Water troughs

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Water troughs, once an interesting feature of our railways, have now been redundant for a third of a century. Very little remains of them physically and only a small proportion of railway enthusiasts can actually recall having seen them, partly from the passage of time but also because some railways did not use them. I grew up on the route that pioneered water troughs and I assumed that all main lines were equipped with them every few miles, but in fact some of the pre-grouping companies did not install them at all while others had only a few placed at fairly infrequent intervals. The water trough was invented in 1860 by John Ramsbottom, Locomotive Superintendent of the LNWR, at the time when railways had emerged from their initial development stage and the main companies were aiming to cut times between principal cities by running faster trains with less stops.

The first installation in 1861 was at Mochdre in North Wales on the Holyhead line that handled the important Dublin service connecting with the LNWR steamships. The Post Office contract for the Irish Mail required an average speed of 40 mph and with the maximum at that time being about 50mph the train needed to run the 85 miles between Chester and Holyhead non-stop. Engines were usually changed at Crewe; 158 miles from Euston, then came the run to Chester and Anglesey, 106 miles in 2 hours 5 minutes, much of it on the fast flat line along the North Wales coast. The normal passenger locomotive then in use was the “Problem” class 2-2-2 (“Lady of the Lake”) weighing in at 24 tons plus 20½ tons of timber framed tender carrying 1500 gallons water & 3 tons coal. Some tenders had been specially modified to take 2000 gallons thereby adding about 5 tons to their weight. Increasing loads and speeds had pushed up water consumption on this stretch to 1900 gallons, more in bad weather, requiring a 2500 gallon tender. The train was loaded to not much in excess of 100 tons so the total weight of the Dublin express was 150 tons, however one third of this was the locomotive itself whose weight was being trundled about the country uselessly since it was not load that produced income, this did not seem to bother other companies but at Euston the idea of hauling more water was unthinkable and so it had to be picked up *en route*. The water trough was born.

As we know, like most good ideas, it was very simple and reliable. All that was required at each location was a U-shaped open top pan, 15” wide, 6” deep about a quarter of a mile long, laid in the “four foot”, and fed with water from an elevated tank under the control of a float valve, from which water could be skimmed by a hinge-down sheet steel scoop below each tender. The speed of the train was sufficient for the lip of the scoop dipping about 2” into the water to lift hundreds of gallons in a few seconds, no great speed was required since under test almost 1000 gallons were lifted at 15 mph, 40 mph was ideal and in fact less water was obtained at high speeds due to spillage. Although a simple idea in principle there were a couple of tricky things to consider, the first was to find a location somewhere in the required area where the track was absolutely flat for about half a mile (obviously water runs out of one end of a sloping pan) and the other was to have an adequate supply of good quality water adjacent to the track. These conditions sometimes made it difficult to install troughs at the optimum places and almost impossible at all on hilly routes: the only level section between Manchester and Leeds is inside the 2 miles of Standedge tunnel, so that is where the troughs went. There is a general belief that the fireman lowered the scoop below rail level once over the trough but in fact when fully down the scoop was still 3” above rail level and it was lowered into the water by the simple expedient of dropping the level of the railhead by 6” at the start of the trough and raising it before the end. If for any reason the scoop could not be pulled up against the force of the water it would still be lifted

clear of the rail before the end of the pan was reached, although the train could not continue far as the scoop would strike objects above rail level in the “four foot”, such as the wooden protection over facing point locks. The suspension of the scoop was deliberately designed as flimsy as possible so that it could be ripped off without damaging the train if it did strike an object.

After the success of the initial installation the North Western went about equipping its main routes at nominal intervals of 30 miles finishing up with a total of 18 installations. This was a closer spacing than any other railway subsequently used but as it offered a refill roughly every 30 minutes footplate men were spared any concern about poor or missed “dips” from low water level or double heading. Although Crewe tenders were small compared with other railways (1800 gal in the 19th century, then 3000 gal) they still provided water for well over an hour of hard work.

Ramsbottom licensed the patent but other railways were not eager to take advantage of the idea, in some cases because operating circumstances were different. The GWR looks like an obvious candidate but, in reality, only the line to Exeter via Bristol after re-gauging was suitable for non-stop running but this could not actually be practised until the Swindon refreshment contract had been bought out. The GWR constructed direct line cut-offs to the west and north in the early years of the 20th century so long runs then became possible and troughs were laid down, but the GW opted for intervals of 40 to 50 miles. GW tenders were bigger, even so 3000 & 3500 gallons sufficed (4000 gal later) as engines were more efficient, but margins were tighter, during the 1910 exchange the LNWR “Experiment”, a saturated engine with 3000 gal tender, ran out of water on the Western route! The Midland under Johnson went to the extreme of equipping Singles with 4500 gal bogie tenders, which at 51 tons outweighed the engine. Increased loads in the Edwardian years drove them to putting in a few troughs, but even then, they were 60 to 70 miles apart so small 4-4-0 engines pulled 3500 gal tenders, albeit on 3 axles. Another route with long through runs that could make good use of water troughs was the GNR / NER / NBR East Coast line and widely spaced troughs were laid down as soon as Ivatt´s hungry Atlantics were put on to expresses. Gresley’s larger but scarcely more efficient engines were given 62 ton tenders on four axles carrying 5000 gallons to bridge the intervals. The LNER fast services in the 1930´s weighed in at about 300 tons so that the 150 tons of engine & tender represented one third of the total weight to be moved: exactly what had concerned Ramsbottom 70 years previously.

At the final count there were 56 water trough installations: LNWR 18, GWR 13, MR 5, L&YR 9, GNR 4, NER 2, GCR 2, GER 2, GSWR 1. The East Coast total of 6 is surprisingly low but it reflects their wide spacing and the 9 troughs on the Lanky seem a lot for a regional railway, but it is probably due to the relationship with Ramsbottom and the extensive use of tank engines for medium length runs. Apart from the rusty tower in a field at Castlethorpe (Northants) all that remains are fading memories of getting soaked at open windows.