ON THE ISSUE OF LONG RAILS AND SLOPING JOINTS

Published in № 35–36 (1896) of «Rail business» note about decision of September meeting of the American road masters concerning long rails with sloping rail joints deserves attention, as the opinion of practitioners, working for many years on improvement of railway track. Recently, it has become known on particular importance of track superstructure in achieving increased speed of trains, coupled with complete safety, and therefore all attempts to improve a railway track should be welcomed, as something very desirable, promising in the near, perhaps, future great success in development of rail communication.

American road masters, mostly practitioners are little familiar with higher mathematical analysis. The position of American road master is synonymous with a division head; but, yielding in education level to a division head, the American road master by virtue of narrow specialization, to which he dedicated himself, and outstanding abilities, which provided him with acquisition of the mentioned position, often has a lot of practical information in maintenance and repair of a railway track, not always known to his more knowledgeable colleagues.

At the previous meeting, opinions of road masters were divided and the majority voted against the use of rails with a length of 60 feet and sloping rail joints. A motivational reason for this decision of the majority was, apparently, not very successfully rolled first batch of 60-foot rails and unsatisfactory service of rails with sloping joints.

The first part of decision of the majority of the meeting cannot be, it seems, recognized

right. The first batch of 60-foot rails, already due to novelty of the case, was obtained with some imperfections, which with subsequent rolling of rails may not emerge. On our Russian roads, e.g., in emergence of railways were laid 18-foot rails, because it was recognized very difficult to manufacture rails of a greater length; then the length of the rail was brought up to 20 feet, many years passed before it was managed to produce 28-foot rails, and only in recent years emerged 35 feet and even 40-foot rails, and there is no reason to believe the latter length to be marginal. 60-feet rail has such undeniable advantages, that it would be highly desirable to continue to experiment with this rail. In addition to savings achieved as a result of reducing the number of plates and bolts of a mile per way from laying of 60-foot rail emerges a more rugged track, as less weak places of joints appear in it. Depending on reduction in the number of joints a corresponding reduction of damages in locomotives and rolling stock can be expected. As for a concern that long rails are more susceptible to longitudinal creeping, elimination of this creeping hardly represents great difficulties. It is generally recognized that creeping of rails occurs in the direction of prevailing movement of trains. Resistance to this creeping is made by iron spikes hammered in butments of compromise splices; for long rails the number of such iron spikes per a mile should reduce and it is possible that as a result of this will increase observed creeping; but the Americans also invented a rather ingenious way to counteract such creeping by screwing on each link of rails intermediate, short, angled beams which with a horizontal shelf bump into iron spikes, and thus resist longitudinal movement of rails. In passing, I note that some resistance to longitudinal creeping of rails should have also decrease in horizontal size of bolt holes in the rails; It would be enough to limit this size with the size of bolt diameter. 6 or 7 millimeters in any case are sufficient for free rail length measurement due to temperature variations.

Turning to sloping rail joints, it must be said that this joint is nothing new, tested even in the emergence of railways in England and then there it was found unstable. Nevertheless, the idea to get a railway track with a continuous thread surface makes many theorists now, little familiar with the history of rail business, see in a sloping joint means of achieving completely

smooth movement along a track. In fact, in case of sloping junction – due to convexity of a rail head, a narrow area of contact of the head with a wheel tyre and inherent in fastening of rails at the joint of motion of all these rail edges during train passage –not achieved the desired compactness of thread surface. But, beyond that, a sloping joint is so fragile that all its advantages, even if they did exist, should soon disappear. If we take for example a rail of government type, weighing 221/2 pounds in linear foot, then with width of its head of 53,5 mm and rod width of 13 mm, overhang of the head above the rod turns in 1/2 (531/2–13) = 20,25 mm. In sloping joints this overhang of a head above a rod is: in bevel angle 45° – in 28,64 mm; 55° – 35,30 mm and in 60 ° – in 40,50 mm. These significant overhangs of a head over a rod greatly increase stress momentum of a head and a rod. Garman, speaking of this joint in his work on rails, among other things points out that implementation of this joint is unthinkable without significant thickening of a rail rod and therefore should be considered unprofitable.

In № 43–44 «Rail business» 1896 I gave explanations concerning reasons of shock felt in joints of rails, and expressed confidence that there were no pumping joints in a way and shocks would almost be not felt. In rail joints of just laid new track all shocks are inobservable and this fact was repeatedly drawn to the attention of passengers, asking why after shocks from which glasses rattled, suddenly you get an impression as if a train is rolling on a carpet. Then, after damage of tracks and subsidence of joints begin to be felt shocks, and these shocks manifest equally, whether a joint is rectangular, beveled or other any.

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