

Theoretically, the flange pressure to overcome center or side-plate friction on double trucks only takes place on entering and leaving the curve, assuming that this is not compounded. The trucks not being absolutely rigid, there is some "give" in them, and consequently flange pressure from this cause will exist all through the curve, though, of course, to a much greater degree at the two ends. To sum up, one cannot assume a minimum rail and flange wear with double trucks, especially of the side-bearing maximum traction type.

Previous to the introduction of the standard types, most of the curve rails had vertical sides to the lip or guard. Consequently the wear of the lip and flange was very rapid until the angle of wear (12 degs. to 16 degs.) was reached. Unfortunately, there was then very little lip left, and renewals were consequently unnecessarily rapid. With the standard type of curve rails much better results will be obtained. Perhaps, in the near future, curve rails will be rolled of a more suitable material, say nickel steel.

CONSTRUCTION

As already stated, the concrete type of construction is, and in all probability will remain, the standard in Great Britain. There are two ways of setting the rails on the concrete, each of which has its partisans. In one case the concrete is laid to within, say, an inch of the proper surface for the base of the rail, and the rails are then laid on the concrete and surfaced by blocks or wedges. The space between the base of the rail and the top of the concrete is packed in with fine concrete. The principal disadvantage of this method is that the surfacing of the rails to the required levels may diminish the packing space to such an extent that only a very thin skin of fine concrete can be placed between the base of the rail and the foundation, properly speaking. The vibratory action of the rails due to the car traffic, may crack, pulverize or otherwise injure this thin layer of concrete or mortar. The other way is to block up the rails to the required levels first, and then place the concrete in one operation. To do this the concrete needs to be made rather wet, so that it will have the characteristics of a quaking mass. The concrete should also be carried up beyond the base of the rails on each side, and worked well under the rails, and then all smoothed off with the shovel before it is set. If the work is properly done, this method should give the better result.

Great care should be exercised that the foundation on which the concrete rests is sufficient to properly carry the cars and regular street vehicular traffic. If the foundation is insufficient there will be settlements of the concrete, and consequent damage to the work. It is a trying problem to the engineer to know just what to do in case the sub-soil looks at all treacherous. Additional depths of concrete will answer in some cases where the settlements are not uniform, but in small pockets. The concrete in this case will act as a bridge or an arch to carry the load over the weak spots. In case uniform settlement is to be expected, a tie construction would be the safest. This would be on the principle that there will be a settlement, and that the cheapest means of resurfacing the track one or more times until all the settlements have taken place will be to lift the rails and ties and repack under the latter. In this case, of course, concrete between the ties for paving foundations would be inadvisable. Broken stone ballast would be the best for temporary purposes until all settlement had taken place, and then finally the whole could be permanently concreted. If a concrete foundation is required at first it might be practical to use ferro-concrete under and beyond the track for the purpose of increasing the bearing surface of the track without using a prohibitive depth of concrete. Fortunately, such cases are comparatively rare, and when they are met there must be some extraordinary means taken to prevent settlement and consequent damage to the work, or, on the other hand, to recognize that this will occur and design the roadbed so that the repairs can be made later at a minimum cost.

Many are familiar with the novel type of construction used at Hull, in which the rails were laid on concrete, but between the base of the rail and the concrete was a creosoted Baltic red-wood stringer 4 ins. deep and 7 ins. wide, to provide elasticity, and consequently a less noisy and perhaps easier riding track. The rail used has a center groove, and the wheel has two treads and a center flange. The joints are mitered to an angle of 45 degs. The engineer of this line, Mr. White, writes "that comparatively little trouble has been experienced with the rail-joints, and the rhythmic hammering of the car wheel as it passes over the joint is not heard on the Hull system in the same way as in most other systems which have been in operation for any length of time with ordinary joints. The two routes first constructed have now been running for over five years, and, until during the last few months, the rail-joints have had practically no attention. We are now, however, having them all tried over with a straight edge, and all joints which are in any way loose, or show a depression of more than 1-16 in. on a 5-ft. stretch with the straight edge, are being opened out, packed where required, and tightened up." Mr. White further points out that, making due allowance for extraordinary expenses connected with the maintenance of the permanent way, there is left a sum of £700 for ordinary maintenance. This for a car mileage of 2,500,000 makes an expense of .067 pence (.134 cents) per car-mile, which is only about one-quarter of that usually found on tram lines that have been running for this period, which is certainly very satisfactory. Personally, I believe that this result is in a great measure due to the care which must have been exercised originally in the construction of the lines, and that the special features of the construction if contributory to the good results are only so in a minor degree.

There is a very marked tendency in permanent way construction now to anchor firmly the rails to the concrete bed. The object of this is to prevent the working of the rails under the rolling action of the cars. The principal disadvantage in the vertical motion of the rails is to produce a joint between the abutting paving and the rails. Whether anchoring will prevent this, and, if so, what form of anchors should be used, and the requisite spacing, will have to be determined by experience. There is one thing that is quite evident, viz., that the amount of movement is slight, and that any anchor which allows the slightest play between it and the rail, or between it and the concrete, will not be efficient.

A peculiar accident occurred on the Columbus, Newark & Zanesville Railway recently. A short distance out of Zanesville the line crosses a long trestle over the Licking River. A lady who lived a short distance from the trestle on the Zanesville side asked the conductor on paying her fare to let her off at the stop before the bridge. For some reason or other the car ran beyond the stopping point and came to a stop on the bridge, the motorman evidently intending to back up to the station. The conductor was forward in the smoking compartment when the car came to a stop, and started back to help the lady alight, as it was a dark night. He found to his horror that she was not on the platform, although he had seen her leave her seat. Investigation showed that she had stepped from the car, fallen into the river 60 ft. below, and had been killed instantly. The officials of the company claim that the woman alighted from the car while it was in motion and before she had been notified that her station had been reached.

The New Orleans Railways Company is operating a new line of cars known as the "Camp Street Route," which relieves the congestion of the Magazine and Coliseum lines. The extra cars are operated on the tracks of the Magazine line up Camp Street into Magazine as far as the Arabella car house, which is the terminus, and down Magazine into Camp to Canal Street.