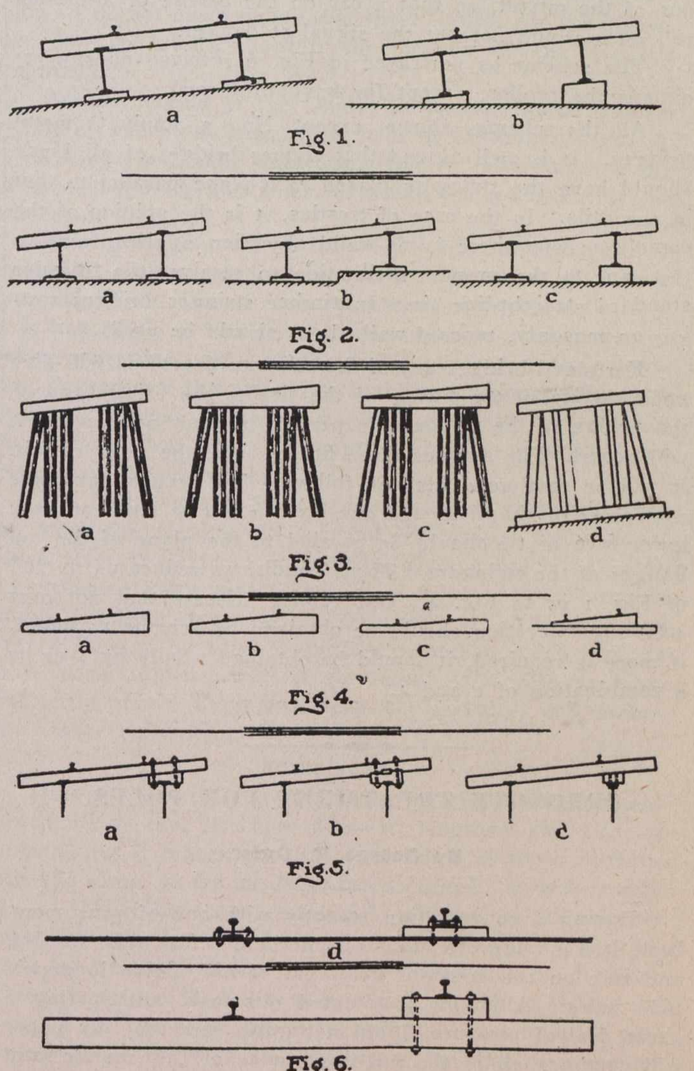

Fig. 1.

Various Methods of Securing Superelevation on Bridges.

Style "b" allows the use of a smaller stick than "a" for a high elevation and is just as efficient.

Style "c" is the standard on the Boston & Maine road for metal bridges. It is somewhat expensive, in that it has to be adzed to shape; but bridges on curves are of no great length and the labor item for a given bridge is hardly appreciable. Its advantage is that the depth at the thin end is not reduced too much for properly holding the guard timber, and the low rail is not canted away from the traffic, as it is on all other inclined ties.

*Committee Report to the annual convention of the American Railway Bridge and Building Association, October 18-20, 1910.